

**Kooragang Water Pty Ltd**

**ACN 609 789 808**

**KIWS-IMS-DOC-006  
Infrastructure Operating Plan**

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## 1. Introduction

Kooragang Water Pty Ltd (**'KWPL'**) holds a Network Operator's Licence number 22\_046 issued under the *Water Industry Competition Act 2006* (NSW) (**'WICA'**) under which it owns water infrastructure that forms part of the Kooragang Industrial Water Scheme (**'KIWS'**). This document, Kooragang Water's Infrastructure Operating Plan, has been developed to satisfy the requirements of the *Water Industry Competition (General) Regulation 2008* (NSW).

### 1.1 Kooragang Industrial Water Scheme

The Kooragang Industrial Water Scheme consists of:

- extracting secondary treated effluent from Hunter Water's discharge pipeline between the Shortland Wastewater Treatment Plant and the Hunter River;
- treating the effluent to produce high quality recycled at the Mayfield Advanced Water Treatment Plant (**'Plant'**); and
- transporting recycled water from the Plant, through a distribution network (**'Network'**) to customers on Kooragang Island (**'Customers'**).

The scope of the Kooragang Industrial Water Scheme is shown in **Annexure A**.

The KIWS is underpinned by a 30-year Supply Agreement between KWPL and Hunter Water which enables KWPL to extract a minimum of 12.6ML/day of treated effluent from Hunter Water's discharge pipeline.

KWPL owns the Plant and has entered into an Operation and Maintenance Agreement with Suez Water & Treatment Solutions Pty Ltd (**'Suez'**) who is responsible for maintaining and operating the Plant and Network.

The contractual structure of the Kooragang Industrial Water Scheme is depicted in **Annexure B**.

KWPL is a member of the coNEXA group of companies (**'coNEXA'**) and through its various subsidiaries, coNEXA provides the resources, skills and expertise required for KWPL to deliver the KIWS.

## 2. Executive Summary

This plan explains how Suez manage the infrastructure assets to best satisfy the contractual and relevant regulatory requirements for the Kooragang Industrial Water Scheme.

This plan complements the KWLP Recycled Water Quality Management Plan, as well as the Suez WHS Management Plan, Environmental Management Plan, Quality Management Plan, Water Quality Management Plan, Standard Operating Procedures, and Asset Management Plan in relation to KIWS.

The key features of Suez's Strategic Asset Management Plan are:

- Development, implementation and continuous improvement of an Asset Management System.
- Asset Management team to develop a comprehensive maintenance program.
- Integration of condition monitoring, renewal and whole of life cost planning processes to promote high availability and durability of assets.
- A focus on providing a competent, well trained and well supported operations team.
- Development of effective maintenance and renewal schedules with an emphasis on condition monitoring to minimise risks.

- Implementation of special information systems to manage MF and RO membranes, as well as capital renewal.
- Selective use of RCM through the operations phase to address reliability issues.

### 3. Abbreviations

The following abbreviations are used in this Plan:

<b>KIWS</b>	Kooragang Industrial Water Scheme
<b>CIP</b>	Clean in Place
<b>KWLP</b>	Kooragang Water Pty Ltd
<b>CMMS</b>	Computerised Maintenance Management System
<b>EIS</b>	Environmental Impact Statement
<b>KIWSP</b>	Kooragang Industrial Water Scheme Plant
<b>FMEA</b>	Failure Mode and Effects Analysis
<b>SAMP</b>	Strategic Asset Management Plan
<b>IMS</b>	Integrated Management System
<b>KPI</b>	Key Performance Indicator
<b>MTBF</b>	Mean Time Between Failure
<b>O&amp;M</b>	Operations and Maintenance
<b>OH&amp;S</b>	Occupational Health and Safety
<b>PLANT</b>	The Mayfield Advanced Water Treatment Plant
<b>PM</b>	Preventative Maintenance
<b>RCA</b>	Root Cause Analysis
<b>RCM</b>	Reliability Centred Maintenance
<b>RO</b>	Reverse Osmosis
<b>SCADA</b>	Supervisory Control and Data Acquisition
<b>MF</b>	Microfiltration
<b>Suez</b>	Suez Water & Treatment Solutions

### 4. Introduction

#### 4.1 Context

This Infrastructure Operating Plan has been prepared as an outline plan in order to assist with the management of assets at Mayfield AWTP.

## 4.2 Scope

The Infrastructure Operating Plan has been developed to provide the following information:

- An overview of the asset management strategy and how the Infrastructure Operating Plan is developed in accordance with this;
- Descriptions of the staff organisational structure and processes to be put in place to implement the asset management aspects of the Water Quality Plans and monitor compliance with all requirements;
- Explanation of the process for developing, reviewing and updating the maintenance program.
- An outline of the asset management information systems to be used;
- Details of how preventative, corrective and breakdown maintenance is to be conducted on site;
- An overview of the process and value of assessing criticality for all assets;
- An overview of the process for performing condition and risk assessment and how this information is used for future planning;
- An outline of the capital investment strategy and the processes involved in making decisions regarding asset refurbishment and replacement;
- Details of the asset renewal program, which consists of major periodic maintenance items, including overhauls and replacement; and
- A summary of how RO and MF membranes are to be managed.

## 4.3 Objectives

The Infrastructure Operating Plan is designed to ensure that the Kooragang Industrial Water Scheme assets are managed to the principles of Suez's Strategic Asset Management Plan. This plan is an integrated and flexible approach, encompassing whole of life cycle costs.

The primary objectives of the Infrastructure Operating Plan are to enable the physical assets of the scheme to be maintained, repaired, rehabilitated and replaced in such a way as to ensure the following outcomes:

- No drop in level of service delivered over the duration of the contract.
- Optimum equipment performance, reliability and availability.
- Minimum total cost of ownership of each asset over its life cycle.
- Minimum business risks to all stakeholders.
- Compliance with all statutory and contractual requirements.

## 5. Asset Management Strategy

### 5.1 Strategy overview

Suez has developed the KIWS Strategic Asset Management Plan (SAMP). The SAMP is subjected to annual review and within that process the condition of assets is assessed and the plans for the management and maintenance of those assets is refined. General information on asset condition is provided from periodic asset condition assessments that are scheduled under the computerised maintenance management system (CMMS) "Infor EAM".

The objective of Suez's asset management strategy is to "Meet Demand and Compliance with tolerable Risks, at lowest Total Cost, and best Energy Performance."

Suez’s asset management strategy is designed to develop, implement and improve the following elements:

- The strategic asset management plan for KIWS in line with the Suez Water ANZ SAMP.
- Preventative Maintenance Schedules.
- Asset Management information system (CMMS/EAM).
- Risk, including asset failure risk assessment, asset condition monitoring and change management.
- Short term asset renewals program and long-term renewals forecast.
- Informed asset renewal and improvement based on risk and TotEx.
- Asset and Energy management policy.
- Energy performance monitoring.

## 5.2 Planning Framework

Suez utilises an integrated approach to asset management planning which considers the impact of all internal and external influences on the systems assets – technical, financial, social, political and economic.

Suez use the PESTEL model to guide reviews and plan asset management. PESTEL stands for Political, Economic, Social, Technological, Environmental, and Legal. It gives a bird’s eye view of the whole environment as illustrated in the figure below.



Figure 1 - PESTEL model.

## 6. Asset Management Organisation

### 6.1 Suez Staffing Structure and Responsibilities

Suez’s organisational structure for the KIWS can be seen in Annexure C.

The asset management responsibilities of the key members of Suez’s asset management team are as follows:

- O&M General Manager – Responsible for reporting, KPIs and data analysis, HSE management, criticality assessment, renewals planning, project management, budget management and continuous improvement.
- Plant Manager – Responsible for Document management, incident management and root cause analysis, preventative maintenance planning, maintenance planning, work order management, contracted works management, procurement, works delivery, asset



condition assessment, criticality assessment, renewals planning, project management, spare parts management, tools and vehicle management and continuous improvement.

- Lead Technician – Responsible for incident management and root cause analysis, maintenance planning, work order management, contracted works management, procurement, works delivery, asset condition assessment, criticality assessment, project management, spare parts management, tools and vehicle management and continuous improvement.
- Asset Manager – Responsible for CMMS administration, preventative maintenance planning, criticality assessment and renewals planning.
- Process Engineering Support – Responsible for engineering support during criticality assessment.
- IT Support – Responsible for CMMS administration and upkeep.
- Health, Safety, Environment and Quality Team – Consulted regarding document management and HSE management.
- Procurement – Responsible for procurement and administrative contracted works management.

## 6.2 Labour Resourcing

To achieve the maintenance objectives of the Plant, the following staff are allocated:

- Suez operator-maintainers – in addition to operating the Scheme, Three (3) operators carry out routine asset maintenance.
- General subcontractors – resourcing requirements vary depending on the work scheduled, but subcontractor tradesmen are engaged on an ad-hoc basis to carry out basic maintenance routines (as required).
- Specialist subcontractors – separate commercial agreements are established for the carrying out of specialist maintenance activities such as servicing of chemical instrumentation, large pump systems, lifting equipment etc.

## 6.3 Equipment Resourcing

The following facilities are available including mobile plant and equipment, to ensure maintenance at the plant is properly carried out:

- Spares storeroom
- Operator vehicles (utilities etc.)
- Operator laptops
- Tools (mechanical fitting, electrical etc.)
- Condition monitoring equipment (Non-contact thermometer etc.)
- Lifting equipment (block and tackle etc.)
- Access equipment (ladders, davits etc.)
- PPE and safety equipment (gas detectors, chemical suits, masks etc.)

Equipment required for major overhauls/repairs or specialised maintenance is generally provided by service contractors.

## 6.4 Culture and Training

Suez WHS and environmental training and competency procedures for staff are described in the Training & Development Procedure – **Suez HR-005**. The training and competency requirements for high risk activities and activities undertaken in areas of high risk, are outlined in the Authorisation of Personnel procedure – **Suez OHS-004**.

The site Training Matrix & Authorisation Register outlines the training requirements for site staff in relation to the work activities conducted. The O&M General Manager ensures that training identified in the matrix is implemented and that certificates of competency etc. are current.

All training undertaken is recorded on the Training Attendance Register. Training is then recorded on the KIWS Training Database to track and record competency and training data.

## 6.5 Policies and Procedures

The policies and procedures required to implement the asset management strategy form part of Suez's Integrated Management System (IMS). Suez has an Integrated Management System (IMS) that is accredited to ISO9001, ISO14001, ISO18001 and AS4801. KIWS is covered within those systems.

Older versions of documents are retained for the records, such as older MS Word format HACCP plans and previous Recycled Water Quality Management Plan drafts.

The integrated management system is used to manage all aspects of the operation and maintenance of the Kooragang Industrial Water Scheme.

A complete list of Suez documents pertaining to the Kooragang Industrial Water Scheme (KIWS) can be generated at any time from the IMS. Reports can show complete listings of recently updated documents.

## 6.6 Establishment of Systems

Infor EAM is the Suez Water ANZ computerised maintenance management system (CMMS) for managing assets, works and parts. It constitutes the primary mechanism for tracking maintenance and asset management activities and storing associated data to support decision making and performance monitoring, to achieve risk control and cost efficiency.

The SAMP has been informed by the KIWS Asset Criticality Review 110-SE-OM-000-RP-001 that involved an assessment of risk related to asset failure and identification of asset criticality. The Review considered the estimated frequency and severity of asset failure. Severity considered the impact of asset failure on safety, process (quality and quantity) and environment as well as cost. The Review considered the mitigation of those risks through preventive maintenance processes at defined frequencies and/or the maintenance of an inventory of potentially necessary critical spare parts. The document considers the system redundancy built into the infrastructure.

## 6.7 Documentation and Records

Suez capture and store, within Infor EAM historical information relating to maintenance, repair and replacement activities conducted on infrastructure assets. Asset maintenance and management is supported by the Infor EAM system that lists specific assets, their general descriptions and properties (such as material, size, age, capacity) and preventive maintenance arrangements and schedules. The CMMS generates reminders and alerts to undertake tasks, produces work orders and supports tracking and recording of works completed and resources allocated against the work order. The maintenance procedures are linked to asset life cycle optimisation, safe and reliable performance of the infrastructure, service criticality and

business risk. Actions scheduled in Infor EAM include reactive, preventive and predictive maintenance.

The following is recorded:

- Comprehensive asset register
- History of all preventative, corrective and breakdown asset maintenance conducted on all assets
- Instrument calibration history
- Meter information and condition monitoring results
- Inventory of spare parts holdings

In addition, the CMMS records the financial details of all purchases of materials and labour carried out in the course of conducting maintenance.

## 6.8 Compliance and Management Review

Suez conduct a Management Review on a regular basis to ensure the system's continuing suitability, adequacy, and effectiveness, and evaluate the need for changes to any aspects of the system. The management review committee comprises of the following personnel:

- i. Executive team members
- ii. HSEQ Systems Manager

The Management Representative, or delegate, shall prepare the agenda (using Suez policy SYS-004B Executive Management System Review Agenda Guideline) and document minutes of the meetings.

## 7. Performance Management

### 7.1 Contractual Targets

The mandatory performance criteria for the KIWS are defined in the Contract Requirements.

These operational performance requirements define the minimum level of service in terms of water quality, water volume and general performance that is to be delivered by the Plant Operator.

The contractual targets are defined in the reference specification in the Operations and Maintenance Agreement between Kooragang Water and Suez.

Contractual targets are a key driver of asset management, particularly in setting targets for (a) plant and equipment availability; (b) maintenance productivity and effectiveness; and (c) equipment operational efficiency.

### 7.2 Performance monitoring and review

Suez monitor performance and reports to the client on a quarterly basis, performance against the agreed standards in accordance with the Contract Requirements. The main objectives of the report are summarized below:

- Provide the required information to identify risks and opportunities and support decision making.
- Monitor the achievement of Asset & Energy Management objectives and the progress of projects and actions.

- Communicate about the Asset & Energy Management activities & performance to the stakeholders.
- Keep records for compliance purpose.

### 7.3 Changes to Contractual Targets

If future changes in demand or other requirements (such as recycled water quality) necessitate modifications to contractual obligations, then it will be necessary for Suez to carefully consider how the delivery of the new targets will impact the performance and management of its assets.

## 8. Asset Inventory

### 8.1 General

Suez maintains an up-to-date inventory of infrastructure assets, known as the 'asset register', within the CMMS.

The asset register database is carefully structured with an appropriate resolution to ensure that:

- site staff, managers and engineers are able to find items easily and unambiguously;
- data capture is properly matched to analysis and reporting requirements; and
- maintenance history and cost information are captured at the right level (identified in a risk assessment process).

### 8.2 Asset Register

The scope of the asset register is to identify all infrastructure assets associated with the Plant, including machinery, structures, and electrical installations.

The asset register has been created, using data from numerous sources including

- Asset list
  - Grouped in major system and equipment areas
- As-built equipment lists (mechanical, electrical, valve and instrumentation)
  - Potential for make, model, serial number, size, capacity, warranty, asset type
- As-built drawings
  - primarily the process and instrumentation drawings (P&IDs) as a checklist for assets that have been included
- Financial
  - purchase date and price where know.

### 8.3 Asset interface points (boundaries)

Interface points between KIWS and Hunter Water Corporation or Orica infrastructure and NCIG are set out in the contracts. This includes:

- Schedule 4 Recycled Water Meter Location of the Recycled Water Agreement (22 September 2021) between Kooragang Water Pty Ltd and NCIG.
- Schedule D Proposed Delivery Point of the Non Potable Water Supply Agreement (1 August 2011) between Kooragang Water Pty Ltd and Orica Australia Pty Ltd.
- Schedule 6 Orica Potable Water Delivery Point and Schedule 7 Treated Effluent Delivery Point of the Supply Agreement (Agreement for the Supply of Treated Effluent and Potable

Water) (Version 1 – currently being updated, 17 December 2015) between Hunter Water Corporation and Kooragang Water Pty Ltd.

## 9. Asset Management System

### 9.1 CMMS

#### 9.1.1 General

- A Computerised Maintenance Management System (CMMS) forms the basis of Suez’s asset management and maintenance plans and will be used for scheduling, recording and analysing all maintenance activities.
- Suez uses a computerised maintenance management system (CMMS), called Infor EAM. The system utilises a web interface and is an important tool for the day-to-day management of asset maintenance and repairs, as well as spares inventory.
- Infor EAM includes many features, including: modules for managing asset details and configuration, preventative maintenance planning and scheduling, purchasing, management of spares, workflow and analysis.

#### 9.1.2 Establishment and Use of Asset Management System

- Suez has developed an asset register and preventative maintenance work order data in the computerised maintenance management system (CMMS).
- The CMMS comprise an inventory of all managed assets. It includes criticality and condition grading of all asset components, and other relevant data such as capacity, size and age. Information is archived to allow trending of asset condition over the operating period.
- Most importantly, the system is to be used to capture data relating to all inspection and maintenance activities conducted at the Plant.
- All required preventative, corrective and breakdown maintenance information is entered into the Infor EAM database, properly linked to the assets that work is to be carried out on. Upon completion of tasks, maintenance personnel record the task as completed in Infor EAM with the following information:
  - date completed
  - personnel undertaking the work
  - labour hours for task
  - materials used
  - asset condition and performance data as observed during maintenance activities, including a brief description of work and important notes
- A high quality preventive maintenance program is critical to prevent inadequate equipment performance that can result in environmental or process incidents. Adherence to the preventive maintenance program must be assessed on a frequent basis, using maintenance performance indicators.
- Infor EAM is used to monitor preventive and corrective maintenance ratios with the objective of minimising breakdowns and failures.
- Regular reviews of maintenance performance will lead to progressive refinement and optimisation of the overall maintenance program. Equally important is the issue of breakdown maintenance, which must be undertaken in a timely, reliable manner.
- A KPI dashboard can be individually configured to monitor performance against certain contractual measures, compliance with statutory requirements as well as benchmarking and monitoring of internal KPI’s.

## 10. Maintenance Planning and Execution

### 10.1 Work Instructions

Work orders and associated task instructions are planned for and generated prior to their required start date. They are issued by the Plant Manager to a trade group who are responsible for:

- Preparation – review of work to be undertaken and ensuring that all materials, spares and tools are available for the timing of the work.
- Safety and Environmental constraints – permits to work, entry permits etc. to be completed as required in high risk areas such as confined spaces.
- Operational constraints – avoid incidents leading to water quality or quantity problems.
- Completion of all maintenance tasks.
- Closing of work instructions in the Computerised Maintenance Management System with all required data completed – hours worked, spares used, external resources etc.

If something unexpected is noted while undertaking the work, the person responsible for the maintenance is required to raise a corrective or breakdown maintenance order. Work instructions for each asset are regularly reviewed by all maintenance staff.

### 10.2 Maintenance program optimisation

Initially, the preventative maintenance program has been developed on the basis of vendor recommendations and applicable regulations. This program is reviewed regularly and in the event of reliability issues occurring. To this end, SUEZ will apply an initial maintenance review and optimisation process, as well as ongoing selective application of analysis in accordance with the principles of reliability centred maintenance (RCM). For more detail refer to the Suez document AM001-SAEMP-V9.

RCM provides a rigorous analysis framework for ensuring that the most cost-effective maintenance activities are employed to manage an asset's failure modes. There are a number of different versions of RCM, but the key elements of any RCM process are defined in SAE Standard JA1011 Evaluation Criteria for Reliability Centered Maintenance.

When properly applied, RCM typically results in a reduced amount of routine maintenance work, while introducing more inspections and diagnostic activities to identify hidden failures and enable a greater degree of maintenance that is condition-based.

Application of RCM is most effective when a 'review group' approach is employed. To achieve this, a well-trained facilitator will conduct workshops with relevant plant-based technical experts. Software is used to document the steps taken and the resulting actions.

Although it can be time-consuming to perform, the outcome of RCM will usually be not only improved reliability and cost, but also an audit trail for maintenance changes, and a much deeper understanding of the assets by all participants. This last point contributes very positively to developing a proactive asset management culture within the operations team.

### 10.3 Preventative Maintenance

#### 10.3.1 General preventative maintenance

Suez policy outlines the driving principle for preventive maintenance tasks and frequency decisions to consider a PM as an investment made to reduce the asset failure risk and total expenditure. As an investor, the decision maker is to ensure the PM is effective (reduces risk and total expenditure) and efficient (value for money). The Preventative Maintenance review process can be seen in Figure 2.

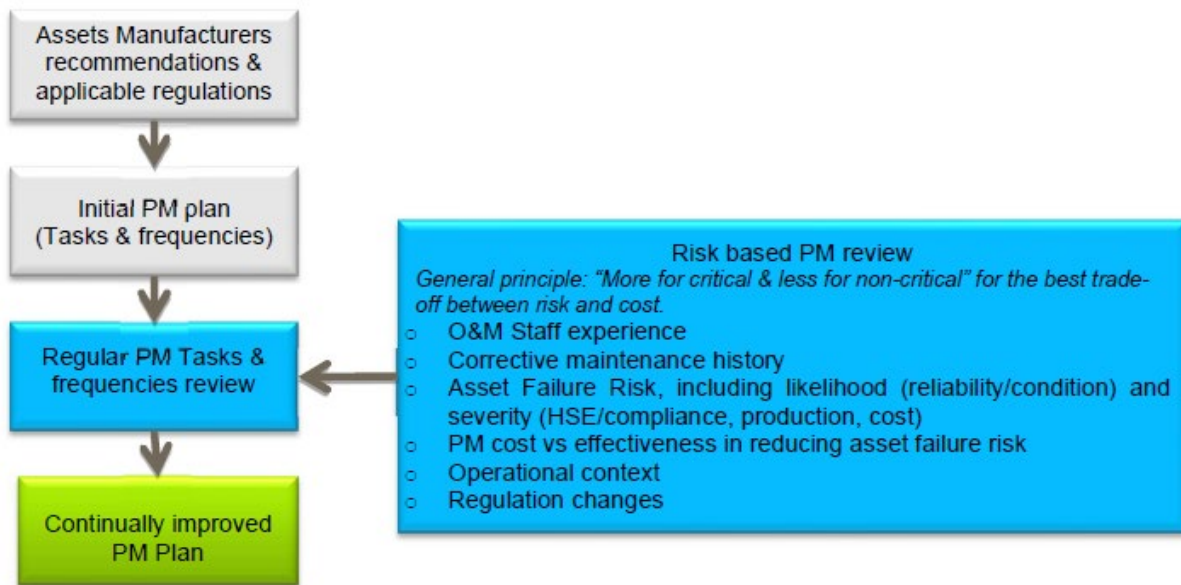


Figure 2 - Suez's preventative maintenance review process.

#### 10.4 Corrective maintenance

In addition to planned preventative maintenance, there is a need to perform on-condition, or 'corrective', maintenance. This is essentially maintenance conducted on the basis of sub-optimal condition, with the aim of preventing further loss of performance or running to failure.

Corrective maintenance may come about as a result of a discovery from a condition inspection or test, or during the conduct of a preventative maintenance routine. Alternatively, it may be triggered by online condition or performance monitoring parameters, which give early indication of deterioration.

#### 10.5 Condition Monitoring

While many corrective maintenance activities cannot themselves be easily planned, the inspections, diagnostic checks and condition monitoring activities that trigger them can be. Suez monitor asset condition and assign a grade to assets in order to prevent breakdowns.

Suez use the following criteria to monitor asset condition:

- Reliability – based on data from Infor EAM and staff inputs
- Performance – based on SCADA data, technical documentation and staff inputs.
- Observable signs of deterioration – based on site inspections, asset condition assessments, specialist assessments and photos.
- Obsolescence – based on input from maintainers and/or suppliers.

Assets in poor condition are placed on a watch list for maintenance and replacement as per the Suez ANZ SAMP.

#### 10.6 Breakdown Maintenance

In contrast to the more organised structure of preventative maintenance, emergency and breakdown maintenance is unpredictable and requires operations and maintenance personnel to be reactive.

Since one of the primary objectives of maintenance is to ensure that equipment is able to meet the required performance standard at all times, then all breakdowns must be attended to.

When a breakdown is discovered, operator-maintainer personnel identify the item and a decision is made as to how the item is addressed. This decision takes into account a number of different factors, including:

- the risks and consequences of not rectifying the problem;
- the costs and complexity of rectifying the problem;
- the criticality of the item that failed and its impact on operations;
- and the overall priorities of the client and operations team.

Information about the breakdown maintenance activity is then entered into the CMMS at the earliest opportunity, and this includes the type/mode of failure, as well as details about the suspected cause, the results of follow-up investigations and the impact on operations, personnel and equipment safety and/or the environment. In the process, the item will be automatically added to the outstanding work list with an appropriate response time along with any tools or spares required.

If the breakdown maintenance item is an emergency, maintenance staff may repair the selected asset on the spot, ensuring all WH&S procedures are undertaken and input into the CMMS at the completion of the works.

## 10.7 Spare Parts

### 10.7.1 Management of Spare Inventory

The spare parts inventory is established in the CMMS. Spare parts are linked to assets and maintenance activities and be identified as used when they are removed from the store. This in turn automatically adjusts stock levels left in the CMMS.

Minimum stock levels are allocated for each spare part. Once reached, reorder reports can be produced for maintenance personnel. The minimum stock levels are based on lead time of replacement, frequency of used, price and criticality of the spare part. Each spare is linked to a preferred supplier to assist in purchasing of new stock.

The CMMS is capable of producing the following reports:

- Monthly reports with average spare part values to determine:
  - Volume and value of spare parts on shelf
  - Volume and value of spare parts used during the month
  - Volume and value of spare parts purchased during the month
- Stocktake audits are conducted yearly to determine the accuracy of the system.

### 10.7.2 Critical spares identification

The criticality of the spare parts is an indication on how important it is to have a spare part on site. Having the right spare parts at the right time can save the plant from a long-term loss of production. However, having expensive and poorly chosen spare parts on site can be considered as unutilised capital and a waste of space in the plant's storeroom.

The criticality assessment for spares is a decision making tool to help decide, according to the suppliers' recommendations and the team's experience, whether a spare should be purchased or not.



The spare parts criticality is assessed on a figure calculated from asset criticality and lead time. The result of the assessment is the spare criticality and can be used to assist with the decision to hold an item.

## 11. Criticality Assessment

### 11.1 Priorities

As an indicator of the ‘consequence’ of asset failure, criticality grading enables assets and associated management activities to be prioritised based on risk. At the Mayfield AWTP, Suez rank criticality using:

- Likelihood of failure
- Severity of outcome – taking in to account HSE and compliance, production and service delivery and total expenditure.

Suez defines an asset as critical if a failure leads to plant unavailability or off spec for more than 8 hours, or a major compliance breach/environmental incident or the cost is greater than \$50 000. When determining the criticality grade, the assessor must understand how the asset fits into the larger process, and how its failure will impact overall operational performance, operator and customer safety, and the environment.

Criticality grading of assets in the Plant has been conducted following commissioning of the Plant. Since criticality is determined by plant configuration, future criticality assessment will be performed as required by the asset team and involve site staff or when modifications are undertaken or if high risk events occur.

## 12. Condition Grading and Asset Assessment

### 12.1 Purpose

An asset condition assessment plan was established during the first year of operation in order to monitor the condition of high risk (watch list) and high replacement value assets. The main objective of asset condition monitoring is to support renewals planning.

Asset condition is defined by Suez as: “State of an asset measured against criteria of functional performance, reliability, observable signs of deterioration and obsolescence”

### 12.2 Condition Grading

For the periodic structured condition assessment of the assets in the watch list, Suez collects and reviews all available data from the following sources:

- O&M staff consultation
- SCADA consultation (incl. operation test, performance comparison vs similar equipment, vs design/specs/nameplate, & performance evolution in time: historical trends)
- CMMS WO history (filtering out external failures & WOs inappropriately assigned to the asset)
- Asset inspection (visual, noise, vibration, temperature, Odour, etc.)
- Reports from specialist contractors when available, regulatory inspections, previous assessments, calibration etc., photos from last maintenance for inaccessible assets (underwater, underground, covered, confined space etc.)
- Manufacturer manuals, nameplates, design notes, specifications and other technical documents

### 12.3 Inspection frequency and records

Asset condition inspections are programmed on an annual basis as a minimum and opportunistically carried out with repairs and scheduled works.

### 12.4 Asset Assessment

The asset assessment is conducted using the condition and criticality gradings in accordance with Suez Water ANZ SAMP.

#### 12.4.1 Very Good

For assets with a 'very good' score (1) the assessment has determined that given the criticality and the condition, they are of minimum current risk to the treatment plant operation.

If it turns out that renewals are planned for a given period, then a low score suggests that the renewal is not required if the main justification is on the basis of condition. Therefore, such activities, in the right circumstances can be delayed.

#### 12.4.2 Good

For assets with a 'good' score (2), the criticality and condition are such that there is not high enough risk to clearly justify a renewal, but sufficient risk to warrant closer monitoring of the asset's performance and condition.

#### 12.4.3 Fair

For assets with a 'fair' score (3), the asset risk must be actively managed. The Operator must investigate the asset more thoroughly as the asset is now "on the radar" for renewal.

#### 12.4.4 Poor

For assets with a 'poor' score (4), the asset is slated for renewal. The Operator must action a plan to renew the asset.

#### 12.4.5 Very Poor

Assets with a 'very poor' score (5), are considered failed and unable to be repaired. Immediate renewal is required.

### 12.5 Asset Assessment Reporting

All asset condition assessment outcomes are captured in a Work Order with a 1 to 5 condition rating, with the supporting information included (checklists) or attached (reports, photos), and relevant comments about the condition assessment findings. The issues to be addressed identified through the assessment trigger the creation of a new Work Order with appropriate type (condition based, corrective or breakdown), and class (Replacement, rebuild, modification, maintenance).

All the assets in poor condition will be listed in Infor EAM, sorted by criticality and regularly reviewed.

## 13. Asset Renewal and Durability

The KIWS Renewals Plan 110-SE-OM-000-WS-001 has been developed to cover the infrastructure over the 15 year life of the contract. The Plan considered major asset maintenance and replacement to ensure good long-term plant condition and performance over time. The Plan

considered estimated lifespan of critical assets, condition assessment and works management as well as renewal of the infrastructure or run-to-fail options. A schedule of capital works for asset renewal, replacement and development has been included. Costings have been forecast over the future 15-year life-cycle covering capital (replacement), operations, maintenance and management and administration expenditure.

### 13.1 Planning and Managing Renewals

The Suez works planning process is structured according to the following:

- Monthly generation of PM WOs due for the next month
- Monthly review of major works (renewals & improvement) scheduled in the next 6 to 12 months.
- Weekly review of Available Works (list of open work orders in Infor EAM) and works waiting for
- spares/resources:
  - Work orders prioritisation (Critical, High, Medium or Low priority)
  - Work orders scheduling (scheduled start date, end date, assigned to)
- Works preparation (mobilization of required human & material resources)
- Safe works delivery
- Work order closure

All works are documented with a work order in the CMMS (Infor EAM).

### 13.2 Analysis of Whole Life Costs

Suez employed Monte Carlo simulations to model asset renewal uncertainty and to understand and quantify the implications for the Plant. The methodology used consists of replacing estimate figures by probability distributions in order to measure the overall uncertainty on the total provision, derived from the combination of uncertainty on each individual parameter for each asset. The probability distributions have been calibrated based on a min-likely-max approach with input from key Operational and Expert contributors. This model was used to associate a whole life cost with the operation and renewal of the KIWS.

### 13.3 Asset Disposal

Asset decommissioning falls under the Suez asset modification project process. The asset decommissioning decisions are therefore identical to any asset modification projects and will be subject to the assessment criteria below:

- Risk: including potential impacts to Health & Safety, Environment, Process and plant reliability/availability, compliance.
- Total Expenditure
- Other intangible considerations

Non-operating assets are to be categorised as following (position status in CMMS):

- Unused assets: positions and systems not required for the current operation context but that could be needed in the future. These assets will have to be kept available to ensure they can operate again within reasonable notice when required. They will be subject to a preservation strategy with appropriate protections and preventive maintenance schedules.

- Abandoned assets: positions and systems that will never be needed again but that are not judged
- worthwhile being removed/disposed. The strategy for abandoned assets consists of minimising costs
- while fully managing HSE and other compliance risks.
- Decommissioned assets: positions and systems that have been removed/disposed (“clean place”).

## 14. Capital Investment Strategy

### 14.1 Asset Renewal

Suez has developed schedules for asset renewal. In the process it has identified the estimated costs associated with all asset overhaul and replacement activities through the life of the Contract. Using the strategies described in the proceeding section, Suez prepares an annual budget including proposed capital works for submission to KWPL as part of finalisation of KWPL’s annual budgeting processes. This budget is considered and reviewed through the Project Control Group (**‘PCG’**) that monitors the performance of the O&M contact between SUEZ and KWPL. Once agreed the budget is finalised and capital works are delivered by SUEZ in accordance with the approved budget.

### 14.2 Initial Planning

The identification of asset condition issues and improvement opportunities includes the following Suez criteria:

- Poor performance (i.e.: not meeting operation requirements),
- Increased costs (corrective maintenance, energy, chemicals, etc.)
- Poor reliability (frequent failures) presenting a risk to the operation.
- Poor energy performance, increased environmental footprint.
- Important signs of deterioration presenting a risk to the operation (e.g. questionable structural integrity due to high level of corrosion, etc.)
- Obsolescence presenting a risk to the operation (poor maintainability on critical asset)
- Failed asset, not economically repairable (corrective renewal)
- Improvement opportunity likely to reduce unacceptable risks, and/or reduce total expenditure.

### 14.3 Project Appraisal and Investment Studies

When needs have been identified, the resulting capital investment needs are evaluated, justified and prioritised as part of the project appraisal process.

Investment studies should be undertaken to deal with strategic options, while project appraisals focus on individual schemes and projects. Investment studies will cover:

- Investment strategy
- Investment justification
- Unit costs
- Investment compilation by asset type/investment category
- Assessment of outputs

- Assessment of total investment

Project study and appraisal reports will cover:

- Justification of need
- Statement of facts (including current situation and forecasts)
- Design criteria (including planning horizon)
- Options consideration
- Investment costs
- Operating costs/ operating method
- Whole of life cycle cost/net present value options - summary of all options and costs
- Investment type, allocation and priority ranking
- Investment program and profiling

#### 14.4 Capital Program Priority Ranking

Renewal projects prioritization/ranking is based on the objective of the project:

- Priority 1: Unacceptable Risk. Projects primarily intended to address a risk that is above tolerance level (Health & Safety, Environment, Production, Compliance, etc.). Priority ranking per level of actual impact (if the event occurred), and then per level of risk assessed.
- Priority 2: Efficiency. Projects primarily intended to reduce asset total expenditure. Priority ranking per payback time.
- Priority 3: Intangible. Projects aiming at providing intangible benefits (operability, maintainability, standardization, innovation, reputation, etc.).

### 15. Membrane Management

#### 15.1 General

Having effective management and maintenance of the membrane system will ensure that the water quality objectives are met and the most cost effective operation of system from an energy, chemical consumption and membrane replacement perspective is achieved.

A clearly defined membrane maintenance programme involves a number of clearly defined processes. These include performance monitoring and process testing.

Another key component of monitoring fouling rates is the ability to autopsy the membrane modules. coNEXA have the capability to perform membrane autopsy analysis in house.

Autopsy diagnostics allow identification of the cause of potential membrane degradation and fouling problems as well as optimisation of the CIP solutions depending on the fouling characteristics.

#### 15.2 Membrane Types

Two types of membranes are used in the KIWS's process:

- Microfiltration - MF Membranes, Pall Microza
- Reverse Osmosis - RO Membranes, Veolia AG-400LF 34 (Stage 1) and Hydranautics ESPA 2LD (Stage 2)

### 15.3 Membrane Management

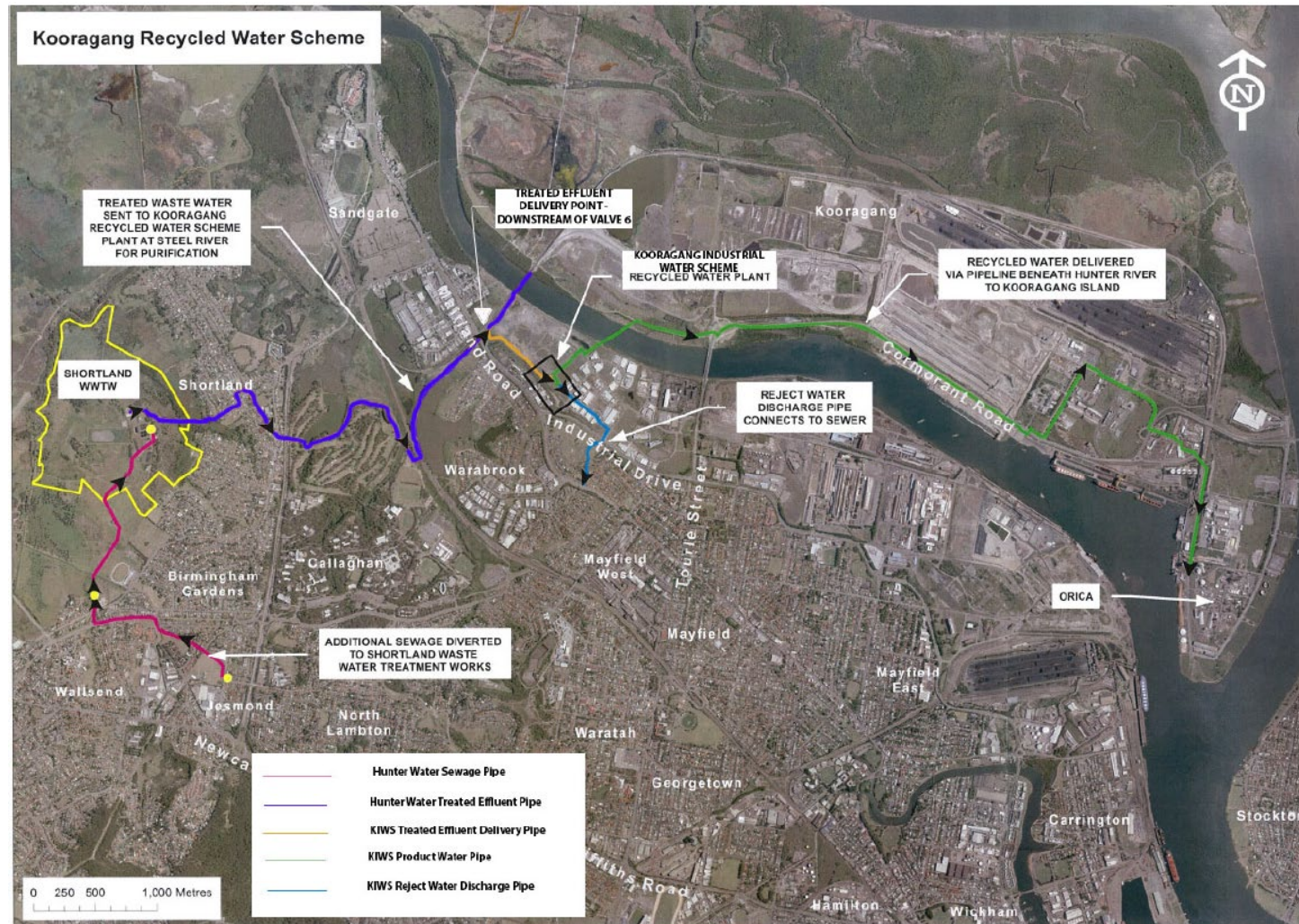
A key aspect of optimising the asset lives is the effective management of the Plant's membrane inventory.

In Australia, Suez manages successfully microfiltration (MF) and reverse osmosis (RO) membranes in several plants the largest being the Victorian Desalination Plant and the Perth Seawater Desalination Plant.

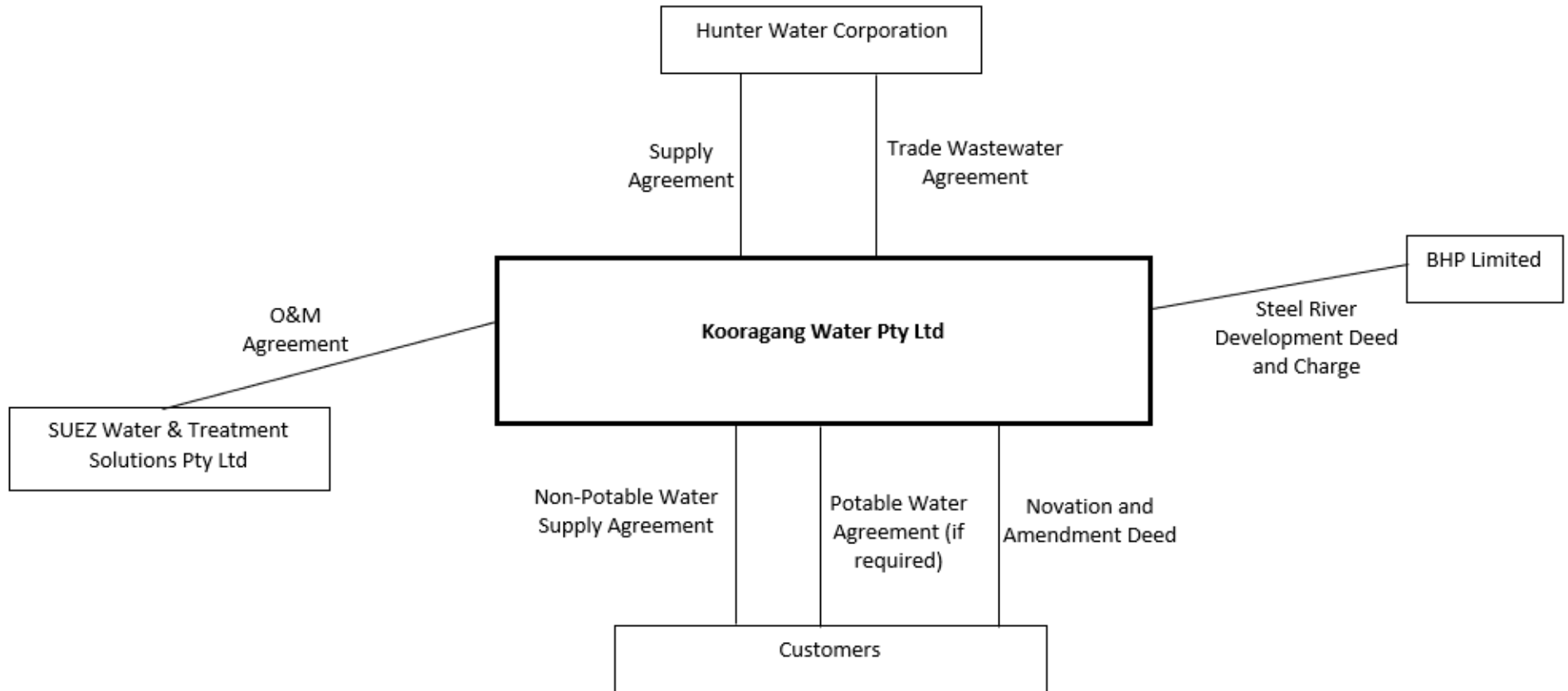
coNEXA also own and operate several similar treatment plants, including the AquaNet Recycled Water Scheme.

Suez and coNEXA discuss membrane performance and management strategies in a monthly Technical Review Group meeting

**Annexure A – Overview of the Kooragang Industrial Water Scheme**



**Annexure B – Kooragang Industrial Water Scheme Contractual Framework**





### Annexure C – Key Suez Personnel

