



KCT OPERATION WATER MANAGEMENT PLAN



Revision:	4.1
Date:	April 2023
Document Name:	KCT Operation Water Management Plan

REVISION HISTORY

Date	Revision	Description
15 Aug 2011	1	2011 KCT Operation Water Management Plan
5 Dec 2011	2	2011 KCT Operation Water Management Plan
Feb 2019	3	Review of Kooragang Coal Terminal Operation Water Management Plan to include: • New document format; • An updated Water Balance; • Update Water Management Infrastructure; and • Updates to the review frequency of the OWMP.
Jul 2019	3.1	Updates to the KCT Operation Water Management Plan addressing DPE comments on the previous plan including: • Addition of water infrastructure & erosion sediment control section • Updates to the Ground water management section • Addition of Site Water Management Schematic (Appendix B3.1, 3.2 & 3.3)
June 2022	4	Review of Kooragang Coal Terminal Operation Water Management Plan to include: • Update to reflect current overflow discharge points (as per EPL 1552), Table 1 & 3 • Update meteorological data reference in Figure 1 & 2 • Update Water Balance inputs, outputs in Figure 3 & 4
April 2023		Modifications/Additions made to address DPE feedback on version 4, as provided on 27 March 2023, including: • Inclusion of the design specification used for drainage channels at Port Waratah (section 3.1.1)

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PWCS Environmental Management System			
Review No.: 4.1	Review Date: April 2023	Review Due: April 2026	Page 2 of 35
Document ID: KCT Operation Water Management Plan		Authorised: Manager Sustainability and Corporate Affairs	

CONTENTS

1	INTRODUCTION.....	4
1.1	CONTEXT	4
1.2	PURPOSE.....	4
1.3	BACKGROUND	4
2	PLANNING.....	5
2.1	CHARACTERISTICS OF WATER MANAGEMENT	5
2.1.1	Meteorological Data.....	5
2.1.2	KCT Water Sources and Receptors.....	6
2.2	COMPLIANCE OBLIGATIONS	8
2.2.1	Approvals and Licencing.....	8
2.2.2	Approved Design Capacity.....	8
2.2.3	WATER Management Infrastructure.....	9
2.2.4	Erosion and Sediment Control.....	9
2.2.5	Standards.....	10
3	OPERATION AND SUPPORT	10
3.1	WATER MANAGEMENT SYSTEM.....	10
3.1.1	storages and management.....	10
3.1.2	design capacity	11
3.1.3	Water Balance.....	15
3.1.4	Groundwater Management.....	17
3.2	WASTEWATER AND SEWAGE TREATMENT	18
3.2.1	Potential Impacts on Water Management.....	18
4	PERFORMANCE EVALUATION	19
4.1	MONITORING AND MEASUREMENT.....	19
4.2	EVALUATION OF COMPLIANCE.....	22
4.2.1	Audit	22
4.2.2	Review.....	22
4.3	DATA RECORDING AND REPORTING	22
5	REFERENCE DOCUMENTS.....	24
5.1	PORT WARATAH DOCUMENTS	24
5.2	OTHER DOCUMENTS.....	24
6	DEFINITIONS.....	25
7	ACCOUNTABILITIES.....	27
APPENDICES		29
	APPENDIX A – KCT CONSENT REQUIREMENTS FOR OWMP	29
	APPENDIX B1 – KCT WATER MANAGEMENT SYSTEM SCHEMATIC.....	31
	APPENDIX B2 – KCT WHARF WATER MANAGEMENT SYSTEM SCHEMATIC	32
	APPENDIX B3.1 – KCT WATER MANAGEMENT SYSTEM (MAIN SITE EAST OVERVIEW)	33
	APPENDIX B3.2 – KCT WATER MANAGEMENT SYSTEM (MAIN SITE WEST OVERVIEW)	34
	APPENDIX B3.3 – KCT WATER MANAGEMENT SYSTEM (WHARF OVERVIEW)	35

Uncontrolled if printed			
PWCS Environmental Management System			
Review No.: 4.1	Review Date: April 2023	Review Due: April 2026	Page 3 of 35
Document ID: KCT Operation Water Management Plan		Authorised: Manager Sustainability and Corporate Affairs	



I INTRODUCTION

I.1 CONTEXT

Port Waratah Coal Services Limited (Port Waratah) owns and operates the Carrington and Kooragang Coal Terminals located in the Port of Newcastle, New South Wales (NSW). Each Terminal receives, assembles and loads coal from the producers across the Hunter Valley Coal Chain (HVCC) onto vessels for export to overseas customers.

Water resources are utilised during the operational functioning of the Port Waratah Terminals and are managed to maintain quality standards for onsite reuse and any external discharges. Managing water is a careful balance between capturing it for operational uses and allocating storage capacity in anticipation of storm events for compliance with statutory requirements. Port Waratah's aspiration regarding water management is to understand our stakeholders' expectations and to develop a consistent set of expectations across our operations that we meet. We are continually working to reduce our impact on the Hunter River by eliminating unlicensed events and improving the quality of stormwater overflows.

I.2 PURPOSE

The purpose of this Operation Water Management Plan (OWMP) is to ensure that statutory requirements are met and to provide information on the operational and environmental controls relating to the management of water at the Kooragang Coal Terminal (KCT).

The following types of water and how Port Waratah manage each aspect are included in this KCT OWMP:

- surface water (including runoff)
- process (or recirculated) water
- potable water
- groundwater

I.3 BACKGROUND

KCT is located on Kooragang Island which is bounded by the north and south arms of the Hunter River. KCT occupies an area of approximately 210ha in the South-East corner of Kooragang Island.

Further details of the site context of Port Waratah facilities can be found in the Port Waratah Operation Environmental Management Plan (OEMP).

Uncontrolled if printed			
PWCS Environmental Management System			
Review No.: 4.1	Review Date: April 2023	Review Due: April 2026	Page 4 of 35
Document ID: KCT Operation Water Management Plan		Authorised: Manager Sustainability and Corporate Affairs	

2 PLANNING

2.1 CHARACTERISTICS OF WATER MANAGEMENT

2.1.1 METEOROLOGICAL DATA

Port Waratah operations are situated in the NSW coastal strip characterised by the following climatic conditions:

- Warm summers and mild winters
- Uniform average total rainfall
- Influenced by the El Niño Southern Oscillation with increased probability of drier conditions with El Niño and increased probability of wetter periods in La Niña

Figures 1 and 2 below, illustrate the long-term (1862 to 2021) monthly mean maximum and minimum temperatures and mean monthly rainfall for the Bureau of Meteorology weather station, located on Nobby's Headland. This weather station is located 6km south-southeast of KCT.

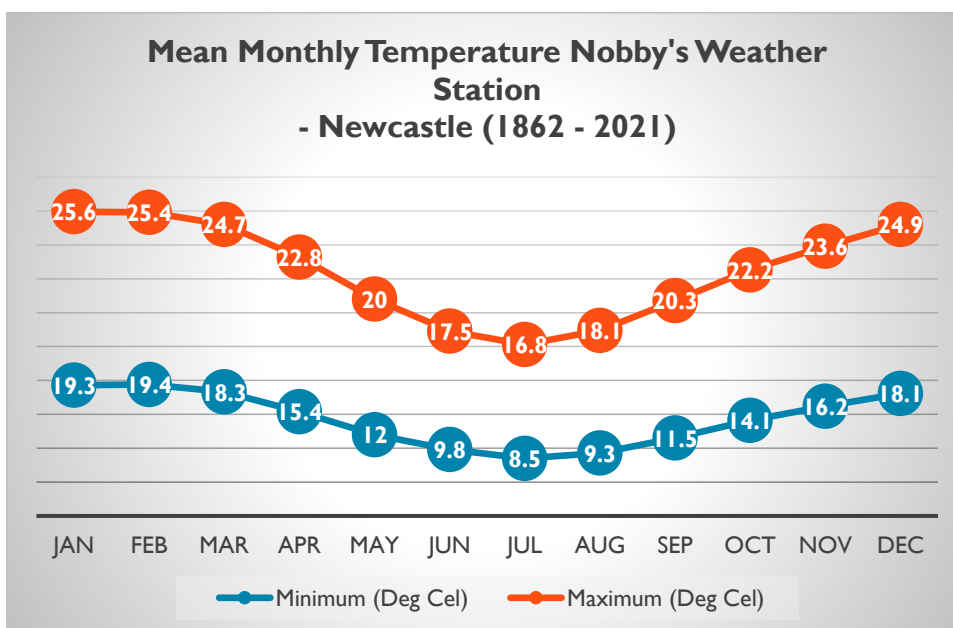


Figure 1: Mean Monthly Temperature Nobby's Headland (1862–2021)

Uncontrolled if printed			
PWCS Environmental Management System			
Review No.: 4.1	Review Date: April 2023	Review Due: April 2026	Page 5 of 35
Document ID: KCT Operation Water Management Plan		Authorised: Manager Sustainability and Corporate Affairs	

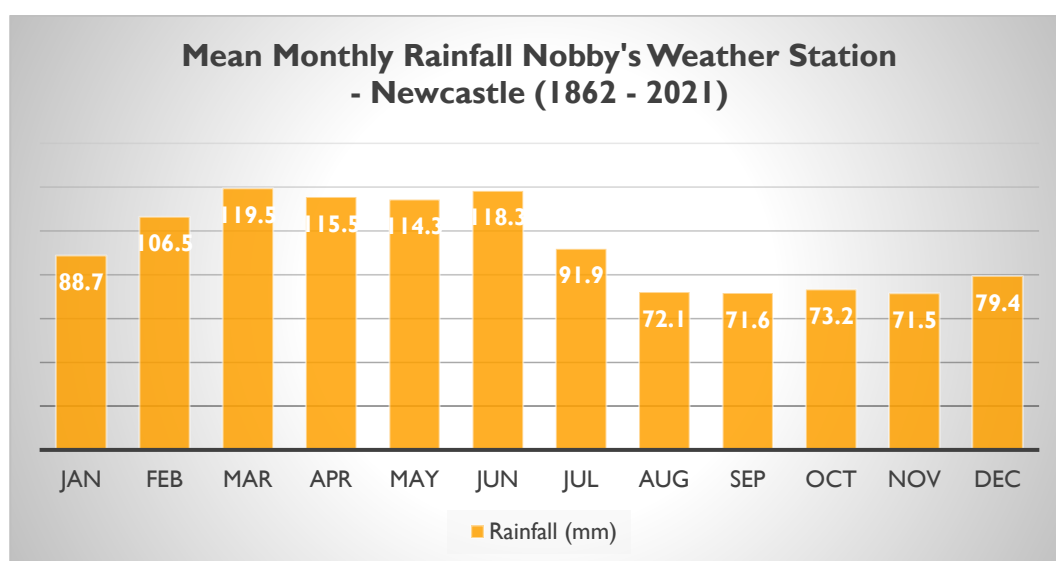


Figure 2: Mean Monthly Rainfall recorded Nobby's Headland (1862–2021)

2.1.2 KCT WATER SOURCES AND RECEPTORS

2.1.2.1 WATER SOURCES

The KCT operation does not extract water directly from the Hunter River but obtains water resources through onsite stormwater harvesting and internal recycling of process water and potable water. KCT can capture and store significant volumes of stormwater for use across the sites however during large storm events and prolonged rainfall, the design capacity of the water management system can be exceeded resulting in stormwater overflows to the Hunter River.

The KCT operation preferentially utilises water stored in the onsite dams, however, KCT has access to potable water for operational purposes when all other sources of water are unavailable. Port Waratah uses, on average, approximately 1,000 to 1,500 kL of process water per day at KCT. This usage fluctuates significantly dependant on the frequency and volumes of recent precipitation at the site, weather conditions and the activities relevant to the Terminal. Improvements to the water management system are performed to maximise the capture, storage and recirculation of water to minimise the usage rates of potable water for operational activities.

2.1.2.2 POTENTIAL SURFACE WATER RECEPTORS

Few potential surface water receptors are situated downstream of KCT operations. The Hunter River, Newcastle Harbour and Tasman Sea are in locations that could potentially receive surface water runoff from Port Waratah however this typically occurs only during large or prolonged rain events. As KCT has an enclosed water management system the majority of surface water is collected for onsite reuse.

The NSW Office of Environment and Heritage (OEH) released in July 2017, the *Hunter River Estuary Report Card 2016*. This Report Card was developed based on the *NSW OEH Lower Hunter River Health Monitoring Program* and preliminary ecological assessment which was implemented during 2014 - 2016. The findings of the Program identify that whilst there has been an improvement in the water quality of the Hunter River in the past decade, the lower reaches of the Hunter River estuary relevant to the downstream location of KCT, including the Hunter River South Arm and Port of Newcastle, are a degraded ecosystem.

Uncontrolled if printed			
PWCS Environmental Management System			
Review No.: 4.1	Review Date: April 2023	Review Due: April 2026	Page 6 of 35
Document ID: KCT Operation Water Management Plan		Authorised: Manager Sustainability and Corporate Affairs	

Another potential neighbouring surface water receptor includes the Hunter Wetlands National Park (including the Kooragang Nature Reserve), which is an extensive intertidal wetland system directly North of KCT. Surface water runoff from KCT does not enter this system under normal circumstances as discharge is intercepted and directed to the Hunter River.

2.1.2.3 POTENTIAL GROUNDWATER SOURCES AND RECEPTORS

Port Waratah operations are situated in areas typically characterised by elevated groundwater aquifers with nearby water courses and natural ecosystems. These natural systems may include but are not limited to the Hunter River, Newcastle Harbour and the Hunter Wetlands National Park.

Groundwater resources at KCT are characterised by two aquifers that are separated by an incomplete clay layer. The upper aquifer is typically fresher in nature and is largely recharged by rainwater. The lower aquifer is generally of more saline conditions and is linked to the local estuaries. Coal handling operations conducted at KCT do not typically interact directly with the groundwater aquifers as any significant groundwater interaction is generally limited to excavation or construction activities which are managed as required.

KCT has an extensive network of groundwater monitoring wells which are sampled and analysed for any potential impacts associated with the groundwater aquifers and generally to understand the characteristics of the local groundwater resources and flow pathways. Groundwater monitoring for KCT is conducted annually and is analysed and reported internally.

2.1.2.4 HUNTER WETLANDS NATIONAL PARK

Directly North and North-West of KCT is the Kooragang Nature Reserve which forms part of the Hunter Wetlands National Park. The estuary consists primarily of intertidal wetlands bordered by lowland floodplain forest, riparian woodlands and small areas of freshwater wetlands.

The Kooragang wetlands were RAMSAR listed in 1984 based on the following criteria:

- Representative, rare or unique wetlands
- Populations important for maintaining biological diversity
- Species at a critical stage in their life cycles or a refuge in adverse conditions
- Supports 1 per cent of the individuals in a population of one species or subspecies of waterbird.

Wetlands in general are considered important ecosystems as they filter water, control and mitigate floods, provide a range of flora and fauna habitats, and offer breeding areas for a range of aquatic and terrestrial species. It is important to ensure that all aspects of water management at KCT continue to protect this important ecosystem.

Uncontrolled if printed			
PWCS Environmental Management System			
Review No.: 4.1	Review Date: April 2023	Review Due: April 2026	Page 7 of 35
Document ID: KCT Operation Water Management Plan		Authorised: Manager Sustainability and Corporate Affairs	

2.2 COMPLIANCE OBLIGATIONS

2.2.1 APPROVALS AND LICENCING

Port Waratah holds Development Consents and Environment Protection Licences (EPL's) that facilitate the operation of the coal handling and associated wharf facilities. Port Waratah has approval to construct and operate KCT at a throughput capacity of 120 million tonnes per annum (Mtpa). This throughput capacity is the result of a series of development stages implemented over several years. This staged development has been supported by associated development consents and environmental assessments as required under the Environmental Planning and Assessment Act 1979. The most recent Project Approval being the KCT 120 Mtpa Project Approval (06_0189) dated 13 April 2007 which was last modified as the KCT 120 Mtpa Project Approval (06_0189 MOD 3) on the 26 November 2012.

The KCT water management system has been developed in accordance with the development consents identified above and as represented by the supporting environmental assessments namely the *Environmental Assessment Kooragang Coal Terminal Proposed Increase to Throughput Capacity* (Umwelt Pty Ltd 2006) and *Environmental Assessment KCT Stage 4 Project Fourth Dump Station & Fourth Shiploader* (Umwelt Pty Ltd 2009).

The KCT Development Consent 35/96 and Project Approval 06_0189 (MOD3) identify the requirement for Port Waratah to develop an OWMP. This Plan satisfies the requirement of these approvals for the purposes of communication and approval to the NSW Department of Planning and Environment (DPE). Further information regarding the requirements of the consents and approvals and where these conditions are covered in this document are contained in **Appendix A**.

Legislation applicable to water management on the KCT site include but not are limited to:

- Protection of the Environment Operations Act 1997 (POEO Act);
- Protection and the Environment Operations (Underground Petroleum Storage Systems) Regulation 2014;
- Environmental Planning and Assessment Act 1979 (EP&A Act);
- Water Act 1912;
- Water Management Act 2000;
- Water Management (General) Regulation 2018;
- Mining Act 1992;
- Water NSW Act 2014;
- Sydney Water Regulation 2017;
- Soil Conservation Act 1938; and
- National Environment Protection (National Pollutant Inventory) Measure 1998.

2.2.2 APPROVED DESIGN CAPACITY

As detailed by the KCT Environmental Assessments Port Waratah has constructed the KCT water management system to reflect a design capacity equivalent to the 1 in 100-year design 1 to 2-hour storm event. The *KCT 120 Mtpa Modified Project Approval (06_0189 MOD3)* includes Condition 2.13 which identifies that the system will overflow during a storm event that exceeds the 1 in 100-year ARI design capacity or due to prolonged wet weather. The ability to maintain the storm design capacity on site is limited by the inability for Port Waratah to manage storage levels via active discharge.

Uncontrolled if printed			
PWCS Environmental Management System			
Review No.: 4.1	Review Date: April 2023	Review Due: April 2026	Page 8 of 35
Document ID: KCT Operation Water Management Plan		Authorised: Manager Sustainability and Corporate Affairs	

The EPL held for KCT (No. 1552) does not permit the discharge of any waters however, the EPL does acknowledge that stormwater overflows do occur when the site's water management design capacity is exceeded. Potential overflow locations have been identified as points 16 to 24 in EPL 1552 which require representative sampling (Condition M2) from each point experiencing overflow. Condition M2 of EPL 1552 does identify analytes to be monitored for each representative sample taken monthly during discharge.

2.2.3 WATER MANAGEMENT INFRASTRUCTURE

Port Waratah's water management system is designed to harvest as much stormwater runoff and wash down water from the site as practical for later reuse in dust suppression and site management. The functional and geographical layout of the system is provided in the following appendices:

- Appendix B1 – Main KCT Water Management Schematic – describes the water infrastructure and the main flow paths around site.
- Appendix B2 – KCT Wharf Water Management Schematic – describes the water infrastructure and the main flow paths around the wharf area.
- Appendix B3 KCT Water Management System geographical layout consisting of:
 1. B3.1 – Main Site East overview
 2. B3.2 – Main Site West overview
 3. B3.3 – Wharf overview

The Water Management infrastructure is designed in accordance with the following philosophy:

- Runoff from the stockyard area is collected by a series of open channels and subsurface drains. The pads of the stockyard drain to low points adjacent to berms where water passes through a coarse layer of coal acting as a filter before being collected by an inlet pit. It is then directed to the site drainage system that leads to the ponds. The channels are generally constructed of concrete and consist mainly of curb and gutter design, v shaped drains or larger open drains with batters of 1:3. Earthen drains then channel the water from the stockyard into the sites pond storage system. The drains are generally constructed with 1:3 batters that are vegetated to minimise erosion. The drains are desilted as required.
- Runoff from the wharf and surrounding areas is collected in the reticulated drainage system and directed to settling lagoons, where it is pumped into the site drainage system.
- Workshop Area – runoff from the workshop area passes through a grit arrestor pit before being combined with the site drainage system. The grit arrestor pit is cleaned out as required.
- Water from the conveyor systems which includes dust suppression sprays and wash down processes are channelled via a series of launders, pipes and open drains into concrete collection sumps. Water is then directed into the site drainage system or wharf reticulation system with the coal material settling in the sumps cleaned out regularly with the use of front-end loaders.

2.2.4 EROSION AND SEDIMENT CONTROL

Erosion and sediment control is managed onsite in accordance with the requirements of the Blue Book (*Managing urban stormwater: Soils and Construction – Volume 1 (Landcom 2004)*). The water management system at KCT is a closed system that has been designed to contain runoff from a one in one hundred, two-hour duration storm. Overflows from the site to the Hunter River will only occur during extreme or prolonged wet weather, as such the receiving waters of the Hunter River will already contain elevated suspended solids

Uncontrolled if printed			
PWCS Environmental Management System			
Review No.: 4.1	Review Date: April 2023	Review Due: April 2026	Page 9 of 35
Document ID: KCT Operation Water Management Plan		Authorised: Manager Sustainability and Corporate Affairs	

during these events The onsite water management system consists of measures to remove sediment from the water which includes sumps, settling and clarifier dams and detention ponds (refer to **Section 3.1** for further details).

2.2.5 STANDARDS

The comparison of monitoring results and associated trends will refer primarily to any criteria listed by consent, approvals and licences. Where criteria is not identified, Port Waratah will consider and compare results to other relevant standards such as the *Australian and New Zealand Guidelines for Fresh and Marine Water Quality 2000* developed by the *Australian and New Zealand Environment and Conservation Council (ANZECC)*.

3 OPERATION AND SUPPORT

3.1 WATER MANAGEMENT SYSTEM

This KCT OWMP is designed to provide an overview of the water management systems at KCT and has been developed as a sub plan to the OEMP.

KCT has a water management system which is fully enclosed and is designed to accommodate the capacity of a 1 in 100-year 2-hour storm event or equivalent. This system operates by collecting process water used during operations and capturing surface water in all operational areas of the site. This water is then channelled to drains and sumps which feed into a series of ponds/ lagoons for settling and clarification prior to recirculation back to the plant for reuse. After rainfall is received the recovery time of the system to prepare for and manage further rainfall is impacted as water can only be reused around site and not actively discharged.

3.1.1 STORAGES AND DRAINAGE MANAGEMENT

The water management system consists of a system of drains, sumps, launders, settling ponds/ lagoons, storage tanks and recirculation infrastructure. This system collects surface water from operational activities and rain events and diverts it for reuse. **Tables 1 & 2** below provides information regarding the water management structures, their locations and connections within the system. See **Appendix B** for the Water Management System schematics and geographical representation.

Water collected by the water management system at KCT can have high levels of Total Suspended Solids (TSS) due to the contact with and transportation of coal fines. Water is primarily directed towards settling ponds or lagoons via an extensive drainage system. The drainage system and ponds/ lagoons are designed to allow for fines to settle and deposit before recirculating the water for reuse through dust suppression and washdown systems. Clarified water is pumped to storage tanks when the Total Suspended Solids (TSS) is below the trigger level identified in Citect for reuse in operations.

The drainage channels consist predominantly of concrete lined floors with a mixture of vertical and battered walls that are constructed of concrete or earthen materials. Drainage channels at Port Waratah typically align with the Typical channel arrangements used at Port Waratah are provided in Figure 3.

Uncontrolled if printed			
PWCS Environmental Management System			
Review No.: 4.1	Review Date: April 2023	Review Due: April 2026	Page 10 of 35
Document ID: KCT Operation Water Management Plan		Authorised: Manager Sustainability and Corporate Affairs	

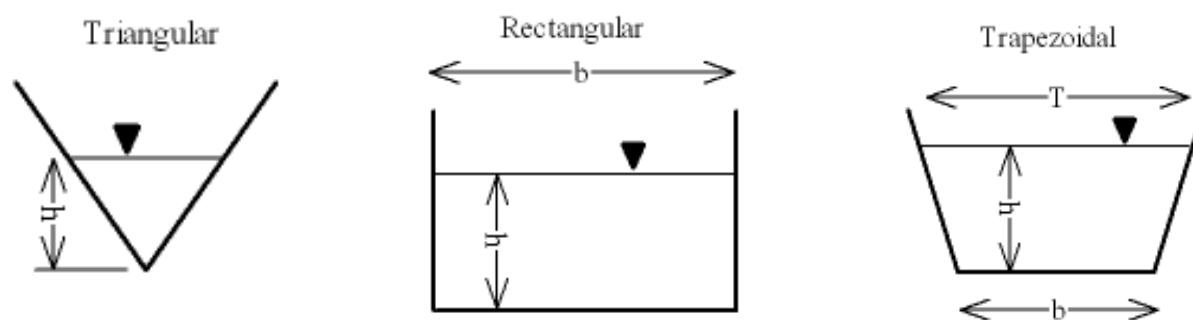


Figure 3: Typical cross sectional drainage designs implemented at Port Waratah

Examples of operational activities and systems which utilise and recapture water for reuse include:

- Dust suppression sprays (i.e. dump stations, pads, conveyors, wharf)
- Washdown of conveyors, transfer houses, stackers and reclaimers
- Wharf launder system (i.e. wharf washdown of ship loaders and deck)
- firefighting (yard conveyors)
- filling water trucks for road cleaning and dust suppression

Weekly inspections of the water management systems are conducted to monitor the effectiveness and assess the capacity for stormwater harvesting. Sediments collected in drains, sumps and ponds/ lagoons are removed as required to ensure adequate water storage capacity.

Surface water collected from unsealed areas has the potential to collect non-coal sediment materials which can deposit in the water management system. Port Waratah actively seals or stabilises available areas where practical to prevent the collection of non-coal sediments in the water management system. This sealing is completed using a range of methods including roadway sealing, dust suppressant chemicals or vegetation to assist in the management of dust and the collection of sediment in stormwater runoff. For areas not suitable for sealing or relevant to project work where ground disturbance may occur, the implementation of sediment and erosion controls is used to manage potential impacts.

Port Waratah implements a monitoring program at KCT to assess the quality of water at various locations within the water management system. Further information regarding the KCT water monitoring program is detailed in **Section 4**.

3.1.2 DESIGN CAPACITY

The KCT water storage ponds overflow to the Hunter River when a storm event or prolonged wet weather causes the volumes held and received to exceed the design capacity of the system. The design capacity of the system and the recognition that the system would overflow under these circumstances is permitted under Project Approval Condition 2.13 which is as follows:

2.13 The Proponent shall not permit the discharge of any water from the Site to the Hunter River unless expressly provided under the provisions of an Environment Protection Licence, or when a storm event exceeds a 1 in 100 year ARI event or after prolonged wet weather 'equivalent' to this event.

The EPL held for KCT (No. 1552) does not permit the active discharge of any waters however, as approved by the KCT Project Approval, the EPL does acknowledge that stormwater overflows do occur when the

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PWCS Environmental Management System			
Review No.: 4.1	Review Date: April 2023	Review Due: April 2026	Page 11 of 35
Document ID: KCT Operation Water Management Plan		Authorised: Manager Sustainability and Corporate Affairs	

site’s water management design capacity is exceeded. Overflow locations have been identified as points 16 to 28 in EPL 1552 which require representative sampling (Condition M2) from each point experiencing overflow. Further information regarding the monitoring of the KCT water overflow points as identified in EPL 1552 is detailed in **Section 4**.

After rainfall is received the recovery time of the system to prepare for and manage further rainfall is impacted as water can only be reused around site. Any unlicensed discharges or unlicensed stormwater overflows are reported to the EPA and other authorities in accordance with EPL and legislative requirements.

Uncontrolled if printed			
PWCS Environmental Management System			
Review No.: 4.1	Review Date: April 2023	Review Due: April 2026	Page 12 of 35
Document ID: KCT Operation Water Management Plan		Authorised: Manager Sustainability and Corporate Affairs	

Table 1: KCT water management system structures

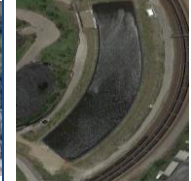
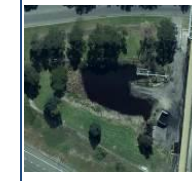
Parameters	EER23 Pump Well	Settling Lagoon 2	Clarified Lagoon 2	Detention Pond D	Settling Lagoon 1	Clarified Lagoon 1	Detention Pond A & B	Detention Pond C	Detention Pond 1	Detention Pond 2	2.5 ML Tank	4 ML Tank	80KL Break Tank
Aerial View													
Capacity	0.25 ML	9.0 ML	12 ML	43.9 ML	12 ML	10 ML	64 ML total	18.9 ML	1.36 ML	1.54 ML	2.5 ML	4 ML	0.08 ML
Position	Rail loop – furthest west	Rail loop between EER23 & Detention D	Rail loop between Detention D & Clarified 1	Rail loop between Settling Lagoon 2 & Clarified 2	Rail loop – East of tanks	Rail loop – West of tanks	Rail loop – between Settling Lagoon 1 & Detention C	Rail loop – East of Detention A&B	South of Curlew St	North of Curlew St	North on tank strip	Middle on tank strip	South on tank strip
Purpose	Screening & Primary Settling	Primary Settling	Clarified water storage	Storm water storage from Settling Lagoon 2	Primary Settling	Clarified water storage	Storm water storage	Storm water storage	Collection & Primary Settling	Collection & Primary Settling	Ready to use water storage	Ready to use water storage	Ready to use water storage
Input	Operations & stormwater from the Western half of stockpile pads	Pumped from EER23	Pumped from Settling Lagoon 2 & Detention D	Overflow from Settling pond 2	Operations & stormwater from the Eastern half of Stockpile pads, transfer houses and wharf return	Pumped from Settling Lagoon 1 & Detention B harvest pump	Pumped from Settling Lagoon 1	Pumped from Detention Pond B	Out bound transfer house & conveyors	Pumped inflow from Detention Pond 1	Hunter Water Potable water main & clarified water from 80KL & 4ML tank water	Hunter Water Potable water main & clarified water from 80KL & 2.5 ML tank water	Clarified Lagoons 1&2
Output	– Pumped to Settling Lagoon 2 – Overflow (EPL1552, ID 26)	– Pumped to Clarified Lagoon 2 – Gravity feed to Detention Pond D – Overflow (EPL1552, ID 24)	– Clarified 1 equalisation – Pumped to 80KL tank – Overflow (EPL1552, ID 25)	– Pumped to Clarified Lagoon 2 – Overflow (EPL1552, ID 23)	– Pumped to Clarified Lagoon 1 & Detention Pond A&B – Overflow (EPL1552, ID 21)	– Clarified 2 equalisation – Pumped to 80KL tank – Overflow (EPL1552, ID 22)	– Pumped to Clarified Lagoon 1 or Detention Pond C – Overflow (EPL1552, ID 20)	– Pumped to Detention Pond B – Overflow to Detention Pond B	– Pumped to Detention Pond 2 – Overflow (EPL1552, ID 27)	– Pumped to SL1 via open channel on Eastern main site boundary – Overflow (EPL1552, ID 28)	– Clarified water to Pump house	– Clarified water to Pump house	– Clarified: 2.5ML & 4ML tanks

Table 2: KCT Wharf water management system structures

Parameters	K4 Settling Pond	K4A Settling Pond	K5 Settling Pond	K6 Settling Pond	K6 Detention Pond	K7 Settling Pond	K7 Detention Pond
Aerial View							
Capacity	4.0 ML	6.5 ML	4.7 ML	2 ML	1.85 ML	2.8 ML	1.8 ML
Position	Northeast of K4 Wharf	Northeast of K4 Wharf	North of K5 Wharf	North of K6 Wharf	East of K6 Settling Pond	North of K7 Wharf	Northwest of K7 Settling Pond
Purpose	Primary Settling	Primary Settling	Primary settling	Primary Settling	Storm water detention	Primary settling	Storm water detention
Input	Operations & stormwater from Wharf drainage & outbound transfer house K4A (Gravity flow above RL2.6)	Operations & stormwater pumped from K5 & K7 directly and K6 (if K5 bypassed) K4 (Gravity flow above RL2.6),	Operations & stormwater from wharf drainage	Operations & stormwater from wharf drainage	Gravity flow from K6 Settling Pond	Operations & stormwater from wharf drainage	Gravity flow from K7 Settling Pond
Output	Pumped to Settling Lagoon I via Open channel on Eastern main site boundary Overflow (EPL1552, ID 16)	Pumped to Settling Lagoon I via Open channel on Eastern main site boundary	Pumped to K4A Settling Pond Overflow (EPL1552, ID 17)	Pumped to K5 Settling Pond or K4A (if K5 bypassed) Overflow (EPL1552, ID 18)	Gravity flow to K6 Settling Pond	Pumped to K4A Settling Pond Overflow (EPL1552, ID 19)	Gravity flow to K7 Settling Pond

3.1.3 WATER BALANCE

The coal handling activities undertaken at KCT utilise water for a range of purposes in different areas of the operation. The use of this water is essential to the management of the coal handling activities, maintenance of plant and equipment, and the suppression of dust. Additional water resources are used in areas such as amenities, landscaping, vehicle washing, and fire systems as identified in **Table 2** below.

Table 3: Water inputs / outputs and usage at KCT

Total Water Input	• Potable water from Hunter Water Corporation • Rainfall
Potable Water Usage	• Supplement recycled water for operational requirements • Firefighting (general) • Vessel water supplies • Truck/car washdown • Liquid resistors • Employee amenities and kitchen facilities • Landscaping and other uses
Process Water Usage	• Dust suppression and stockpile water sprays • Firefighting systems • Wash down • Landscape irrigation
Total Water Output	• KCT stormwater overflows through licenced discharge points primarily into the channel flowing into the North Arm of the Hunter River and to the Harbour (only during significant rain events in excess of the design capacity or due to prolonged rainfall)
Losses	• Evaporation • Infiltration • Leaks • Coal dust suppression – Overseas with the export coal • Disposal of effluent to sewer

Port Waratah has developed and integrated a Water Balance Model to assist in the effective management of water resources on site. The KCT Water Balance Model is a water balance developed using GoldSim software which has been calibrated and integrated with the KCT SCADA and Citect system to use real time and forecast information and display for operational personnel. The purpose of the Model is to allow for the analysis of the KCT water management system in relation to water storage relationships with usage and forecast weather scenarios.

A graphical representation of the inputs, outputs and uses for the water management system for 2019, 2020 and 2021 is detailed in **Figure 4**. A summary of the average water balance for the entire 3-year period is provided in **Figure 5**. The significant increase in potable water use and comparative low rain falls recorded on site in 2019 reflects the transition from drought which effected much of the state. 2020/21 represent a more typical year in terms of KCTs water balance.

Uncontrolled if printed			
PWCS Environmental Management System			
Review No.: 4.1	Review Date: April 2023	Review Due: April 2026	Page 15 of 35
Document ID: KCT Operation Water Management Plan		Authorised: Manager Sustainability and Corporate Affairs	

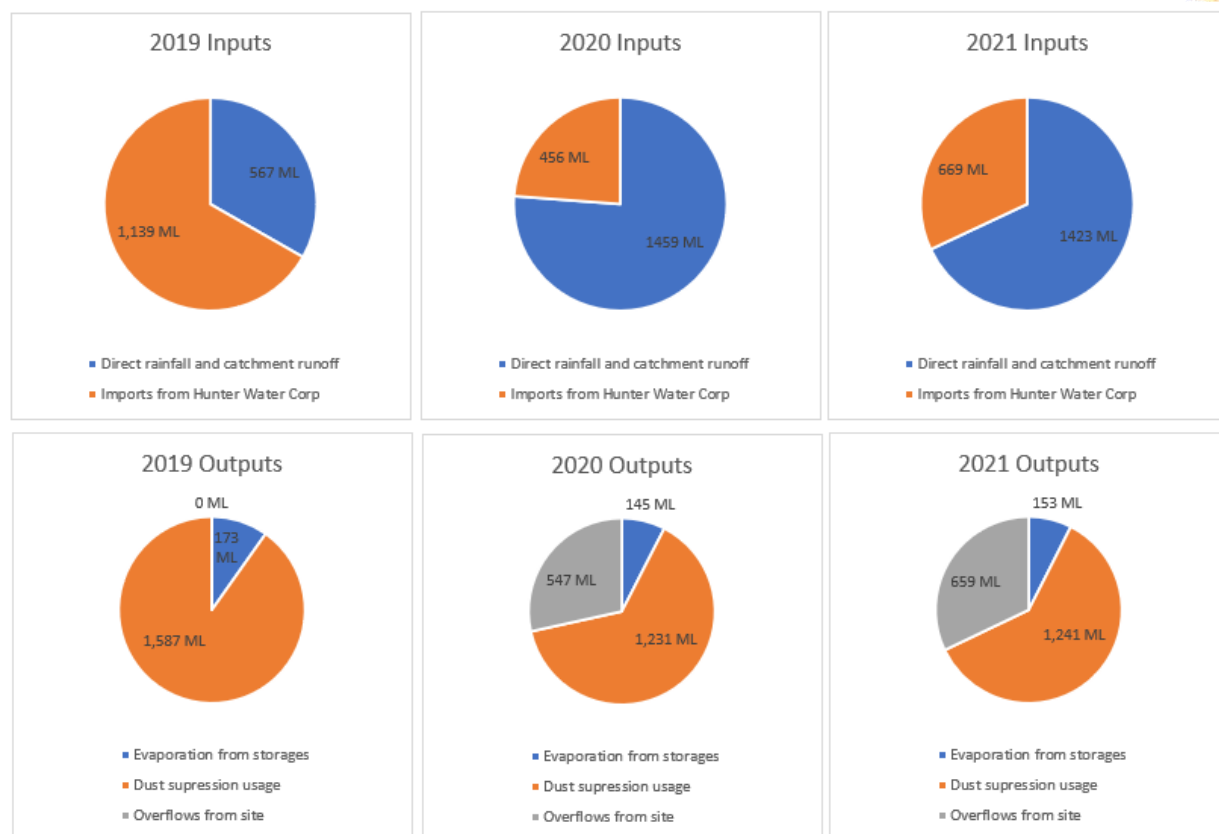


Figure 4: Water Balance inputs, outputs and use for 2019 - 2021

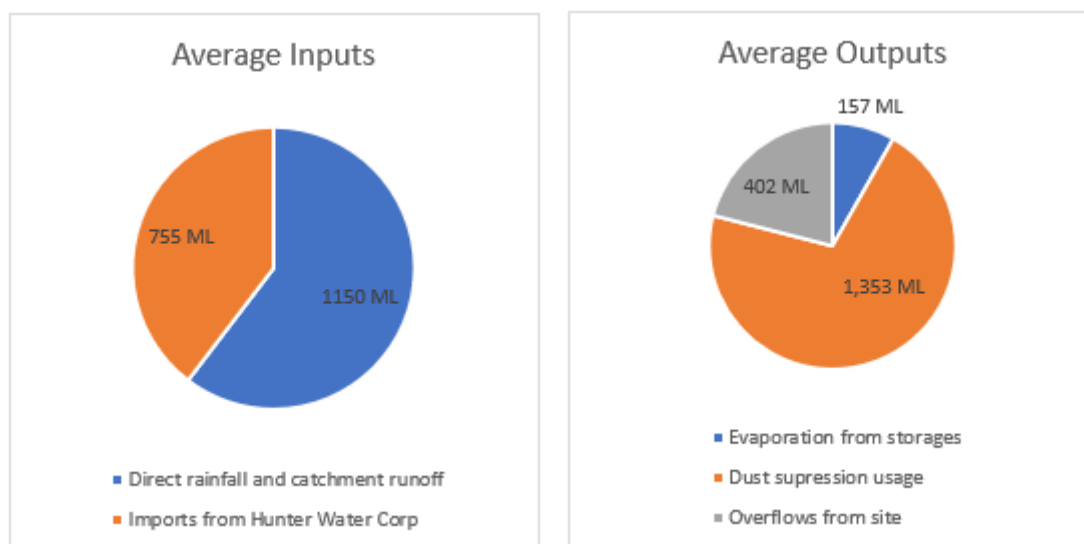


Figure 5: Average inputs and outputs for the past 3 years

Uncontrolled if printed			
PWCS Environmental Management System			
Review No.: 4.1	Review Date: April 2023	Review Due: April 2026	Page 16 of 35
Document ID: KCT Operation Water Management Plan		Authorised: Manager Sustainability and Corporate Affairs	

3.1.4 GROUNDWATER MANAGEMENT

Port Waratah maintains a network of groundwater monitoring wells at KCT to facilitate the monitoring of the groundwater resources to assess volume and quality trends and consider any potential impacts Port Waratah operations may have on groundwater resources.

A review of historical information and past groundwater sampling programs has been undertaken to assist in the development of a comprehensive groundwater monitoring program for KCT that is implemented each year. Each year the assessment and update of groundwater contours is conducted to enable Port Waratah to better understand the movement of groundwater at KCT.

The hydrogeological systems at KCT are affected by significant volumes of fill associated with the historical reclamation works that created the Kooragang Island formation from a number of smaller islands, channels and shallows. The historical flow of water and reclamation of land using fill material has impacted on the movement of groundwater particularly at KCT complicating the understanding of groundwater dynamics. Port Waratah has however completed a range of groundwater investigations including an annual groundwater monitoring program and supporting documentation associated with the Environmental Assessments completed for the approval of the staged expansion of the KCT facility.

The bulk of large-scale construction at KCT has been completed, however projects may require construction of subsurface structures, creating a need to dewater during construction. Generally, excavations are minimised to avoid potential impacts on and from groundwater ingress. Where excavation is deemed necessary, appropriate groundwater measures are implemented (after a detailed risk assessment is completed) which may include the following:

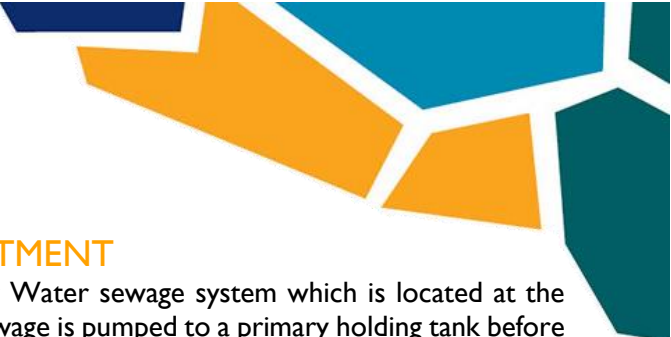
- Cut off walls e.g. sheet piling, diaphragm walls
- Excavation lining e.g. shoring screens, jet grout plug
- Groundwater interception e.g. perimeter drains, extraction wells
- Groundwater recharge e.g. recharge wells or trenches

Port Waratah will develop specific Dewatering & Groundwater Management Plans as appropriate and obtain licences from Authorities (such as the NSW Department of Industry—Lands & Water Division) as required.

Dewatering & Ground water management plans will as a minimum consist of the following:

- A description of site geology and hydrogeological setting;
- An overview of the proposed development, including dewatering and reinjection well networks;
- Details of compliance requirements associated with the relevant licences & environmental legislation and
- A summary of subsurface conditions based on previous investigations
- Estimates of potential water inflows and aquifer draw down based on modelling and analytical methods;
- A water monitoring plan including test parameters, frequency, sample collection and handling procedures and contingency measures; and
- Decommissioning and long-term management requirements.

Uncontrolled if printed			
PWCS Environmental Management System			
Review No.: 4.1	Review Date: April 2023	Review Due: April 2026	Page 17 of 35
Document ID: KCT Operation Water Management Plan		Authorised: Manager Sustainability and Corporate Affairs	



3.2 WASTEWATER AND SEWAGE TREATMENT

Amenities located at KCT are connected to the Hunter Water sewage system which is located at the front of the Kooragang Coal Terminal near Curlew St. Sewage is pumped to a primary holding tank before being pumped to the sewer system.

A number of onsite septic tanks exist in some remote locations at KCT such as contractor site sheds etc. These tanks are periodically emptied, and the effluent taken offsite for disposal.

3.2.1 POTENTIAL IMPACTS ON WATER MANAGEMENT

3.2.1.1 DROUGHT

Access to adequate water supplies is a critical aspect of operations at Port Waratah. The ability to maintain adequate supply, capture and storage of water resources for onsite use may be negatively impacted during periods of drought if the capacity to purchase water from Hunter Water becomes restricted.

Operations at KCT primarily use captured stormwater and recycled water for industrial purposes, but also relies on potable water to augment supplies. Port Waratah does not extract water from the Hunter River or groundwater for operational purposes.

3.2.1.2 SURFACE WATER & FLOOD

The KCT is located in a low-lying area and may be susceptible to localised flooding during storm surge periods of significant or prolonged rainfall. As the Port Waratah operations are located near the mouth of the Hunter River as it enters the Newcastle Harbour and Tasman Sea, any significant rain events within the Hunter River catchment can have a flow on impact to KCT operations.

Potential impacts relevant to KCT operations from significant rain events or prolonged rainfall (including localised and also within the upper catchment) include increase in overland surface water flows, potential for stormwater overflows, damage to infrastructure (particularly wharf areas) and suspension of operations.

To reduce the potential impacts of surface water and floods, Port Waratah implement the following measures:

- Use of an integrated Water Balance Model;
- Use of a meteorological forecasting systems; and
- Maintaining sufficient capacity in the sites stormwater system to contain the design rainfall event.

A Flood Risk Review was conducted by Newcastle City Council (NCC) on behalf of Port Waratah in 2011 to assess the potential impact of a 'severe flood event'. The NCC considers such an event to be a 1 in 100-year occurrence flood. As an outcome of the review, NCC issued Port Waratah with Flood Information Certificates for KCT which has been used to assess the potential onsite impacts.

The findings of the Review are as follows:

- Key operational infrastructure at KCT is positioned above the estimated flood levels for a 1 in 100-year flood event.
- Site entry roads may be subjected to flooding however estimated water levels would indicate that entry roads may remain passable for vehicles.

Uncontrolled if printed			
PWCS Environmental Management System			
Review No.: 4.1	Review Date: April 2023	Review Due: April 2026	Page 18 of 35
Document ID: KCT Operation Water Management Plan		Authorised: Manager Sustainability and Corporate Affairs	

- Significant rainfall may impact on the effectiveness of transporting coal on conveyor systems, particularly inclined conveyors.
- The ARTC rail network may be impacted locally and upstream causing impacts to the ability to deliver coal to the Terminals.
- Higher water levels in the Newcastle Harbour may impact on ship loading.
- The Hunter River and Newcastle Harbour may be subjected to significant amounts of floating debris that may impact vessel movements and even cause Harbour closures.

4 PERFORMANCE EVALUATION

4.1 MONITORING AND MEASUREMENT

The KCT water quality monitoring program has been developed to facilitate the analysis of key site water resources additional to the requirements of the KCT EPL 1552. The program incorporates recirculated water sources, water storages and licenced overflow points with samples collected by an independent Environmental Contractor and analysed by an external NATA accredited laboratory. Monitoring results are collated and reported internally to inform the management team regarding the operation of the KCT water management system, and externally as required by the KCT Project Approval and EPL 1552.

Monitoring locations within the KCT main site area are detailed in **Figure 6** and **Table 4** below.

Uncontrolled if printed			
PWCS Environmental Management System			
Review No.: 4.1	Review Date: April 2023	Review Due: April 2026	Page 19 of 35
Document ID: KCT Operation Water Management Plan		Authorised: Manager Sustainability and Corporate Affairs	



Figure 6: KCT Overflow Discharge Monitoring Locations listed by EPL I 552

Uncontrolled if printed			
PWCS Environmental Management System			
Review No.: 4.1	Review Date: April 2023	Review Due: April 2026	Page 20 of 35
Document ID: KCT Operation Water Management Plan		Authorised: Manager Sustainability and Corporate Affairs	

Table 4: KCT Surface water monitoring locations

Sample Point	Location	Frequency	Method	Tested for
Recirculated Water				
RWQ-K1	4 ML Tank	Once per month - All months	Grab sample	TSS, HPC, pH, Legionella, E coli, Total phosphorus
RWQ-K2	Settling Lagoon 1	Once per month - Jan, Apr, Jul, Sep, Oct, Nov & Dec	Grab sample	TSS, HPC, pH, Legionella, E coli, Total phosphorus
RWQ-K3	Settling Lagoon 2	Once per month - Jan, Apr, Jul, Sep, Oct, Nov & Dec	Grab sample	TSS, HPC, pH, Legionella, E coli, Total phosphorus
Overflow				
WW-K2	Open stormwater channel inside rail loop at boundary of KCT site	Monthly	Representative Sample	pH, TSS, conductivity
EPL 1552 – Point 16	KCT Overflow discharge point – K4	Samples taken during overflow events. Representative sample reported monthly.	Representative Sample	pH, TSS, Oil and grease
EPL 1552 – Point 17	KCT Overflow discharge point – K5	Samples taken during overflow events. Representative sample reported monthly.	Representative Sample	pH, TSS, Oil and grease
EPL 1552 – Point 18	KCT Overflow discharge point – K6	Samples taken during overflow events. Representative sample reported monthly.	Representative Sample	pH, TSS, Oil and grease
EPL 1552 – Point 19	KCT Overflow discharge point – K7	Samples taken during overflow events. Representative sample reported monthly.	Representative Sample	pH, TSS, Oil and grease
EPL 1552 – Point 20	KCT Overflow discharge point – Detention Pond A/B	Samples taken during overflow events. Representative sample reported monthly.	Representative Sample	pH, TSS, Oil and grease
EPL 1552 – Point 21	KCT Overflow discharge point – Settling Lagoon 1	Samples taken during overflow events. Representative sample reported monthly.	Representative Sample	pH, TSS, Oil and grease
EPL 1552 – Point 22	KCT Overflow discharge point – Clarified Lagoon 1 & 2	Samples taken during overflow events. Representative sample reported monthly.	Representative Sample	pH, TSS, Oil and grease
EPL 1552 – Point 23	KCT Overflow discharge point – Detention (Floodplain) D	Samples taken during overflow events. Representative sample reported monthly.	Representative Sample	pH, TSS, Oil and grease
EPL 1552 – Point 24	KCT Overflow discharge point – Settling Lagoon 2	Samples taken during overflow events. Representative sample reported monthly.	Representative Sample	pH, TSS, Oil and grease
EPL 1552 – Point 25	KCT Overflow discharge point - Clarified Lagoon 2	Samples taken during overflow events. Representative sample reported monthly.	Representative Sample	pH, TSS, Oil and grease
EPL 1552 – Point 26	KCT Overflow discharge point – Western Point Well	Samples taken during overflow events. Representative sample reported monthly.	Representative Sample	pH, TSS, Oil and grease
EPL 1552 – Point 27	KCT Overflow discharge point – Detention Pond 1	Samples taken during overflow events. Representative sample reported monthly.	Representative Sample	pH, TSS, Oil and grease
EPL 1552 – Point 28	KCT Overflow discharge point - Detention Pond 2	Samples taken during overflow events. Representative sample reported monthly.	Representative Sample	pH, TSS, Oil and grease
Units for measurements				
Total suspended solids (TSS) - mg/L Heterotrophic Plate Count (HPC) (Total Bacteria Count) - CFU/mL Legionella - CFU/mL			E coli - CFU/100mL Total phosphorus - mg/L Oil and grease – mg/L	

Uncontrolled if printed			
PWCS Environmental Management System			
Review No.: 4.1	Review Date: April 2023	Review Due: April 2026	Page 21 of 35
Document ID: KCT Operation Water Management Plan		Authorised: Manager Sustainability and Corporate Affairs	



4.2 EVALUATION OF COMPLIANCE

Evaluation and tracking of compliance with the requirements of this management plan and associated compliance obligations will be conducted on an ongoing basis. This program shall include, but not necessarily be limited to:

- Review of water monitoring data & reports;
- Review of applicable legislation, changes or updates identified and communicated as required;
- Review & update of the Approvals & Consents compliance register; and
- KCT independent compliance audit and annual compliance reports.

4.2.1 AUDIT

Environmental audits are carried out at various times throughout the year by internal and external parties as required. These audits typically involve a specific area of site or compliance focus but will normally include matters relating to the management of water. Examples of audits completed at Port Waratah include compliance audits at KCT, environmental management system audits, internal workshop audits and internal activity inspections.

A workplace inspection framework has been implemented to ensure the physical condition of all operational areas at Port Waratah are maintained to the required standard. These inspections encompass the operations checklist for the inspection of water management infrastructure such as Ponds, Drains and Sumps.

4.2.2 REVIEW

The water management system is regularly under review and is modified as required to suit climatic and site conditions to effectively manage water resources onsite.

The KCT OWMP will be reviewed in accordance with the following requirements:

- At least every three years;
- Following an independent environmental audit, with findings relevant to this plan;
- Following an environmental incident or community complaint relevant to the control measures outlined in this plan (only if required); or
- Following relevant outcomes from a risk assessment or change management process.

If any significant modifications to the plan are required as an outcome of the review, the revised Plan will be submitted to DPE for approval. Minor changes such as formatting edits may be made with version control on the Port Waratah website.

4.3 DATA RECORDING AND REPORTING

A range of data is collected at KCT regarding the operation and performance of the water management system. This data is collected via a range of activities including manual monitoring programs, installed quality probes, SCADA level and flow information and the KCT Water Balance Model. All data is collected and stored for relevant periods to allow for analysis and long-term trend interpretation which is used to identify improvement opportunities for the system.

Uncontrolled if printed			
PWCS Environmental Management System			
Review No.: 4.1	Review Date: April 2023	Review Due: April 2026	Page 22 of 35
Document ID: KCT Operation Water Management Plan		Authorised: Manager Sustainability and Corporate Affairs	



Port Waratah operates and maintains a SCADA system that manages and records a range of activities onsite at KCT. This SCADA system operates a range of automated activities in relation to the water management system at KCT and records data and trends in relation to this operation. The SCADA system provides information for operational purposes via the Citect displays that are accessible across the site and remotely on devices.

Historical data and trends are archived by the Port Waratah Historian system which retains, and archives information and data obtained from the SCADA and reporting systems for future reference.

The data recorded is reported internally and externally as required. External reports are developed and submitted to Agencies as required by EPLs, development approvals, works approvals or legislative requirements.

Examples of external reports developed by Port Waratah for KCT include the following:

- Sustainable Development Report
- EPL 1552 Annual Return & monthly monitoring data reports
- National Pollutant Inventory
- KCT Compliance Audits

Uncontrolled if printed			
PWCS Environmental Management System			
Review No.: 4.1	Review Date: April 2023	Review Due: April 2026	Page 23 of 35
Document ID: KCT Operation Water Management Plan		Authorised: Manager Sustainability and Corporate Affairs	

5 REFERENCE DOCUMENTS

5.1 PORT WARATAH DOCUMENTS

- KCT Stage 3 Expansion – DA 35/96
- Kooragang Coal Terminal Stage Three Expansion - Environmental Impact Statement
- KCT Modified 120Mtpa Approval – 06_0189 MOD 3
- Kooragang Coal Terminal Proposed Increase to Throughput Capacity – Environmental Assessment
- Kooragang Coal Terminal Stage 4 Project Fourth Dump Station & Fourth Shiploader – Environmental Assessment
- KCT Environment Protection Licence 1552

5.2 OTHER DOCUMENTS

- Port Waratah Flood Information Certificates 2011 (provided by Newcastle City Council)

Uncontrolled if printed			
PWCS Environmental Management System			
Review No.: 4.1	Review Date: April 2023	Review Due: April 2026	Page 24 of 35
Document ID: KCT Operation Water Management Plan		Authorised: Manager Sustainability and Corporate Affairs	

6 DEFINITIONS

ANZECC	Australian and New Zealand Environment Conservation Council
ARI	Average Recurrence Interval
ARTC	Australian Rail Track Corporation
CFU	Colony Forming Units
Dewatering	Any process that removes water from sludge
DPE	Department of Planning and Environment (NSW)
DoI	Department of Industry (NSW)
DPI	Department of Primary Industries (NSW)
E-coli	Escherichia coli bacteria
Effluent	Treated or untreated wastewater and sewage from showers, toilets, kitchens, basins
El Nino	is the warm phase of the El Niño Southern Oscillation and is associated with a band of warm ocean water that develops in the central and east-central equatorial Pacific
EMS	Environmental Management System
EPA	Environment Protection Authority
EPL	Environment Protection Licence
HPC	Heterotrophic Plate Count
HVCC	Hunter Valley Coal Chain
ISO 14001	International standard that specifies requirements for an effective environmental management system
KCT	Kooragang Coal Terminal
kL	Kilolitres
La Nina	is the positive phase of the El Niño–Southern Oscillation and is associated with cooler-than-average sea surface temperatures in the central and eastern tropical Pacific Ocean
Mg/L	Milligrams per Litre
mL	Millilitres
NATA	National Association of Testing Authorities

Uncontrolled if printed			
PWCS Environmental Management System			
Review No.: 4.1	Review Date: April 2023	Review Due: April 2026	Page 25 of 35
Document ID: KCT Operation Water Management Plan		Authorised: Manager Sustainability and Corporate Affairs	



NCC	Newcastle City Council
NSW	New South Wales
OEH	Office of Environment and Heritage
OEMP	Operation Environmental Management Plan
OWMP	Operation Water Management Plan
pH	A figure expressing the acidity or alkalinity of a solution
PIRMP	Pollution Incident Response Management Plan
Potable water	Town supply (Hunter Water Corporation) water suitable for drinking
Process Water	Water that has been in contact with coal and may contain coal fines or elevated salinity
RAMSAR	Convention on Wetlands of International Importance especially as Waterfowl Habitat is an international treaty for the conservation and sustainable use of wetlands
SCADA	Supervisory control and data acquisition
STP	Sewage Treatment Plant
TSS	Total Suspended Solids

Uncontrolled if printed			
PWCS Environmental Management System			
Review No.: 4.1	Review Date: April 2023	Review Due: April 2026	Page 26 of 35
Document ID: KCT Operation Water Management Plan		Authorised: Manager Sustainability and Corporate Affairs	

7 ACCOUNTABILITIES

Role	Description of Action(s) Accountable For	Frequency
Chief Executive Officer	Provide strategic direction during the development of the Environmental Policy and Objectives & Targets	Ongoing
	Allocate appropriate resources to investigate and address water related issues.	Ongoing
	Approve LTO projects, incorporate into Business Plan and authorise implementation.	Ongoing
Manager Operations Delivery	Accountable for water management at Terminals including usage and quality.	Ongoing
	Operate the water management discharge plant & infrastructure	Ongoing
	Immediate notification of environmental incident as per PIRMP requirements.	As Required
Operations Superintendents	Accountable for on-site water management and response.	Ongoing
	Accountable for implementing operational controls related to environmental management and minimising impacts.	Ongoing
	Accountable for reporting and/ or responding to matters and incidents relating to the environment including community enquiries.	Ongoing
Operations Supervisors	Accountable for daily checking of performance of water management system and forwarding of any faults to accountable teams for rectification.	Daily
Maintenance Superintendents	Accountable for all maintenance and fault investigations/repairs of industrial plumbing including pumps and instrumentation of pumps, flow meters and associated equipment.	Ongoing
Manager Sustainability and Corporate Affairs	Accountable for managing relationship(s) with Regulators and other water management stakeholders (e.g. Hunter Water)	Ongoing
	Allocate resources to ensure compliance with statutory requirements relevant to environmental management.	Ongoing
	Approval of the Operation Water Management Plan	As required
	Ensure reporting of water management matters are undertaken in a timely and accurate manner	Ongoing

Uncontrolled if printed			
PWCS Environmental Management System			
Review No.: 4.1	Review Date: April 2023	Review Due: April 2026	Page 27 of 35
Document ID: KCT Operation Water Management Plan		Authorised: Manager Sustainability and Corporate Affairs	



Role	Description of Action(s) Accountable For	Frequency
Manager Assets and Infrastructure	Accountable for investigating potential improvements to the water management system including alternatives to potable water.	Ongoing
Specialist Environment	Accountable for the ongoing tracking of water consumption trends at each Terminal including water balances and reporting monthly to the Manager Operational Delivery.	Ongoing
	Ensure compliance with any reporting requirements associated with Licences and Approvals.	Ongoing
	Report internally and externally as required, data and interpretations relating to water management and overall performance.	Ongoing
Port Waratah Employees & Contractors	Follow all safe work procedures and policies to protect water systems from contamination	Ongoing
	Report environmental incidents and near misses	Ongoing
	Aim to conserve water and water quality	Ongoing

Uncontrolled if printed			
PWCS Environmental Management System			
Review No.: 4.1	Review Date: April 2023	Review Due: April 2026	Page 28 of 35
Document ID: KCT Operation Water Management Plan		Authorised: Manager Sustainability and Corporate Affairs	

APPENDICES

APPENDIX A – KCT CONSENT REQUIREMENTS FOR OWMP

Consent	Condition	Requirements	Compliance
KCT Development Consent 35/96	10	<i>The Applicant shall undertake the following studies and prepare the following strategies and plans (conditions 7 – 12) within twelve months of the date of this consent, or such later time as the Director General shall approve..... A comprehensive Water Management Plan in consultation with the EPA, DLWC, and NPWS and to the satisfaction of the Director General.</i>	This updated KCT OWMP
KCT Project Approval 06_0189 (MOD3)	2.12	Except as may be expressly provided under the provisions of an Environment Protection Licence for the project, the proponent shall comply with section 120 of the Protection of the Environment Operations Act 1997 which prohibits the pollution of waters.	Noted
	2.13	The proponent shall not permit the discharge of any water from the site to the Hunter River unless expressly provided under the provisions of an Environmental Protection Licence, or when a storm event exceeds a 1 in 100-year ARI event or after prolonged wet weather 'equivalent' to this event.	Section 3.1
	2.16	The proponent shall maximise the capture and re-use of stormwater on-site for beneficial purposes such as dust control on coal stockpiles	Section 2.1.2 and Section 3.1
	2.17	In the event that stormwater runoff collection cannot meet the water demand of the site, treated wastewater, if available from the relevant water authority, shall be used preferentially over potable water for the purposes of dust control, unless otherwise agreed by the Director General	Not available as yet, discussions with potential providers are ongoing
	7.4	<i>Prior to the commencement of operation of the project, the Proponent shall prepare and submit for the approval of the Director General and Operation Environmental Management Plan (OEMP) to detail an environmental management framework, practices and procedures to be followed during the operation of the project.....</i>	See below
	7.5	<i>As part of the Operation Environmental Management Plan for the project required under condition 7.4 of this approval, the Proponent shall prepare and implement the following:</i>	See below
	7.5 (c)	A Water Management Plan to outline the water management system for the site. The Plan shall include, but not necessarily be limited to:	Development of this Plan
		i) predicted Site water balance including the water supply system;	Section 2.1.2 and Section 3.1.3
		ii) details regarding water management structures such as settling ponds and water tanks;	Section 3.1 & Appendix B1,2 and 3
		iii) locations and design specifications for all water diversions from undisturbed runoff areas including channel design and stabilisation, sediment retention storages and other structures;	Section 3.1 and Appendix B1,2 and 3
		iv) details on the internal drainage system including bunding, drainage channels, dewatering sumps and any pipelines;	Section 3.1 and Appendix B1,2 and 3

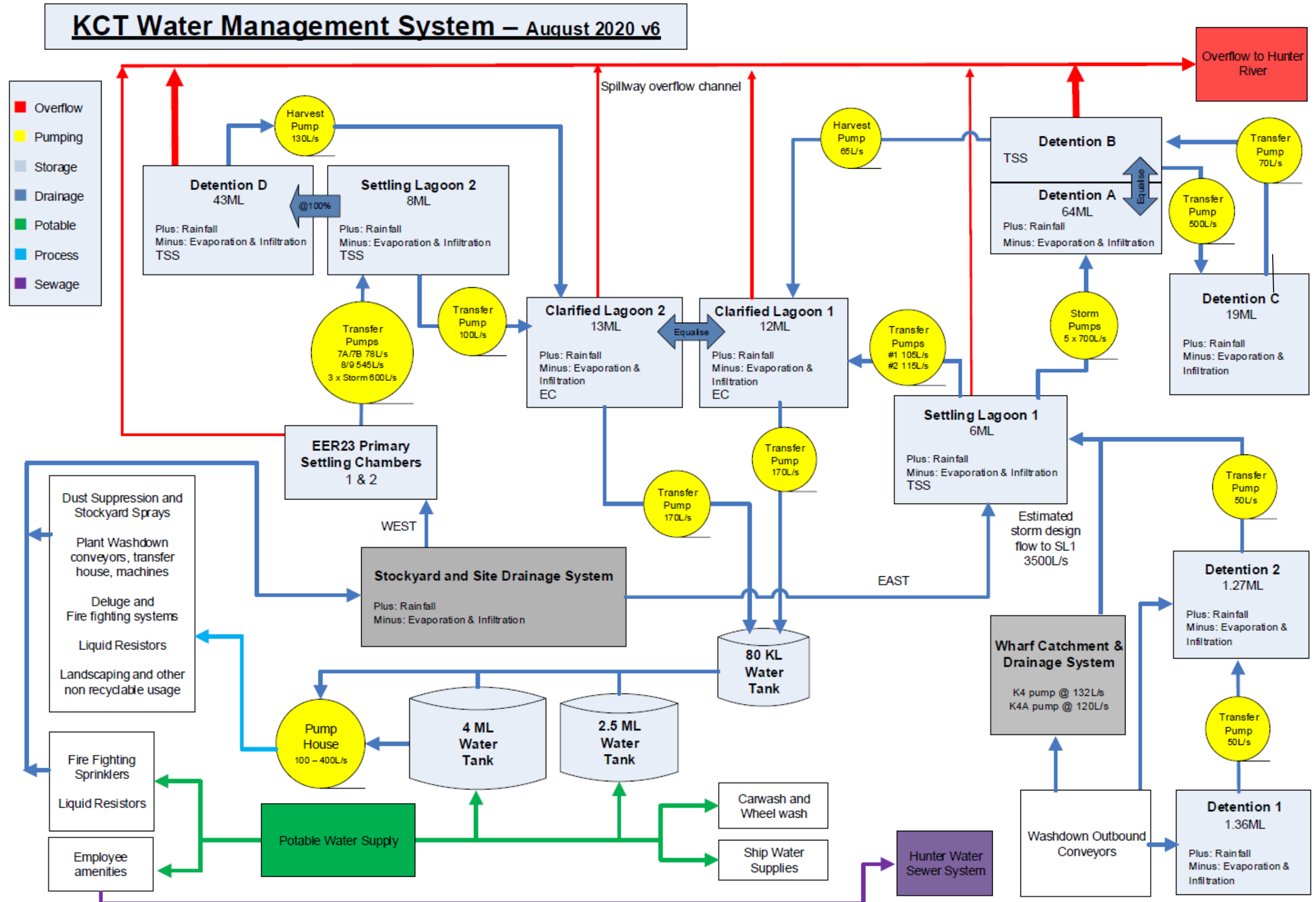
Uncontrolled if printed			
PWCS Environmental Management System			
Review No.: 4.1	Review Date: April 2023	Review Due: April 2026	Page 29 of 35
Document ID: KCT Operation Water Management Plan		Authorised: Manager Sustainability and Corporate Affairs	



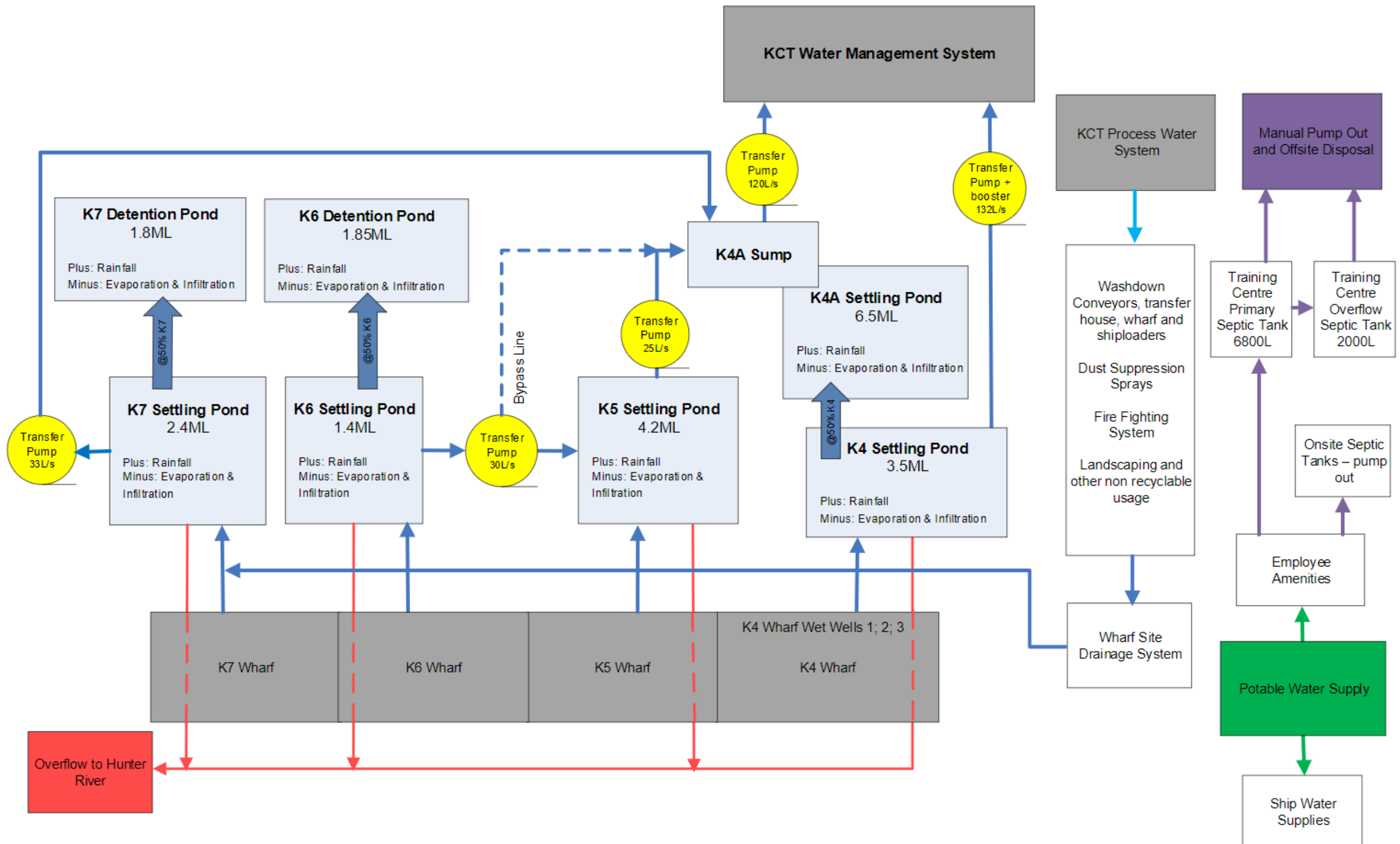
Consent	Condition	Requirements	Compliance
		v) procedures for the management of groundwater encountered on site and any temporary dewatering facilities; and	Sections 3.1.4
		vi) procedures to be implemented to minimise potential surface water impacts.	Section 3.1.6

Uncontrolled if printed			
PWCS Environmental Management System			
Review No.: 4.1	Review Date: April 2023	Review Due: April 2026	Page 30 of 35
Document ID: KCT Operation Water Management Plan		Authorised: Manager Sustainability and Corporate Affairs	

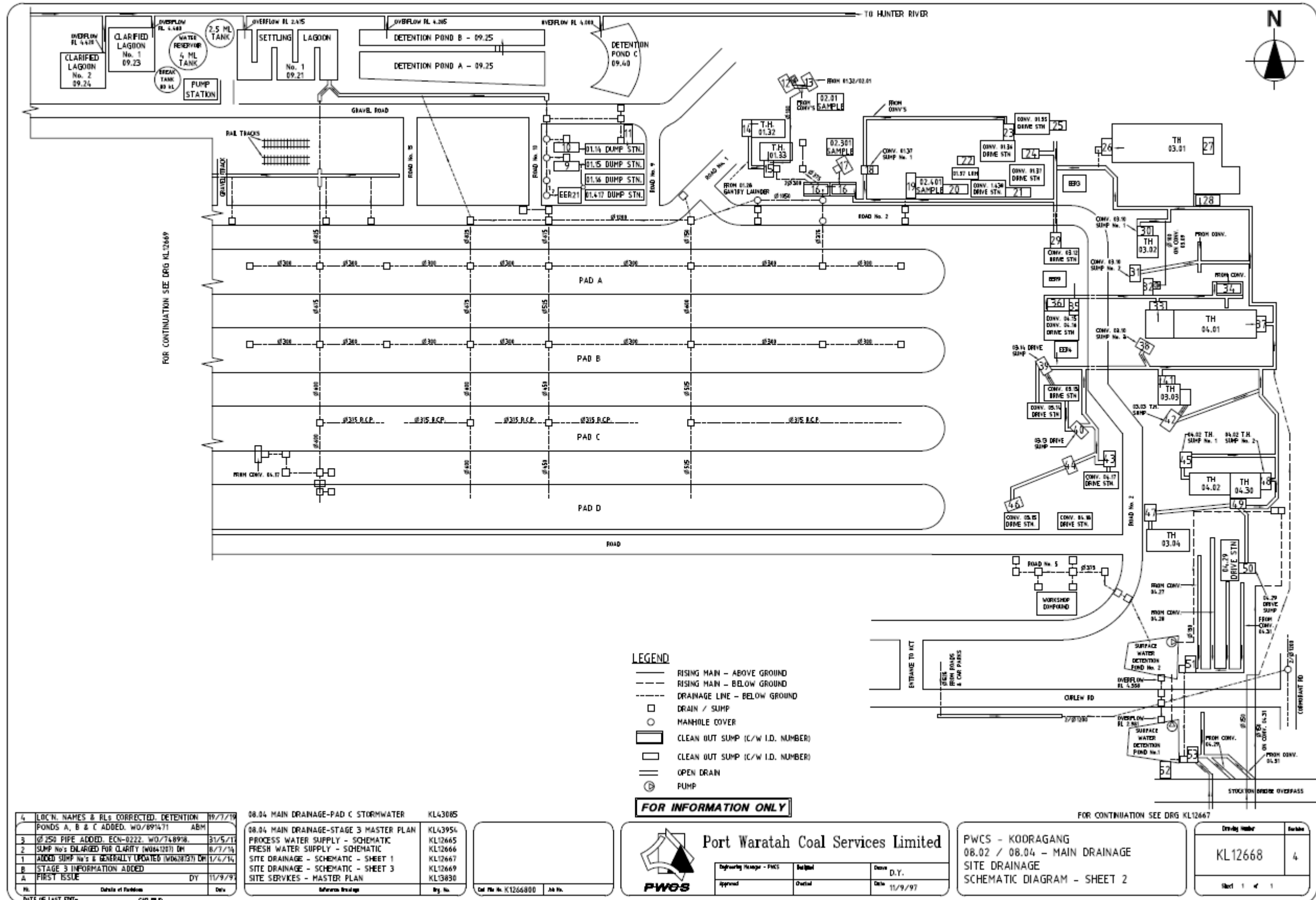
APPENDIX BI – KCT WATER MANAGEMENT SYSTEM SCHEMATIC



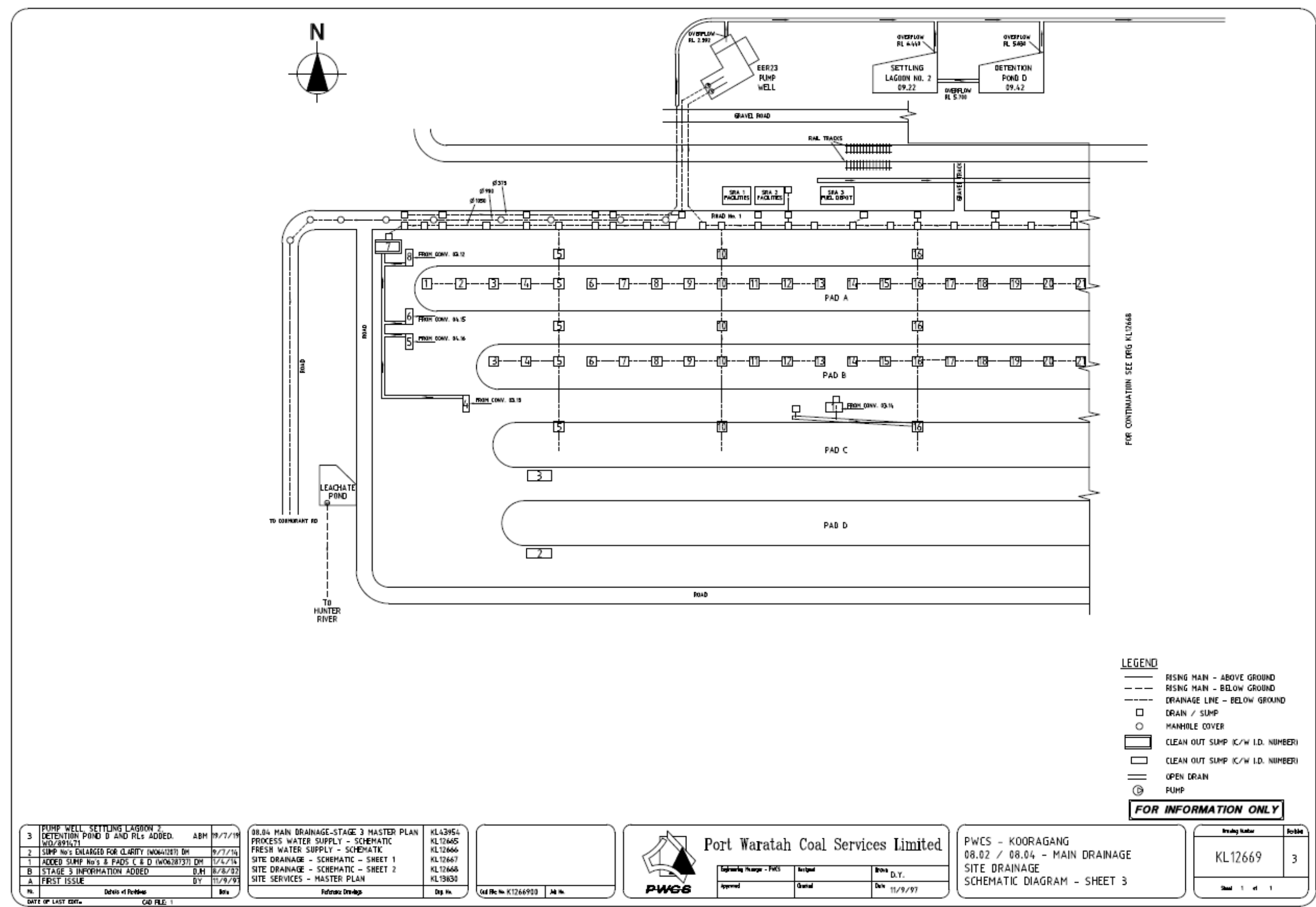
KCT Wharf Water Management System – August 2020 v4



APPENDIX B3.1 – KCT WATER MANAGEMENT SYSTEM (MAIN SITE EAST OVERVIEW)



APPENDIX B3.2 – KCT WATER MANAGEMENT SYSTEM (MAIN SITE WEST OVERVIEW)



APPENDIX B3.3 – KCT WATER MANAGEMENT SYSTEM (WHARF OVERVIEW)

