



WATER MANAGEMENT PLAN

August 2024

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Definition

AEMR refers to Annual Environmental Monitoring Report

DECC refers to the Department of Environment, Climate Change and Water

DPIE refers to the Department of Planning, Industry and the Environment

EES refers to the Environment, Energy and Science Group (part of DPIE)

EPA refers to the Environment Protection Authority

EPL refers to Environment Protection Licence

NSWP refers to NSW Ports

OEH refers to the Office of Environment and Heritage

PKCT refers to Port Kembla Coal Terminal

PRP refers to Pollution Reduction Program

WMP refers to Water Management Plan

WCC refers to Wollongong City Council

TTE refers to tertiary treated effluent

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Version	Date	Comment
5	10th August 2011	Revised plan submitted to DPE after DPE address feedback
6	5th April 2012	DPE approved plan on 5.412
7	8th August 2014	Reviewed/ minor changes (n.b.2014 Independent audit findings)
8	18th September 2015	Reviewed, minor changes only
9	3rd November 2016	Minor updates; updated Appendix B,C,D charts
10	6th September 2017	Update to include 2017 Triennial Audit findings
11	26th February 2019	Annual review, updates to PKCT roles only
12	21st August 2019	Review following submission of AEMR, updated EPL Overflow points and Appendix figures.
13	1st June 2020	Annual review, no changes
14	14th September 2020	Review following 2020 Independent Audit. Updated doc version number to correct version, updated catchment plans and other maps associated with 2020 CWCT review. No material changes to Plan concept.
15	12 th February 2021	Review and update following DPIE RFI and PKCT site separation for AIE site.
16	21 st August 2023	Annual review – no material changes made. Updates to document I.D's where required.
17	14 th August 2024	Annual review – no material changes made. Updates to document I.D's where required.

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AUTHORISED BY: Michael Curley, Health Safety Environment & Risk Lead - Date Authorised: 30/09/2024

1. INTRODUCTION

1.1 Purpose

The purpose of this Water Management Plan is to outline the processes by which water is managed on the Port Kembla Coal Terminal (PKCT) site in accordance with PKCT policies, site operations and applicable legal requirements. This Plan has been prepared in accordance with Condition 13 of Schedule 3 of the Department of Planning, Industry and Environment (DPIE)'s Major Project Approval 08_0009 (refer section 3.3), which stipulates that PKCT shall prepare and implement a Water Management Plan (WMP).

1.2 Background

PKCT provides a coal and bulk products receipt, storage and ship loading service to customers who predominantly constitute mining companies in the NSW Southern and Western Coal Fields. PKCT is located on the northern side of the port of Port Kembla Inner Harbour and operates on land leased from NSW Ports (NSWP).

PKCT has been in operation since 1990 and operates under an Environment Protection Licence (EPL) No. 1625 in accordance with the *Protection of the Environment Operations Act 1997* (POEO Act).

To meet EPL obligations, upon commencement of operations, PKCT reviewed water management processes on site and upgraded water collection facilities to address identified deficiencies. This was done in consultation with EPA enabling EPL water quality parameters for licenced discharge to be met. The water collection and treatment system upgrade provided reuse water for water cart operations used for road cleaning and dust control activities. The system was commissioned in 1993 and received an environmental excellence award through the NSW Minerals Council.

In October 2020, NSW Ports, PKCT and Australian Industrial Energy (AIE) agreed to a surrender of the southernmost portion of the PKCT to AIE effective from 31st March 2021. This has resulted in a reduced operational footprint at the PKCT site, resulting in a change to water management within the site and subsequent revision to this WMP effective from 31st March 2021 implemented at the site.

1.3 Scope

This Management Plan applies to the management of water on PKCT premises and associated operations and activities. The Plan addresses water use, run off collection, reuse and discharge of excess water to adjacent environs and is supported by other Management Plans and procedures.

1.4 Objectives

The objectives of this WMP are to:

- Comply with all regulatory requirements set out in EPL 1625 and the DPIE approval conditions (refer Section 3.1 and 3.2)
- Incorporate and address DPIE approval conditions pertaining to water management

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- Provide guidance and instruction to site personnel on requirements, including the importance of water conservation
- Outline the methodology in place for water use and ongoing usage reduction without compromising environmental or operational performance in other areas
- Ensure the collection and availability of water related data for the Annual Environmental Monitoring Report (AEMR), EPL and other reporting
- Monitor the effectiveness of this WMP in achieving compliance with requirements and facilitating continual improvement
- Outline the management review of the water management process, leading to consideration and/or implementation of suitable improvement opportunities.

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2. RESPONSIBILITIES

The roles and responsibilities relevant to the environmental management at PKCT are defined in Table 1 below.

Table 1 Environmental Management Roles and Responsibilities

Role	Responsibility
PKCT employees, contractors and site personnel	All PKCT employees, contractors and other site personnel are responsible to comply with this Management Plan. PKCT employees, contractors and other site personnel must take appropriate action detailed in this Management Plan in accordance with PKCT's legal and environmental obligations.
Environmental Specialist	Is responsible to the HSER Superintendent for the coordination and implementation of this Management Plan to PKCT site operations. The Environmental Specialist is responsible to the HSER Lead for the collection, storage and retention of data and monitoring of water management system performance.
Health Safety Environment and Risk (HSER) Lead	Is responsible to the General Manager for site monitoring and operation of environmental control systems.
Operations Manager	Is responsible for managing and supporting the shift and daywork teams to effectively and safely operate the business in line with customer, community and regulator expectations.
Maintenance Superintendent	Is responsible to the General Manager for work execution, ensuring environmental control equipment is maintained, reliable and effective.
Asset Manager	Is responsible for asset management and planning, ensuring environmental control equipment is fit for purpose, reliable and effective.
General Manager	Is accountable for PKCT's legal and environmental compliance.

3. LEGISLATIVE AND OTHER REQUIREMENTS

3.1 Legislative Requirements

3.1.1 Protection of the Environment Operations Act 1997

The Protection of the Environment Operation (POEO) Act 1997 sets requirements and controls regarding pollution of the environment. Section 120 of this Act confirms it is an offence to cause or permit pollution of any waters. PKCT is required to comply with this requirement together with PKCT's EPL which provides site specific water pollution permissions and requirements.

PKCT's activities are defined as a 'Scheduled Activity' under the POEO Act (refer to Clause 10, Part 1 of Schedule 1 of POEO Act). Clause 48 of this Act requires PKCT to hold an Environmental Protection Licence (EPL) issued under the authority of the POEO Act. PKCT holds EPL 1625, which limits emissions to air and water from the PKCT premises. Scheduled activities referenced on the EPL pertain to Coal Works and Shipping in Bulk.

3.1.2 Environmental Protection Licence (EPL No. 1625)

PKCT is licenced by the NSW EPA under the POEO Act 1997. This licence is reviewed at least every 5 years after the issue of the EPL. The conditions of the EPL with respect to water quality monitoring and management are addressed in this WMP. A copy of the EPL can be accessed via the NSW EPA web site. EPL requirements pertaining to water and EPL discharge points are detailed in Section 4. Other requirements include:

- Water quality monitoring
- Rainfall monitoring
- Notification, investigation and reporting of EPL exceedances
- Completion of an Annual Return (report) to be submitted to EPA. PKCT's return period is 1st April to 31st March (the following year). Annual Return must be submitted by 31st May at the end of the return period
- Use of Pollution Reduction Programs (PRPs) and Environmental Improvement Programs (EIPs) are encouraged by the EPA to pursue improvements and to cover corrective actions which may be required when exceedances occur. PRPs and EIPs are attached to the EPL
- Liaison with EPA, in general, on matters pertaining to EPL requirements
- Operation of a community line and having a process for the management of community complaints and enquiries.

There are no load based licensing requirements associated with PKCT's EPL.

3.1.3 Sydney Water Act

PKCT receives potable water and recycled water from Sydney Water. PKCT and Sydney Water also have a recycled water supply agreement in place. PKCT has obligations to comply with this Act and agreement which include:

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- Recycled water management including use and monitoring
- Backflow prevention on water supplies
- Trade waste.

3.2 Department of Planning, Industry and Environment: 2009 Approval Conditions

Condition 3A of the development consent (08_0009) identifies PKCT's conditions relating to water management. Table 2 below identifies the condition details and the area within this WMP.

Table 2: Condition details

Condition Details	Area addressed in WMP
Discharge Limits 12. Except as may be expressly provided in an EPL for the project, the Proponent shall comply with Section 120 of the <i>Protection of the Environment Operations Act 1997</i>.	Section 4
Water Management Plan 13. The Proponent shall prepare and implement a Water Management Plan to the satisfaction of the Director-General. This Plan must: (a) be prepared in consultation with DECC (b) be submitted to the Director-General for approval within 12 months of this approval or as otherwise agreed by the Director-General (c) include: <ul style="list-style-type: none"> • a site water balance, which includes details of sources of water supply, on-site water use and management and off-site water discharges and investigates and describes measures to minimise water use by the project • a sediment control plan for surface works on the site that is consistent with the requirements of the <i>Managing Urban Stormwater: Soils and Construction Manual</i> (Landcom 2004, or its latest version) • a surface water monitoring program that includes: <ul style="list-style-type: none"> ○ stormwater effluent discharge criteria ○ a monitoring protocol for evaluating compliance with the stormwater effluent discharge criteria ○ reasonable and feasible mitigation measures to ensure the stormwater effluent discharge criteria are met. 	Section 4,5,7

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3.3 Policies and Standards

PKCT is managed by South32 (Illawarra Coal) and has a management system in place which operates in accordance with its Sustainable Development Policy (PO.003), Environment Policy (PO.002) and Quality Policy (PO.004). These policies are summarised in Table 3 below.

Table 3 PKCT Policies and Standards

Policy / Standard	Description
Sustainable Development Policy	<p>The sustainable development policy outlines the objectives PKCT undertake to ensure site operations are undertaken in a sustainable manner which considers the following key concepts:</p> <ul style="list-style-type: none"> • The health and safety values of PKCT staff, contractors and site personnel • Set and achieve sustainable development targets with respect to energy and water efficiency targets which promotes the efficient use of resources and include reducing and preventing pollution throughout the lifecycle of PKCT products • Develop partnerships that foster the sustainable development of our local communities, enhance economic benefits from our operations • Ongoing consultation with customers, employees, indigenous land owners and the local community.
Environmental Policy	<p>The environmental policy outlines PKCT commitment to improved environmental performance and ensuring site operations are undertaken in an environmentally responsible manner which includes:</p> <ul style="list-style-type: none"> • Understanding and controlling impacts of site operations on the environment and community • Maintain the highest possible standards of environmental management and monitoring • Compliance with regulatory requirements, conditions of approval and licence conditions • Ongoing consultation with customers, employees, indigenous land owners and the local community.
Quality Policy	<p>PKCT Business Management System provides a framework for managing quality and establishing, achieving and reviewing quality objectives in compliance with the requirements of AS/NZS ISO 9001:2016 and ISO 14001:2015. PKCT staff, contractors and site personnel will fulfil the requirements detailed in the AS/NZS ISO 9001:2016 and ISO 14001:2015 and continually seek opportunities to improve system effectiveness</p>

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4. SITE OPERATIONS

4.1 Water Usage

Figure 1 provides a flow diagram of water supply and usage for the PKCT Site. The primary use of water on the PKCT Site is for dust suppression of the coal products stockpiles. Water usage is weather dependant and usage tends to increase during dry and windy periods. Water usage and monitoring data is included annually in the AEMR.

Dust emission is the most significant environmental aspect that can potentially affect the community. PKCT seeks to prevent/ minimise dust emissions to within acceptable levels through the operation of stockpile spray systems, water sprays at transfer points, conveyor sprays and other controls. Numerous water sprays are located within the PKCT site. These controls replace moisture lost due to evaporation and maintain the required level of moisture within the coal products to limit escape of dust into the atmosphere. These operational activities require significant water use.

Historically, potable water was used onsite for all operational purposes. However, a potable water savings plan was implemented in 2009 with Sydney Water to obtain recycled tertiary treated effluent (TTE) from the adjacent Wollongong Sewage Treatment Plant. The project was commissioned in 2009 and has been in operation since that time. PKCT uses TTE across the site for dust suppression, wash-down of plant and equipment, and for emergency response such as firefighting.

In developing the recycled water project, the appropriate risk assessments and studies were completed to assess impacts associated with its use. Consideration was given to occupational health and safety, customer products and environmental impacts. In noting recycled water's higher nutrient content, consideration was given to the impact on surface run off, water collection and harbour discharges. Assessment included baseline sampling and testing of receiving waters.

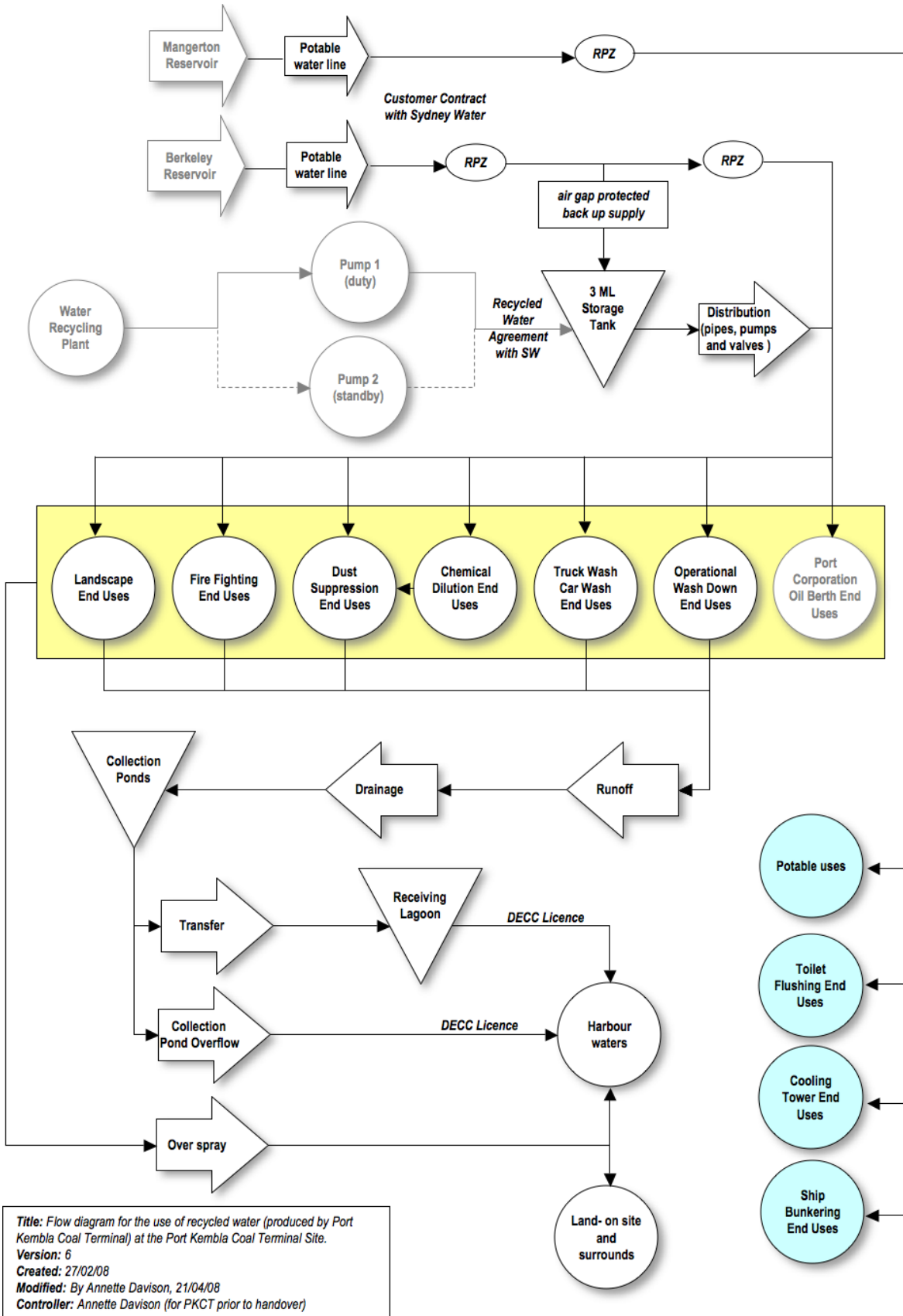
The receipt, storage, delivery and use of recycled water is controlled in accordance with the PKCT Recycled Water Quality Management Plan MP.016. This Plan integrates with the Sydney Water Recycled Water Quality Management Plan and Sydney Water Recycled Water Agreement, ensuring recycled water is supplied to the specified water quality.

Potable water is now only used for domestic purposes, such as amenities, drinking, washing and ship bunkering. With reference to Figure 1:

- Potable water is supplied by a water supply main from the Mangerton Reservoir, known as the 'Corrimal Street supply'
- There is a separate potable water supply from the Berkeley Reservoir, serving as a back-up supply in the event that TTE is unavailable from the Wollongong Sewage Treatment Plant, known as the Tom Thumb Road supply'.



Figure 1: Water Supply and Usage Flow Chart



Title: Flow diagram for the use of recycled water (produced by Port Kembla Coal Terminal) at the Port Kembla Coal Terminal Site.
 Version: 6
 Created: 27/02/08
 Modified: By Annette Davison, 21/04/08
 Controller: Annette Davison (for PKCT prior to handover)

4.2 Contaminated Water Collection and Treatment (CWCT) System

4.2.1 General Description of CWCT System

The Contaminated Water Collection and Treatment (CWCT) System at PKCT consists of a number of satellite collection ponds and sumps, strategically positioned to collect, convey, detain and treat all surface water, inclusive of stormwater and run off generated on the PKCT site. The surface water that collects in the collection ponds and sumps is pumped to a Settling Lagoon (Position 6), where it is treated to remove suspended coal particles by a combination of natural settling (due to the designed 'shape' of the Lagoon) and accelerated settling by dosing the water with a chemical settling additive (polymer flocculant). The Settling Lagoon discharges clarified water into Port Kembla Inner Harbour via Gurungaty Waterway or pumps clarified water to a truck filling station for road washing and dust suppression purposes. Discharges into the harbour must be undertaken in accordance with the operating conditions, monitoring requirements and concentration limits stipulated in EPL 1625.

The following figures provide details for the overall CWCT System:

- Figure 2: Drawing WP-H2-0022 (CWCT Catchment Areas Arrangement) provides details of the CWCT System catchment, including sub-catchment delineation for each pond / sump, and a high level process flow diagram for the CWCT System
- Figure 3: Drawing WP-H2-0021 (CWCT Site Wide Pump Discharge Pipework Arrangement) provides details of the discharge pipework arrangement for each pumping location, including details of which locations discharge to harbour.

In terms of infrastructure, the CWCT System consists of:

- Satellite collection ponds and sumps
- A Settling Lagoon, including the primary flocculant (polymer) dosing system, for removing suspended coal particles
- Pumps and associated pipe networks
- Two (2) secondary coagulant dosing systems, one at Central Pond and one at Northern Pond, for removing suspended clay particles (when required)
- Pond and sump level control infrastructure
- Programmable Automation Controller (PAC), Human Machine Interface (HMI) and electrical control systems.

Section 6.3 provides details for the operation and monitoring of the CWCT System.

4.2.2 CWCT System Discharges

The PKCT site has one (1) Licenced Discharge Point LDP16 at the Settlement Lagoon which allows PKCT to discharge water from the operation at any time provided the water quality meets the required pollution limits, as follows:

- Total Suspended Solids (TSS) does not exceed 50mg/L; and

- Oil and grease are not visible.

Discharge from LDP16 can exceed 50mg/L TSS as a result of rainfall exceeding a 5-day rainfall depth value of 90mm over a consecutive 5-day period.

A number of the satellite ponds and sumps in the CWCT System have their own piped emergency overflow to harbour. These ponds and sumps are termed as 'wet weather discharge' points in EPL 1625. There are six (6) 'wet weather discharge' points nominated in EPL (Note that DP27 is neither a piped overflow, nor a pond or sump):

- DP22 - TS1 Pond
- DP23 - Central Pond
- DP26 - Workshop Pond
- DP27 Berth 102 (overflow at southern end of berth)
- DP28 TS8 Sump
- DP29 South Eastern Pond.

These satellite ponds and sumps will overflow only when incoming stormwater exceeds the available surge volumes and pump capacities.

There is a requirement for PKCT to monitor the concentration of pollutants discharged from the PKCT operation. Refer to Section 6.3 for details of the monitoring protocols in place for the CWCT System.

4.2.3 Sedimentation Ponds

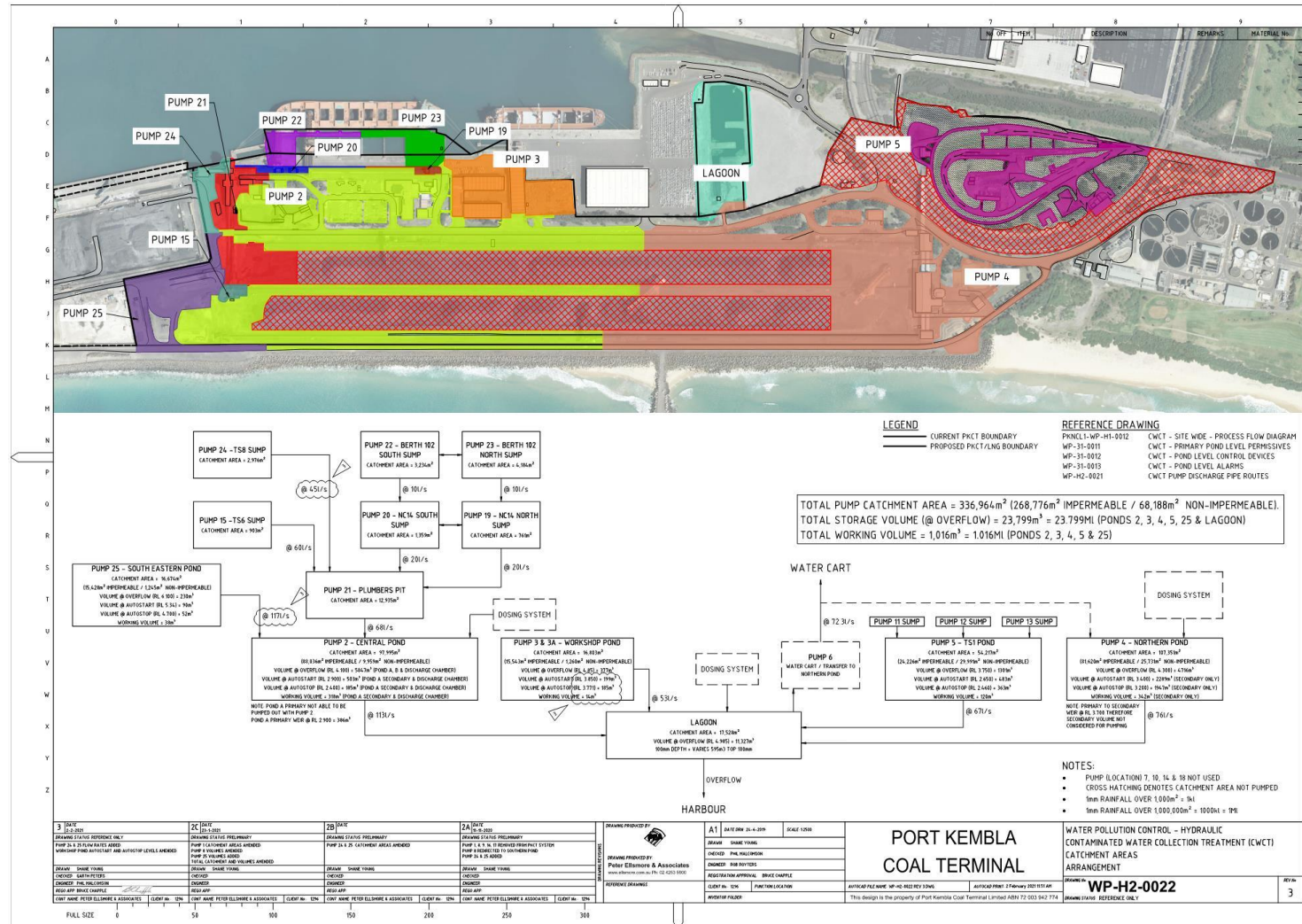
In addition to providing buffer storage during storms, the settling of suspended sediments occurs in the satellite ponds, prior to pumping to the Settling Lagoon for further water treatment. EPL 1625 stipulates that these 'Sedimentation Ponds' must be maintained to ensure that sedimentation does not reduce their capacity by more than 20% of the design capacity. These nominated satellite ponds therefore need to be cleaned periodically to prevent excess sediment build up that will reduce their detention volume.

The Sedimentation Ponds defined in EPL 1625 are:

- Central Pond (Position 2)
- Workshop Pond (Position 3)
- Northern Pond (Position 4)
- TS1 Pond (Position 5)
- Settlement Lagoon (Position 6)
- TS8 Sump (Position 24)
- South Eastern Pond (Position 25).



Figure 2: CWCT Catchment Areas Arrangement

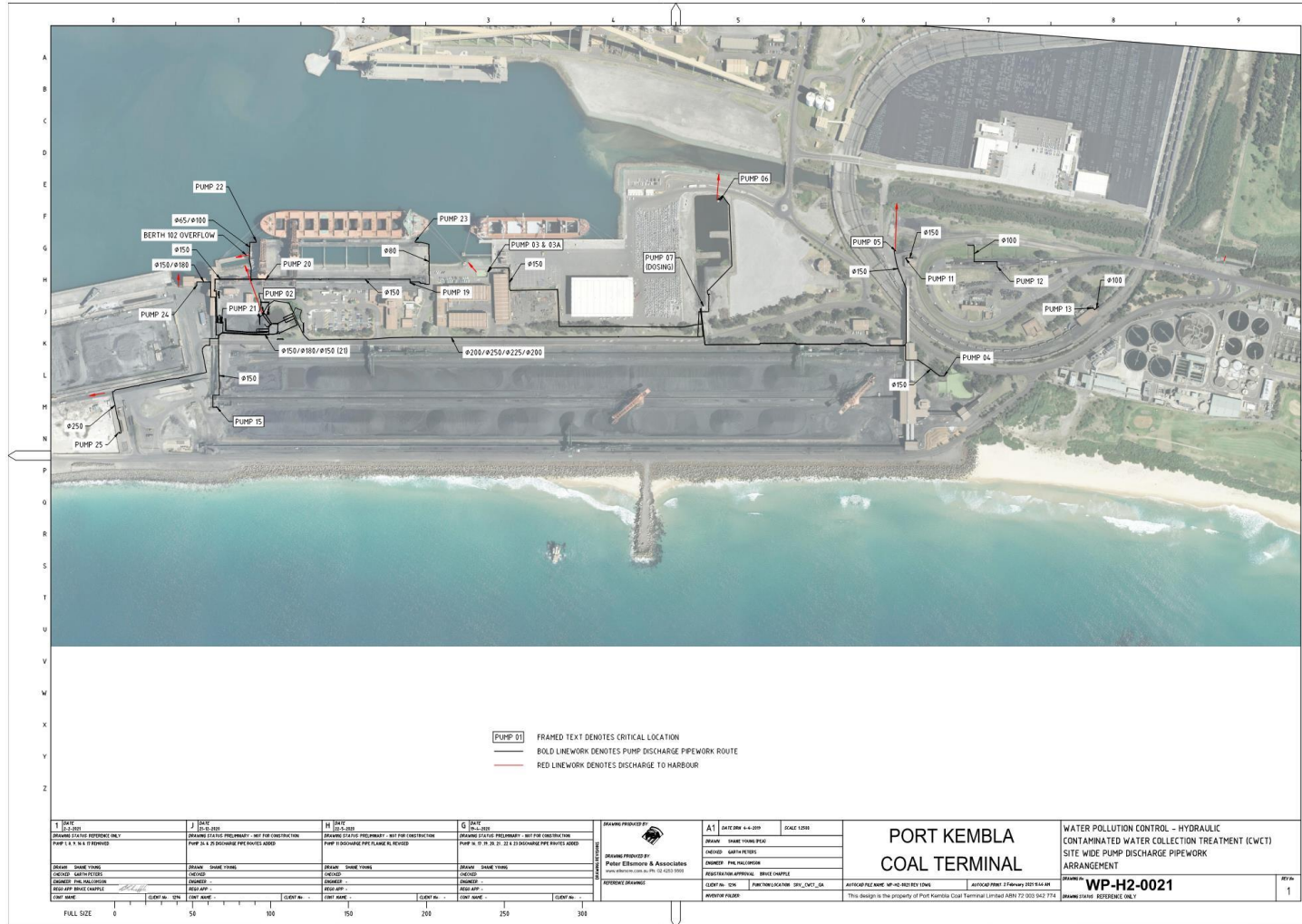


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Figure 3: CWCT Site Wide Pump Discharge Pipework Arrangement



4.2.4 Sediment Control

PKCT's site is contained primarily through a perimeter road network. Roads are asphalt with kerb and gutter, and the stormwater drainage system capturing run off drains back into the CWCT System. PKCT's stockyards are contained within this network and all material handling operations occur within the stockyards. Land disturbance of areas outside the road network is not normally required.

Consideration is given to environmental aspects when planning tasks at an operational or project level, as follows:

- Operational – task planning, job safety environment analysis.
- Project – change management, risk assessment, project evaluation.

Where surface works are proposed, consideration is to be given to the potential of erosion and sediment contamination of stormwater runoff. Consideration shall be given to the following key objectives:

- Diverting uncontaminated water away from the site of the proposed works.
- Minimising erosion by minimising site disturbance, stabilising disturbed surfaces and securing material stockpiles.
- Preventing sediment contaminated water from leaving PKCT's premises.

Though PKCT's drainage and collection facilities provide for the capture and containment of sediment contaminated runoff, this should be viewed as secondary containment. Where practical measures are available, controls shall be put in place to prevent/ minimise sediment contaminated water from leaving a disturbed site. Such measures would be beneficial in reducing sediment build up in pipes, ponds and drains.

The CWCT system has been designed to prevent run off water from leaving the PKCT site boundary, other than via the licenced discharge point LDP16 at the Settlement Lagoon, except when incoming stormwater exceeds the available surge volumes and pump capacities. Refer Section 4.2.2 of this WMP for further details.

An Erosion and Sediment Control Plan (ESCP) shall be prepared if there is a risk of runoff beyond the PKCT site boundary and this Plan shall be submitted to the appropriate regulatory authorities. The ESCP shall be prepared in accordance with Managing Urban Stormwater: Soils and Construction Manual (Landcom 2004), commonly known as the 'Blue Book', to ensure water is contained with the PKCT site boundary. A copy of the 'Blue Book' can be obtained from the DPIE publications webpage.

The ESCP must consider the following principles:

- Through inductions, tool box meeting and site communications, ensure all personnel are aware of their legal obligations in the prevention of pollution and the importance of preventing/ minimising sediment contamination of storm water runoff
- Minimise the extent of disturbance
- Install erosion and sediment controls before commencing work
- Inspect and maintain controls through to completion of the work
- In developing controls, consideration shall be given to the ones recommended as follows:

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- Minimise the number of entry points to the work site and stabilise to prevent/ minimise drag out. Clean adjacent areas regularly if adversely affected
- Install a silt fence on the lower side of a disturbed site
- Install wind protected waste receptacles to collect and store rubbish for disposal
- Divert runoff from the high side of a disturbed site
- Provide erosion/ sediment controls for stockpile
- Stabilise disturbed areas and embankments upon completion of works and clean up.

4.3 Site Water Balance

Water balance modelling of the CWCT system at the PCKT site was originally undertaken in 2010 and has been updated and reviewed accordingly, where changes to site operations have occurred, and includes:

- Catchment boundaries
- Areas of hardstand
- Changes to capacities of pump systems
- Changes in recycled water usage for dust suppression purposes.

The water balance model has been reviewed and updated to reflect the changes that have occurred at PKCT, including revised number of ponds included in the reduced site boundary, and relevant updated catchment boundaries, revised pump rates and revised pump operation levels. The water balance model consists of the three calculation modules which includes:

- Inflow module – Calculates the amount of water entering the ponds each day due to runoff from the local catchment (calculated by applying a runoff factor to the daily rainfall), additional inflows from stockpile sprays, discharges pumped inflows from upstream ponds, and overflows from upstream ponds.
- Outflow module – Calculates the amount of water removed from the ponds each day as a result of pumped discharges to downstream ponds, operational consumption (e.g. stockpile sprays and wash down activities), evaporation, seepage, and spillway discharges to the harbour.
- Final volume module – Calculates the volume of water remaining in the ponds at the end of each day.

Appendix A provides a copy of a Technical Memorandum prepared to describe the site water balance model.

4.4 AIE Site Interactions with PKCT

AIE is working to develop Australia's first liquefied natural gas (LNG) import terminal at PKCT's Berth 101. PKCT has reached a commercial agreement with NSW Ports and AIE to surrender the southern area of its lease for AIE to construct and operate the LNG import terminal. The date of surrender is 31/03/2021. The revised site boundary for PKCT, as shown in Figure 4, has resulted in a change in PKCT's site operations, infrastructure and environmental management strategies.

The changes include:



- Reduced lease area due to the surrender of Bulk Products Area, Berth 101 and Seawall Road
- The removal of five (5) collection ponds / sumps and two (2) wet weather discharge points from the PKCT Contaminated Water Collection Treatment System (CWCT), which include:
 - Pump 1 – Southern Pond (wet weather discharge point)
 - Pump 8 – T3 Pond (wet weather discharge point)
 - Pump 9 – Conveyor C7 Sump
 - Pump 16 – Berth 101 North Sump
 - Pump 17 – Berth 101 South Sump
- The addition of two (2) collection ponds / sumps and two (2) wet weather discharge points to the CWCT System, which include:
 - Pump 24 – TS8 Sump (wet weather discharge point)
 - Pump 25 – South Eastern Pond (wet weather discharge point)
- Amendment to the Air Quality Monitoring network which includes the relocation of the southernmost continuous dust monitor (nominated as C1)
- Traffic management and site access arrangements from the southern end of the revised PKCT site boundary.

PKCT and AIE will work collaboratively during the operation of the AIE site to ensure environmental obligations are met, site operations for PKCT and AIE can be run effectively and safely and any issues raised are dealt with in a timely manner.

Figure 4: PKCT Site Layout



5. MANAGEMENT STRATEGY

5.1 General

PKCT recognises that water is a valuable resource and the importance of water conservation. Similarly, PKCT is cognisant of potential impacts of PKCT operations on the community and harbour environs.

This is reflected in PKCT policy, in site requirements and communications to site personnel, together with the priorities placed on having effective environmental controls in place and pursuing improvements.

PKCT has an Environmental Management System in place certified to AS/NZS ISO: 14001:2015. Preventative processes such as audits, reviews, risk assessments provide for the identification of improvements. Corrective actions are identified through investigation when events occur or hazards are identified.

Improvements may be developed at an operational level but also strategically through PKCT's Business Planning process and capital works program.

5.2 Environmental Aspects and Impacts

Aspects listed on PKCT's Environmental Aspects and Impacts Register (RG.001) relating to water management which require assessment and control are as follows:

- Water usage – PKCT is a high water user, and as such, it is important to conserve water
- Recycled water usage – Higher nutrient levels in recycled water than potable water; on site impact and impact on receiving waters
- Water discharges – pH, oil/ grease, suspended solids; impact on harbour and adjacent waterways
- Trade waste – Discharge to sewer.

5.3 Management Reviews

Management reviews undertaken include:

- Business Planning – 5 year strategic and annual business plans (financial year) are developed identifying improvement projects. Inputs may include data from risk assessments, audits, legal compliance evaluation, SWOT analysis, stakeholder feedback, environmental incidents
- Business Management System Reviews – Inputs include legal compliance, ISO14001 and environmental matters.

5.4 Identification of System Improvements

Effectiveness and the need for improvement may be determined by management reviews at an operational level through site observations, incidents, as monitoring data becomes available or through the annual reporting process.

The Water Savings Action Plan is reviewed on a 6 monthly basis by relevant PKCT personnel, with a summary of the review shared with PKCT management. The reviews include:

- Review of current water usage against targets outlined within the plan, trends and proposed improvement initiatives
- Identification of any improvement opportunities
- Development of any significant improvements as projects through PKCT's project framework and capital works program
- Tracking of any new initiatives and projects within the Water Savings Action Plan to determine their effectiveness
- Sharing of any water improvement initiatives across the PKCT workforce via various communication processes as well as publicly within the AEMR.

All actions undertaken as part of the Water Savings Action Plan and any initiatives developed via this review process are tracked using PKCT's event management system.

EPL matters may result in EPL Pollution Reduction Studies or Programs. A number of Pollution Reduction Programs (PRPs) have been established and carried out associated with the water collection system. PRPs are recorded on the EPL and reported through EPL Annual Returns and DPIE AEMRs. PRPs deliverables also often require reports to be submitted. Records associated with PRPs are retained by PKCT and controlled. A list of PRP's associated with PKCT's Water Management Plan is shown in Table 5 below. Further details associated with the PRP's can be found in PKCT's EPL.

Table 4: EPL Completed PRP's

PRP Number	PRP Title	Status
PRP2	Water Collection System Performance Upgrade	Completed 31 st Jan 2007
PRP5	Reuse of treated effluent from Coniston STP in dust control	Completed 30 th Jun 2009
PRP8	Identify options to improve the performance of the stormwater pollution control system	Completed 31 st August 2010
PRP13	Algae control trial in Settlement Lagoon	Completed 31 st March 2014
PRP9	Performance upgrades to the stormwater control system	Completed 30 th June 2012

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PRP Number	PRP Title	Status
PRP12	Implement upgrades to stormwater pollution control system	Completed 16 th January 2017

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6. MONITORING PROTOCOL

6.1 Water Usage

PKCT has water meters installed on potable water and recycled water supplies which provide data on water usage. The data enables usage trends to be assessed and evaluated.

6.2 Recycled Water

The receipt, storage, delivery and use of recycled water is controlled in accordance with the PKCT Recycled Water Quality Management Plan MP.016. This Plan integrates with the Sydney Water Recycled Water Quality Management Plan and Sydney Water Recycled Water Agreement, ensuring recycled water is supplied to the specified water quality.

6.3 CWCT System Operation and Monitoring

Shift Teams, under the guidance of the Operations Manager, are responsible for operating, monitoring and troubleshooting the CWCT System. Shift Teams provide coverage 24 hours per day, 7 days per week.

The CWCT System is controlled by a Programmable Automation Controller (PAC), Human Machine Interface (HMI) and electrical control systems. The Main Control Room (MCR) is responsible for monitoring system status via the HMI, including system alarms, faults and discharges from site. As the CWCT System is a critical environmental system for the PKCT site, 'supercritical alarms' have been implemented in the HMI for aspects associated with compliance to EPL 1625. In addition to the monitoring of system status via the HMI, the Day Work Operations Team and Shift Teams perform physical in-field checks for the CWCT System during each shift.

There is a requirement for PKCT to monitor the concentration of pollutants discharged from the PKCT operation. Discharges to harbour are possible from the following locations on site at PKCT:

- Licenced Discharge Point LDP16 at the Settlement Lagoon
- The six (6) 'wet weather discharge' points nominated in EPL 1625:
 - DP22 TS1 Pond
 - DP23 Central Pond
 - DP26 Workshop Pond
 - DP27 Berth 102 (overflow at southern end of berth)
 - DP28 TS8 Sump
 - DP29 South Eastern Pond.

Shift Teams are responsible for taking a daily grab sample whenever any of the above locations are discharging from the PKCT site. Whenever the Settlement Lagoon is discharging, an observation is recorded of whether oil and grease is visible or not visible (as specified in EPL 1625).

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Samples are sent to a NATA-registered service provider for laboratory analysis and results are typically received within 5 working days. If results of a sample are found to be non-compliant with the pollution limits in EPL 1625, they are to be reported by the PKCT Environmental Specialist or other member of the PKCT management team to the EPA within 7 days, as per conditions R2.1 and R2.2 of PKCT's EPL. Water quality data is included annually in the AEMR.

6.3.1 Trade Waste

Trade waste flows generated by PKCT are low and infrequent. Basic monitoring is required by Sydney Water under PKCT's Trade Waste Permit No. 33844.

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7. EVENT MANAGEMENT

Shift Teams shall provide immediate action to respond to alarms and faults detected for the CWCT System, with support from other day work personnel if required. Identified system faults and failures shall be promptly attended to and suitable repair or remedial work initiated without delay to avoid an EPL exceedance.

In the event of a non-compliant discharge to harbour or another pollution event, Shift Teams are to enact a pollution incident response in accordance with the PKCT Pollution Incident Response Management Plan 2018 (MP.013). Refer to sections related to a 'Water Pollution Event' within that Procedure.

In the event of an EPL exceedance, the EPA will be notified and an investigation into the cause carried out. Investigation will seek to identify the root cause and the key contributing factors so that corrective actions may be identified to prevent a recurrence. The event will be entered into PKCT's Event Management System and actions tracked.

An event which causes (or may cause) material harm to the environment shall be reported to the EPA, DPIE and other relevant regulators in accordance with PKCT's Pollution Incident Response Incident Management Plan (PIRMP), MP.013. The PIRMP aligns with PKCT's obligations under the *Protection of the Environment Operations Legislation Amendment Act* (PEOLA) and DPIE Project Approval 08_0009. A written report shall be forwarded to DPIE (refer DPIE Approval Condition Schedule 4- Incident Reporting Condition 2 & 3).



8. REPORTING

8.1 Reporting

Reports on PKCT's water management are prepared and submitted to the EPA (EPL Annual Return), Monthly Environmental Monitoring Reports published to PKCT's website and DPIE (AEMR). Additional reports may be prepared to further support this Management Plan when necessary.

This Management Plan shall be reviewed annually and updated if required. The Plan may be updated earlier if there is a material change to current arrangements or as per the outcome of other reviews and audits.

8.2 Auditing

This Management Plan is included in the scope of PKCT's audit program. This includes a 3 yearly independent external audit which is tasked to review compliance with DPIE approval conditions. As a part of the ISO14001 accreditation process, PKCT undertakes six monthly external audits which include detailed reviews of the water collection system and monitoring/reporting processes. PKCT also has a scheduled program for conducting environmental task observations. Records of audits and environmental task observation are held in PKCT's event management system.

8.3 Preventative and Corrective Actions

In the event that the water sampling identifies an exceedance of the criteria stipulated in the EPL and DPIE approval, the results of monitoring are retained by PKCT to evaluate compliance, to meet reporting requirements, to provide historical data to determine performance and to determine whether system improvements are having the desired effect. PKCT will determine if system and operational improvements are required to ensure compliance with licence and condition of approval criteria.

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9. COMPLAINTS RECORDING AND REPORTING

PKCT has a 24 hour, 7 day free call community hotline number (1800 111448) and email link i.e. communitylinks@pkct.com.au which is advertised on the PKCT website (refer www.pkct.com.au). This provides a mechanism by which complaints and general enquiries regarding the environment or community issues associated with operational activities can be managed.

PKCT has a Stakeholder Management Procedure (PR.055) in place which ensures complaints are recorded, registered and investigated. Where appropriate, corrective actions are developed and implemented as detailed in Section 8.3 above.

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10. REFERENCES

The following documents are relevant to this Management Plan:

NSW DOP (2009) *Project Approval 08_009*. New South Wales Government Department of Planning.

NSW EPA, *Environmental Protection Licence (EPL) 1625*, New South Wales Environment Protection Authority.

PKCT *Stakeholder Management Procedure PR.055*. Port Kembla Coal Terminal

PKCT *Pollution Incident Response Management Plan MP.013*. Port Kembla Coal Terminal.

PKCT *Emergency Management Plan MP.001*. Port Kembla Coal Terminal.

PKCT *Environment Policy PO.002*. Port Kembla Coal Terminal.

PKCT *Environmental Aspects and Impacts Register RG.001*. Port Kembla Coal Terminal.

PKCT *Main Control Room Environmental Control PR.063*. Port Kembla Coal Terminal

PKCT *Quality Policy PO.004*. Port Kembla Coal Terminal.

PKCT *Recycled Water Quality Management Plan MP.016*. Port Kembla Coal Terminal

PKCT *Sustainable Development Policy PO.003*. Port Kembla Coal Terminal.

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Appendix A: Water Balance Model

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Technical Memorandum

Title	Port Kembla Coal Terminal Water Balance Model Review - 2017		
Client	Port Kembla Coal Terminat	Project No	8201802201
Date	04/09/2017	Status	Final
Author	Brad Elliott	Discipline	Water Infrastructure
Reviewer		Office	South Coast

1 Overview

Water balance modelling of the stormwater management system at Port Kembla Coal Terminal was originally undertaken in 2010 using a site-specific Microsoft Excel based daily water balance model. A 19 year rainfall data set dating back to 1991 was compiled from the Bureau of Meteorology (BOM) rainfall data from the surrounding area.

A number of model inputs and outputs were built into the model including daily rainfall, daily evaporation, operational water consumption, seepage, and overflows to the Port Kembla Harbour.

Model calibration was attempted for the period from 1/4/2009 to 10/2/2010 using rainfall data obtained from the BOM and overflow data supplied by PKCT.

The scope of this study was to review and update the water balance model to reflect the changes that have occurred at PKCT since 2010 including areas of hardstand, pump operating levels and upgrades to the Central Pond. The rainfall data set has been updated annually since 2010 to provide PKCT with an estimate of the annual flows discharged to the harbour.

2 Source Data

2.1 Catchment Areas

Catchment areas draining to the satellite ponds and Treatment Lagoon were defined using Figure 2 from the Mechatricity report. The catchment plan is presented in CFR GIS plan 1804 in Annex A. These catchments did not change from 2010 to 2017.

2.2 Rainfall Data

Rainfall data was originally sourced from the BOM using gauged rainfall data from the surrounding area. Rainfall data from two gauged sites was combined to create a continuous 19 year simulation rainfall data set spanning from 1991 to 2010. The rainfall data set has been updated since 2010 using the rainfall data collected at PKCT.

In order to ensure that the simulation daily rainfall dataset was representative of the actual rainfall pattern at the site, rainfall data from the different sources was assigned a preference according to their proximity to the site. The daily rainfall reading used in the simulation rainfall dataset on any given day was chosen from the closest available rainfall reading for that day. This approach ensured that the rainfall reading used in the simulation dataset for any particular day was measured as close to the site as possible.

The data sources used in the water balance modelling are listed in Table 1 (in order of preference and including distance from site). The nearest BOM gauge was the Port Kembla gauge, with is approximately

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2.2 km from the site. This gauge was not used however as data was missing frequently and any missed days appeared to accumulate on the next recorded day.

Table 1 Trip Generation of Proposed Development

Order of Preference	Data/Gauge Description	Data Source	Distance from the Site (km)
1	PKCT site data	PKCT, July 2010 – June 2017	0.0
2	Wollongong University Station ID 68188	BOM, Sep 1970 – Jun 2008	6.0
3	Bellambi, Station ID 68228	BOM, Apr 1997 – Apr 2010	10.0
4	Port Kembla, Station ID 68131	BOM, May 1963 – Oct 2009	2.2

2.3 Daily Evaporation Data

Evaporation rates were sourced from the BOM's Monthly Gridded Evaporation Data. The mean daily evaporation rate for each month was calculated by dividing the monthly evaporation total by the number of days in each month. A summary of the monthly and daily mean evaporation data used is provided in Table 2.

Table 2 PKCT Water Balance Modelling Rainfall Source Data

Month	Monthly Evaporation (mm/month)	Daily Mean Evaporation (mm/day)
1	200	6.45
2	175	6.25
3	150	4.84
4	150	5.00
5	150	4.84
6	80	2.67
7	80	2.58
8	125	4.03
9	150	5.00
10	175	5.65
11	175	5.83
12	250	8.06

2.4 Other Model Inputs and Assumptions

In addition to the catchment area, rainfall, and evaporation data described above, a number of other model inputs were used to simulate the water balance in the PKCT pond system. These are summarised in Table 3.

Table 3 PKCT Water Balance Model Input Parameters

Model Input / Assumption	Value	Source / Comment
Volumetric Runoff factor (impervious areas)	1.0	Calibration / review of industry standards (EPA, 1997)
Volumetric Runoff factor (pervious areas)	0.5	Calibration / review of industry standards (EPA, 1997)
Treatment Lagoon and Satellite Pond surface area	varies	Measured from aerial photograph
Average daily operational water consumption for dust suppressant	1.32 ML/day	Supplied by PKCT



Model Input / Assumption	Value	Source / Comment
Impervious fraction of catchment area	varies	CFR Report "Surface Water Management Appraisal", January 2008
Wind speed data		BOM
Dust Suppressant Runoff Factor	0.56	Calibration
Consumption from Treatment Lagoon for Road Washing	45.3 m ³ /day	Supplied by PKCT
Hydraulic Conductivity via pond foundation area	1.69 mm/hr	Calibration
Rainfall initial loss	5 mm	Calibration
Rainfall initial loss criteria	Initial loss only applied if rainfall in previous 3 days < 30mm	Calibration

3 Model Construction

The water balance model was built using Microsoft Excel. The model has been developed as a daily water balance with daily input/output flows to and from each pond in the system, and upstream components (e.g. stockpile sprays and upstream ponds) incorporated where required to create an accurate representation of the water balance in the pond system.

The water balance model consists of three general types of calculation modules:

(a) **Inflow Module** which calculates the amount of water entering the ponds each day due to runoff from the local catchment (calculated by applying a runoff factor to the daily rainfall), additional inflows from stockpile sprays, discharges pumped inflows from upstream ponds, and overflows from upstream ponds. The use of a runoff factor reflects the fact that only a proportion of the rainfall depth falling on the catchment will be converted to runoff, with the remainder lost through a variety of mechanisms including ground infiltration, absorption by vegetation, and filling of depression storages. The adopted runoff factors are provided in Table 3.3.

(b) **Outflow Module** which calculates the amount of water removed from the ponds each day as a result of pumped discharges to downstream ponds, operational consumption (e.g. stockpile sprays and wash down activities), evaporation, seepage, and spillway discharges to the harbour.

(c) **Final Volume Module** which calculates the volume of water remaining in the ponds at the end of each day. There is a net input on any given day if the inflow volume for any given pond is greater than the outflow. Conversely, there is a net output if the inflow volume is less than the outflow. The amount of water remaining in each pond at the end of each day is calculated by adding (or subtracting) the net input or output volume for that day to/from the amount of water present in that pond at the start of the day.

A separate "sub" water balance model has been constructed for each pond in the system. Each of these contains the above three calculation modules, with overflows from each "sub" models forming an INFLOW into "sub" model for the receiving (downstream) pond.

4 Original Model Calibration

The PKCT water balance model was originally calibrated using recorded overflow frequency and wind speed data. The records used for the original calibration cover the period from 1/4/2009 to 10/2/2010.

The recorded overflow data over this period was plotted along with Treatment lagoon overflows modelled by our water balance model over the same period. Calibration was then undertaken by fine tuning key model input parameters (such as rainfall runoff factors, initial loss criteria, and pond seepage rates, dust suppressant runoff factors) to optimise the correlation between the recorded and modelled overflow events.

It is important to note that the water balance modelling of the collection system uses long-term averages (for the daily rate of consumption for reuse from the Treatment Lagoon, dust suppressant runoff to collection system, and evaporation) as daily inputs and outputs. In reality, these parameters are likely to fluctuate



from day to day and month to month, and these fluctuations have an impact on the water balance in the collection system. Therefore, it is impossible to achieve a perfect correlation between modelled and measured data while using only long-term averages for process flows.

Notwithstanding the above, the objective of model calibration is to ensure the water balance model is predicting similar patterns to those measured onsite, such as the collection system's general response to runoff and the overall number of days that the Treatment Lagoon and Satellite Ponds are discharging to the harbour.

There are some minor discrepancies between the modelled and recorded overflow data. One of the discrepancies was that the model predicted 13 additional overflows from the Treatment Lagoon during the calibration period compared to the number of recorded events. Six of these events were less than 160 m3. The small volume of these predicted overflow events suggests they could have either been within the models' margin of error or the overflows were small enough that they were not detected.

The model predicted 7 overflows between the period from 16/6/2009 to 17/7/2009 that were not recorded. These were larger overflows and the discrepancy is likely to have been caused by either inaccuracies in the model or failure of monitoring equipment onsite. Inaccuracies in the model could have been caused by the use of long term averages for some of the input parameters in the absence of daily data.

Recorded overflows sometimes occurred on days when there was no predicted overflow in the model simulation. When this discrepancy did occur the recorded overflows were typically following a predicted overflow. This suggests that there was sometimes a delay between a rainfall event and an overflow from the Treatment Lagoon. This is to be expected considering that both the coal stockpiles and the satellite ponds retain the runoff for a period of time delaying it from reaching the Treatment Lagoon.

5 2017 Model Calibration Review

As part of this study the model calibration was reviewed using FY2017 overflow data (July 1, 2016 – June 30, 2017) supplied by PKCT. The results are presented in Table 4.

Table 4 Number of FY17 Pond Overflows in Water Balance Model Simulation

Ponds	Number of Overflows in Simulation	Number of Overflows recorded by PKCT
Southern Pond	0	1
Central Pond	0	2
Treatment Lagoon	46	54

There were a small number of discrepancies between the water balance model simulation overflows and the recorded overflows. The overflows at the satellite ponds were not predicted in the model as the daily input volumes did not exceed the daily output volumes. These recorded overflows may have been caused by a high intensity storm that exceeded the pump output and available storage within the pond.

There were a small number of overflows recorded by PKCT that did not seem to be caused by rainfall events. These may have been caused by high dust suppression use but could not be confirmed.

The water balance model simulation review confirmed the model achieves similar statistical output to the recorded overflow over the calibration period. Therefore, the model is considered appropriate for the intended purpose of assessing the effectiveness of the collection and storage of runoff at the PKCT site.

6 Existing System Performance

6.1 Collection System/ Satellite Ponds

The performance of the existing collection system including the satellite ponds was assessed using the calibrated water balance model. Table 5 summarises the number of overflows that occurred in the simulation based on the 26 years of rainfall data.

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Table 5 Number of Pond Overflows in Water Balance Model Simulation

Ponds	Number of Overflows in Simulation
Southern Pond	1
Tower 3 Pond	0
Central Pond	46
Northern Pond	16
TS1 Pond	5
Treatment Lagoon	1364

The water balance model highlights the Central Pond overflows much more frequently than the other satellite ponds. The frequent occurrence of Central Pond overflows is caused by the Southern and Tower 3 ponds discharging into the Central Pond.

The water balance model indicated that the Treatment Lagoon overflowed 1,364 days over the 26 year period. Water transfer from the satellite ponds to the Treatment Lagoon occurred on 4,630 days in the model. This suggests that water transfers from the satellite ponds to the Treatment Lagoon regularly requiring frequent operation of the polymer dosing system.