

INDEPENDENT ENVIRONMENTAL AUDIT REPORT



Proponent:	Sydney Metro
Project:	City & South West, Chatswood to Sydenham
Scope:	Water Monitoring, Treatment & Control
Works / Process:	TSE (Tunnels and Station Excavation)
Auditee:	John Holland CPB Ghella Joint Venture

Audit Organisation: QEM Consulting Pty Ltd
Auditor: Larry Weiss
Registration: Exemplar Global EMS Auditor Accreditation no. 12355
Audit References: QEM 1803-A18
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1.0 AUDIT DETAILS

1.1 Purpose

The purpose of this Independent Environmental Audit was to assess Principal Contractor JHCPBG joint ventures' implementation of the Construction Water Management & Monitoring Plan requirement to mitigate off-site water discharge impacts of the City & Southwest (C&SW) Infrastructure Project and associated compliance with relevant Planning & Assessment Approvals.

1.2 Context

Planning Approvals issued by the Department of Planning & Environment require Sydney Metro to develop an Environmental Audit Program for independent annual environmental auditing against the terms the City & Southwest (C&SW) Critical State Significant Infrastructure (CSSI) Project Approvals.

QEM Consulting Pty Ltd have been engaged by Sydney Metro Delivery Office (SMDO) Safety, Sustainability & Environment (SSE) to deliver a program of Independent Environmental Audits. As required by C&SW Planning Approval CSSI 15_7400 (A39) and the associated Environmental Audit Program, an Independent Environmental Audit was undertaken to assess compliance with Planning Approvals requirements relating to water management & monitoring for the TSE contract.

The TSE works generate a significant amount of tunnelling, excavation and rain-event related water requiring off-site disposal unless beneficially used. As context:

- A number of TSE construction sites utilise Water Treatment Plants (WTPs) to remove sediment, oil and grease prior to off-site discharge;
- An Environment Protection Licence held by JHCPBG mandates testing frequencies and sets limits for pH and suspended solids compliance;
- The Barangaroo WTP also receives supernatant from a Sludge Treatment Plant which dewateres slurry generated by tunnelling underneath Sydney Harbour, and
- There is known contamination from a prior gasworks operation south of the Station Box excavation.

1.3 Audit Objectives & Focus

The Audit Objective was to independently assess Planning Approval compliance with Project-wide Water Monitoring & Reporting obligations, including off-site water quality discharge risks. The audit focussed on project-wide surface water quality testing, plus pre-discharge testing and operational control of the Barangaroo Water Treatment Plant in preventing or mitigating pollution events and/or Environment Protection Licence non-compliances.

1.4 Audit Scope

The Audit Scope included components of the JHCPBG Construction Soil, Water & Groundwater Management Plan, related discharge procedures plus engineering, operational and administrative controls, as well as project-wide Monitoring Plan compliance data and reports.

The Barangaroo scope included treatment of construction groundwater and surface water, testing records of discharge to receiving waters, and associated operational, monitoring and non-compliance / incident preparedness & response protocols.

The scope excluded Groundwater Monitoring MCoA C9 (d) and related hydraulic interactions.

1.5 Audit Criteria

City & Southwest Project Environmental Planning Approval CSSI 15_7400 including

- MCoA C3, C4, C9(c), C10, C16, E66 & E67

Revised Environmental Mitigation Measures relating to Soil & Water i.e.

- SCW4, Environment Protection Licence compliance, noting JHCPBG EPL 20971

C&SW Construction Environmental Management Framework, CEMF:

- Sections 2.3, 7.2, 3.10, 3.13 & 15.2

1.6 Audit Process and Methodology

The audit comprised an off-site desktop review, preparation of an Audit Checklist, a Principal Contractor audit, a brief site inspection, a post audit assessment of documentation and records, plus a second audit review conducted at the project office. The audit process including scoping and planning was undertaken in accordance with the principals of ISO 19011:2018 – Guidelines for Auditing Management Systems. Refer to Appendix 2 to this report for further details on Auditor credentials, independence and audit disclaimer.

1.7 Auditees and Participation

Refer to full Audit Attendance list in Appendix 3.

1.8 Audit Definitions & Abbreviations

The following abbreviations and definitions apply throughout this report:

Item	Explanation
C&SW	<i>City & Southwest</i>
CEMF	<i>Construction Environmental Management Framework</i>
CSSI	<i>Critical State Significant Infrastructure</i>
CSW&GMP	<i>Construction Soil, Water & Groundwater Management Plan</i>
EPA	<i>Environment Protection Authority</i>
EPL	<i>Environmental Protection Licence</i>
IEA	<i>Independent Environmental Audit</i>
MCoA	<i>Minister's Conditions of Approval</i>
POEOA	<i>Protection of the Environment Operations Act</i>
RAP	<i>Remedial Action Plan</i>
REMM	<i>Revised Environmental Management Measure</i>
SM	<i>Sydney Metro</i>
WTP	<i>Water Treatment Plant</i>
WQ	<i>Water Quality</i>
Non-compliant	<i>Refer Section 2.1 overleaf</i>
Observation	
Improvement Opportunity	
Compliant	
Notable Practice	

2.0 AUDIT FINDINGS

2.1 Compliance Summary

This table provides a summary of compliance against audit criteria and area of focus, indicating the number of actions required:

Focus Area	Key Criteria	STATUS			
		Compliant			Non-Compliant
		NP	IO	OBS	NC
Management & Regulatory Controls	MCoA C3 d, C4, C9c & C10 CEMF, REMM SCW4 & POEO Act			3	
Monitoring Programs	EIS Chapter 18.5 REMM SCW4, POEO Act s120 MCoA C10, E66 & 67 EPL 20971 L2.3		1		1
Water Quality Data	CEMF 15.2 (MCoA C1) MCoA C9 c & C10			1	
Consultation & Reporting	MCoA C9, C10, C16 EPL 20971 M2.2		1	1	
Non-Compliance, Breach & Incident Management	REMM SCW4, POEO Act s120 MCoA C4 & MCoA C1 / CEMF 3.10, 10.4 & 10.5		1		1
Site (WTP) Operation & Control	MCoA C4 EPL 20971 O2.1		2	2	

* Note: Compliance is limited to demonstrated evidence referenced in Appendix 1 and/or Audit Checklist notations.

Audit Findings are classified as follows:

Status	Explanation
Notable Practice (NP)	Outstanding positive observation about a system, process or practice, for recognition and/or sharing purposes.
Improvement Opportunity (IO)	A suggestion or opportunity to implement a good or better practice to improve efficiency, further reduce exposure to risk or improve information management. When specifically stated as a Recommendation, this requires a formal response as to a considered action, alternative action or management decision in the negative.
Observation (OBS)	Documented requirement and/or implementation issue which may not strictly affect required performance or compliance outcomes. Also termed a non-conformance (as opposed to non-compliance) in the industry, observations could be an early indication of potential non-compliance and/or an adverse performance outcome.
Non-compliant (NC)	The intent of one or more specific requirements of a condition or obligation have not been met, based on insufficient objective evidence to demonstrate required outcomes or deliverables being achieved and/or complied with.

Note: 'Compliant' status is determined where sufficient verifiable evidence demonstrates that intent, specific requirements or elements of a condition / obligation have been met within the scope of the Independent Audit. As a result, no actions may be required this, or, actions commensurate with an Improvement or Observation status above will be needed.

2.2 Summary of Environmental performance

The following provides a brief summary of the project environmental performance being a MCoA A39 Independent Environmental Audit requirement. Limitations to this assessment include scope, methodology, duration and the disclaimer noted further in this report.

2.2.1 CSSI performance & effects on surrounding environment (MCoA 39a & d)

In accordance with Project Approvals, quarterly surface water quality testing of nine sites located close to the project alignment were being undertaken, reporting a few random exceedances of baseline data, subsequently analysed by the TSE Contractor and indicated as unlikely to be directly attributable to project activities at that time. Additionally, water catchments were assessed at baseline stage as being disturbed and subject to other ongoing impacts including urbanisation and other infrastructure developments. Available monitoring data seem to indicate there was no significant project environmental impacts on surface or receiving waters. There was however an increase in oil and grease concentrations in most of the catchments in the 2nd quarter of 2019 though, which should be closely reviewed subsequent to upcoming water tests results becoming available.

The CSSI projects' environmental performance and immediate or direct effects on receiving waters could be compromised by pollutants being introduced to the surrounding environment from licensed discharge points associated with TSE Water Treatment Plants however. In the case of Barangaroo, this audit concluded that there was insufficient water quality discharge data on record to be able to definitively confirm the TSE works' direct environmental performance, compliance or otherwise. It is therefore recommended that potentially contaminated groundwater being directed to the Water Treatment Plant be subject to increased monitoring and/or review, especially regarding discharges from the outlet of the WTP, given that the current Project Environmental Protection Licence did regulate prescribed matter, including identified contaminants of concern. Refer to the associated non-compliance reference #10 of section 2.3 further in this report.

2.2.2 Project Approvals compliance (MCoA 39b)

Required documentation plus systems of monitoring and reporting were assessed as mostly compliant indicated by Summary Table, paragraph 2.1 earlier in this report. A non-compliance (reference #4 of section 2.3) was raised against the Planning Condition for a Water Monitoring Program relating to inconsistencies and lack of definition around sampling, analysis and monitoring frequency of potentially contaminated groundwater being released to the environment via the WTP.

2.2.3 Documentation adequacy (MCoA 39c & d)

The audit determined that Management Plans, Monitoring Programs, procedures forms, templates, registers and reports were mostly being maintained and generated to achieve and/or demonstrate required project outcomes – refer to the Tables of Appendix 1 further in this report.

Observations were raised however pertaining to evolving risks, plus controls, mitigation measures or decision-making criteria not updated and/or specified in the Construction Soil, Water & Groundwater Management Plan and related plans and operating manuals. These and other recommendations to improve documentation have been articulated as Audit Findings and subsequently incorporated into the Agreed Action Plan, section 2.3 further.

2.3 Detailed Audit Findings & Action Plan

Ref	Audit Finding	Status	Priority	Agreed Action Plan
	MANAGEMENT & REGULATORY CONTROLS			
1.	<p><u>Environmental discharge risk.</u> There was no current environmental discharge risk assessment linking harbour ecosystem protection, legislative obligations and use of the Barangaroo Water Treatment Plant to treat potentially contaminated groundwater prior to discharge into Sydney Harbour.</p> <p><i>Although the Golder report indicated that significant dissolved-phase contamination was not expected to reach the station box excavation during the two-year works period, compliance obligations (below) and other commitments require a risk assessment of a receiving water impacts.</i></p> <p>Compliance obligations:</p> <ul style="list-style-type: none"> • MCoA C4 d) requires that issues requiring management during construction be identified through ongoing environmental risk analysis • The May 2018 Barangaroo RAP been outputs from MCoAs E67 & E67 obligations states that "Water will only be disposed when the contaminants of concern have been assessed and found to be below the required disposal thresholds (either with or without treatment). The required disposal thresholds will be based on the disposal method used (e.g. disposal to sewer, disposal to stormwater)" • EPA Guide to Environment Protection Licensing provides a Risk Assessment Tool and suggests "a detailed description of the concentration of pollutants before and after treatment" as supporting evidence to a license application. 	OBS	Medium	<p>Action to be taken by JHCPBG:</p> <p>Document a formal risk assessment of current and potential groundwater contaminant loadings for required ecosystem protection levels, with disposal decision criteria linked to management controls including:</p> <ul style="list-style-type: none"> • Discontinued processing by the WTP • Sewer discharge with Tradewaste Agreement • Liquid Waste disposal to licensed treatment facility. <p>Responsible person: Manager, Environment, Approvals & Sustainability</p> <p>Due date: 29 November 2019</p>

Ref	Audit Finding	Status	Priority	Agreed Action Plan
2.	<p><u>Management Plan update.</u> The Construction Soil, Water & Groundwater Management Plan had not been formally updated since March 2018 to reflect current processes, activities and systems, including but not limited to risks, controls and mitigation measures needed for treatment and legal disposal of potentially contaminated groundwater.</p> <p><i>In support of the above-mentioned, the audit observed numerous and sometimes conflicting advice, commitments, RAP revisions and correspondence, the latter including several stakeholders e.g. EPA, the EPA Accredited Site Auditor and JHCPBGs Contamination Consultants.</i></p> <p>Compliance obligations:</p> <ul style="list-style-type: none"> • MCoA C4 requires sub-plans to identify issues and define and implement mitigation measures to achieve project environmental performance outcomes and Planning Approval compliance. 	OBS	Medium	<p>Action to be taken by JHCPBG:</p> <p>Consult with stakeholders as required and update the Construction Soil, Water & Groundwater Management Plan as necessary, including operational controls for the management of potentially contaminated groundwater.</p> <p>Note: to include commitments made to stakeholders, and required obligations of the current RAP.</p> <p>Responsible person:</p> <p>Manager, Environment, Approvals & Sustainability</p> <p>Due date: 13 December 2019</p>
3.	<p><u>Authorised environmental releases.</u> A Hold Point or Permit system had not been implemented by Barangaroo to ensure that groundwater directed to the WTP was not able to be discharged to the environment without confirmation of contaminants (<u>prior</u> to release) being less than required environment protection levels.</p> <p><i>Whilst contaminant levels had been tested as relatively low to date, the time lag in receiving laboratory analysis results did not ensure that discharge at the time of sampling and ensuing days was indeed compliant when discharging. It was also noted that the current JHCPBG monthly discharge authorisation was EPL focused, only verifying pH and Turbidity, not contaminants of concern.</i></p> <p>Compliance obligations:</p> <ul style="list-style-type: none"> • Sydney Metro C&SW Construction Environmental Management Framework CEMF s15.2 e) states that "No water to be discharged from the site without written approval of the Contractor's Environmental Manager (or delegate). This is to form a HOLD POINT". 	OBS	HIGH	<p>Action to be taken by JHCPBG:</p> <p>Utilise Environmental Dewatering (*Discharge) Permit form to authorise the transfer of station box water to the WTP and/or after subsequent treatment following receipt of groundwater laboratory test results.</p> <p>*Note: The purpose of the HOLD release should confirm that no pollution would occur by contaminants additional to parameters specified in the EPL i.e. pH, Turbidity, Oil & Grease</p> <p>Responsible person:</p> <p>Manager, Environment, Approvals & Sustainability</p> <p>Due date: 15 November 2019</p>

Ref	Audit Finding	Status	Priority	Agreed Action Plan
	WATER MONITORING PROGRAMS			
4.	<p><u>Water Monitoring Program</u> The Water Monitoring Program component of the CSW&G Management Plan did not:</p> <ol style="list-style-type: none"> Clearly specify ecosystem protection levels and/or <u>discharge</u> concentration limits for RAP identified contaminants of concern; Facilitate the implementation of Barangaroo RAP recommended sampling methodology ("sump and pump" grab sample), analysis and assessment post treatment; Reference or enable a minimum suite of <u>treated contaminants</u> to be analysed, as required by the abovementioned RAP; Define or commit to a minimum analysis frequency of treated groundwater discharges by Barangaroo to Sydney Harbour receiving waters. <p><i>The audit observed conflicting CSW&G Management Plan specification and/or implementation for protection levels for discharge water quality using the ANZECC Guideline, noting the WTP was stated as expected to achieve a 95% protection level.</i></p> <p>Compliance obligations:</p> <ul style="list-style-type: none"> MCoA C10 re Water Quality Monitoring Program Barangaroo Remedial Action Plan addendum dated 27 February 2019 relating to MCoA's E66 & 67 et al. 	NC	HIGH	<p>Action to be taken by JHCPBG:</p> <p>Update the Monitoring Program within the Construction Soil, Water & Groundwater Management Plan to clarify pollutant discharge concentration limits* and address Audit Findings (alongside) including Planning Approvals, RAP requirements and related formal correspondence.</p> <p>*Note: Consultation may be required with Planning Approval specified and/or other stakeholders including contamination site auditor and related consultants.</p> <p>Responsible person: Manager, Environment, Approvals & Sustainability</p> <p>Due date: 29 November 2019</p>
5.	<p><u>EPL discharge compliance monitoring</u> It was observed that WTP environmental operational performance data was not routinely and/or promptly provided to JHCPBG by the WTP service provider for review and compliant reporting purposes.</p> <p><i>This included the monthly Water Filtration Plant WQ discharge dataset which should be used for monthly Discharge Water Monitoring reporting required by the EPL.</i></p>	IO	Low	<p>Action to be taken by JHCPBG: Ensure that Environment Protection Licence discharge data is obtained in a timely manner to enable compliance review, external reporting and due diligence record keeping purposes.</p> <p>Responsible person: Manager, Environment, Approvals & Sustainability</p> <p>Target date: from 7 November 2019 onwards</p>

Ref	Audit Finding	Status	Priority	Agreed Action Plan
	WATER QUALITY information			
6.	<p><u>Compliance sampling and analysis records</u> There were no records of physical testing prior to offsite discharge / release being undertaken.</p> <p>This was required by the Sydney Metro CEMF plus the JHCPBG CSW&G Management Plan and/or Water Discharge procedure.</p> <p><i>Currently, EPL Environmental Performance Compliance data of treated construction water discharge quality was observed to be reliant on in situ WTP instrumentation only.</i></p> <p>Compliance obligations:</p> <ul style="list-style-type: none"> • Sydney Metro C&SW Construction Environmental Management Framework CEMF s15.2 f (iii) • Revised Environmental Mitigation Measure SCW4 	OBS	Medium	<p>Action to be taken by JHCPBG: Undertake WTP water quality verification tests prior to issuing of discharge permit.</p> <p>Responsible person: Manager, Environment, Approvals & Sustainability</p> <p>Due date: from November 2019 onwards</p>
	CONSULTATION & REPORTING			
7.	<p><u>Reporting accuracy</u> JHCPBG Discharge Water Quality Table of the Environment Monitoring Data Report on the John Holland website only evidenced a single pH and Turbidity value associated with the monthly Discharge Permit "snapshot", not evidencing required daily monitoring frequency, minimum and maximum values plus exceedance information.</p> <p>There were also data and date inaccuracies which had not been identified during the report review process.</p> <p>Compliance obligations:</p> <ul style="list-style-type: none"> • Environmental Protection Licence 20971, M2.2 specifies a sample frequency of "daily during discharge" • EPA "Requirements for Publishing Pollution Monitoring Data" recommends minimum and maximum values, plus reporting of exceedance information et al. 	OBS	Medium	<p>Action to be taken by JHCPBG: Ensure that data in future EPA Discharge Water Quality Monitoring reports:</p> <ol style="list-style-type: none"> a) Includes daily pH and turbidity ranges b) Are checked for accuracy against source data by the document reviewer. <p>Responsible person: Manager, Environment, Approvals & Sustainability</p> <p>Due date: 14 November 2019</p>

Ref	Audit Finding	Status	Priority	Agreed Action Plan
8.	<p><u>Reporting timeframes</u> The August 2019 Monthly Environment Monitoring Data Report was not made publicly available on the John Holland website within 14 days of month end, as required by the JHCPBG Environmental Protection Licence.</p> <p><i>There might be a systemic issue requiring improvement, noting there was a prior non-compliance raised against MCoA C16 for 6-monthly Water Monitoring Reports not being submitted within required timeframe.</i></p>	IO	Low	<p>Action taken by JHCPBG: This was remedied when highlighted by the Independent Environmental Auditor during the drafting of <u>this</u> audit report. An obsolete EPL was removed and replaced as well.</p> <p>Responsible person: Manager, Environment, Approvals & Sustainability</p> <p>Completion date: 23 August 2019</p>
NON-COMPLIANCE, EXCEEDANCE & INCIDENT MANAGEMENT				
9.	<p><u>Overflow alarms</u> Float switches had recently been installed in Barangaroo WTP bunds to detect overflows (being a lessons learnt initiative resulting from a Marrickville WFP incident), however formal ongoing functionality testing of these instruments had not been established as yet.</p> <p>Compliance obligations:</p> <ul style="list-style-type: none"> EPL 20971 02.1 a) requires equipment to be maintained in a proper and efficient condition. Both Environmental and Safety legislation require routine response testing. JHCPBG Emergency Response Plan Element 2, paragraph 2.6 requires that emergency equipment and alarm systems are inspected, tested and maintained at regular intervals. 	IO	Low	<p>JHCPBG noted and committed to: Update Weekly Inspection Checklist to include this item.</p> <p>Responsible person: Manager, Environment, Approvals & Sustainability</p> <p>Target date: date: 14 November 2019</p>

Ref	Audit Finding	Status	Priority	Agreed Action Plan
10.	<p><u>Protection of the Environment Operations Act s120 compliance records</u></p> <p>For the project to date, there was insufficient evidence to demonstrate that <u>discharges</u> from the licensed Water Treatment Plant were compliant with the Protection of the Environment Operations Act s120 pollution prohibition requirements and/or guidelines required by Schedule 5 of the POEO Act (General) Regulation regarding water pollution by 'prescribed matter' such as potentially contaminated groundwater directed to the WTP for treatment.</p> <p><i>The audit observed that:</i></p> <ul style="list-style-type: none"> a) <i>The minimum suite of 3 pollutants discharged, regulated by EPL 20971 appeared to comply, noting some instrument and data issues further in this report however;</i> b) <i>The current EPL does not does not regulate pollution of any other substances per POEA s122 liabilities, including identified contaminants of concern;</i> c) <i>Other than commissioning tests of August 2018, Laboratory analysis data of potential contaminant discharges was confined to two (2) samples to date;</i> d) <i>The above-mentioned test results indicated a few minor exceedances, these not appearing to be assessed and reported as being anomalies, incidents or otherwise;</i> e) <i>JHCPBG were undertaking quarterly sampling and analysis of groundwater (pre-treatment), mostly confirming low level contamination as predicted by specialist consultant reports;</i> f) <i>No WTP proficiency tests had been undertaken to confirm reduction of contaminant concentrations by treatment processes.</i> <p>Compliance obligations:</p> <ul style="list-style-type: none"> • As stated above. Plus Planning Approval REMM SCW 4 requiring compliance monitoring of discharges from WTP's 	NC	HIGH	<p>Action to be taken by JHCPBG:</p> <ul style="list-style-type: none"> a) Continue to accumulate a compliance dataset of laboratory contaminant discharge analysis, at a frequency commensurate with risk to the environment and/or prosecution; b) Provide monthly updates of dissolved-phase Contaminant Analysis Tracking Register (Spreadsheet). <p>Responsible person: Manager, Environment, Approvals & Sustainability</p> <p>Due date: from 29 November 2019 to project completion / treatment cessation, verifiable quarterly</p>

Ref	Audit Finding	Status	Priority	Agreed Action Plan
	SITE (WTP) OPERATIONS & CONTROLS			
11.	<p><u>Operational of pollution controls</u> The CSW&G Management Plan and/or WFP Operation and Maintenance Manual did not define operational, maintenance, training or compliance information requirements relating to Carbon Filters, reportedly installed for hydrocarbon and other groundwater contaminant removal.</p> <p>Compliance obligation:</p> <ul style="list-style-type: none"> MCoA C4 requires sub-plans to identify issues and define and implement mitigation measures to achieve project environmental performance outcomes and Planning Approval compliance. 	OBS	Medium	<p>Action to be taken by JHCPBG:</p> <p>Update the following documentation:</p> <ol style="list-style-type: none"> Barangaroo WFP Operation & Maintenance Manual Barangaroo WFP Daily Inspection Checklist WTP Training and familiarisation package <p>AND</p> <ol style="list-style-type: none"> Provide training/retraining <p>Responsible person: Manager, Environment, Approvals & Sustainability</p> <p>Due date: 29 November 2019</p>
12.	<p><u>Turbidity meter calibration.</u> Other than monthly service reports, there was no evidence to demonstrate 2 point calibration of the Discharge Turbidity meters using a 100.0 NTU reference according to WTP O&M Manual s10.5.</p> <p><i>It should be noted that compliance data and due diligence reports rely on the accuracy of the turbidity monitoring instrumentation, plus EPA required correlation with the EPL specified total suspended solid concentrations limit.</i></p> <p>Compliance obligations:</p> <ul style="list-style-type: none"> EPL 20971 02.1 a) requires equipment to be maintained in a proper and efficient condition 	OBS	HIGH	<p>Action to be taken by JHCPBG:</p> <ol style="list-style-type: none"> Ensure that Monthly Calibration Certificates are provided indicating calibration details (alongside) as opposed to a service report File as project records <p>Responsible person: Manager, Environment, Approvals & Sustainability</p> <p>Due date: 1 November 2019</p>

Ref	Audit Finding	Status	Priority	Agreed Action Plan
13.	<p><u>Discharge Flow Meter calibration.</u> The cumulative WFP discharge Flow Meter required by the JHCPBG Monitoring & Protection Plan was approaching annual calibration specified by the WFP O&M Manual s10.5.</p> <p><i>It was noted that WTP commissioning including testing of water quality parameters had been undertaken late August 2018</i></p>	IO	Medium	<p>JHCPBG noted and committed to: Undertake annual Flow Meter calibration as required.</p> <p>Responsible person: Manager, Environment, Approvals & Sustainability</p> <p>Target date: date: 14 November 2019</p>
14.	<p><u>Project compliance records.</u> There was no flowmeter or pumping volume / duration estimation process to quantify or estimate the volume of Station Box groundwater/infiltration being pumped (as inflow) to the WFP, noting:</p> <ul style="list-style-type: none"> ➤ Tunnel water quantities to the WTP were being estimated as indicated in the Audit Clarification below; ➤ Pump flowrate characteristics would be known from technical performance specifications, or could be practically confirmed. <p>Compliance implication: Inadvertent WFP discharge suspected of polluting would require an estimate of volume discharged to enable an assessment of material harm or not.</p>	IO	Low	<p>Action to be taken by JHCPBG: In the absence of a flowmeter, investigate whether site could record pump start and stop times in daily records, and formally communicate resolution or justification to this Audit Finding to Sydney Metro.</p> <p>Responsible person: Manager, Environment, Approvals & Sustainability</p> <p>Target date: 29 November 2019</p>
15.	<p><u>WTP operating compliance data</u> The Water Treatment Plant WQ discharge dataset from 02-07-2019 to 26-08-2019 was assessed post audit by the Independent Environmental Auditor, noting the functionality of the WTP programmable set points to control pH upper and lower limits and upper Turbidity limits being demonstrated over 2 minute intervals to shut down valves and discharge flow. Whilst not limiting future verification and clarification by interested parties, the following items were questioned:</p> <p>a) Some discharges were noted of 0.00 NTU i.e. 'Zero' Turbidity measurement for some time, noting Turbidity meters had not been calibrated – refer Audit Finding (above).</p>	Note	N/A	<p>JHCPBG response: JHCPBG and/or responses by the WTP constructor and service provider are indicated in section 2.4 further in this report.</p>

Ref	Audit Finding	Status	Priority	Agreed Action Plan
	<p>b) Discharge output exceeded the baseplate WTP throughput capacity of 50 l/s, in some cases approaching 150 l/s. It was also noted that WTP O&M Manual mentions a 'gravity flow to discharge' but the diagram depicted 2 pumps in parallel</p> <p>c) Tunnel Water Flow volume appeared to exceed the WTP discharge flow by over 4,300m³ i.e. a significant discrepancy between input and output volumes, although the spread sheet does indicate tunnel volumes being "Estimated".</p>			

2.4 Supplementary Audit Notes

The following notes provide key supporting evidence around prior Audit Findings, and the context of their classification and action priority.

No.	Audit evidence / comments
	MANAGEMENT & REGULATORY CONTROLS
1	Environmental discharge risk
a)	<p>EPL application of June 2017 indicated that a (future) Phase 2 Contamination Assessment would inform the disposal pathway decision.</p> <ul style="list-style-type: none"> ➤ Assessments and related contamination investigations were subsequently undertaken by related specialist consultants, advice predominantly from a soil and land usage perspective though, but also providing guidance on liquid phase sampling and disposal.
b)	<p>EPA Guide to Licensing provides a Risk Assessment Tool and suggests "a detailed description of the concentration of pollutants both before and after treatment" as supporting evidence to a license application</p> <ul style="list-style-type: none"> ➤ This was not provided by JHCPBG at the time of application (July 2017)
c)	<p>JHCPBG email trail dated 20/9/2018 to an EPA query around S120 obligations and groundwater contamination, in summary</p> <ul style="list-style-type: none"> ➤ Refers to a review of available data and an assessment of the receiving environment - this was limited to a baseline 80% assessment of predominantly physical characteristics, as part of MCoA C10 ➤ Did not sanction any treated contaminant release or imply frequency of analysis.
d)	<p>Golder report entitled "Qualitative Assessment of possible contamination migration from former gasworks site to Station Box at Barangaroo" 1783731-041-TM revision 1 dated 18 April 2019.</p> <ul style="list-style-type: none"> ➤ Acknowledging the reports requirement to read entirely and in context, significant dissolved-phase contamination was not expected to reach the excavation during the two-year works period.
e)	<p>Construction Soil, Water & Groundwater Management Plan dated March 2018 states at 7.11.8 that "A Standard Water Treatment Plant configuration (with sediment and dissolved phase removal) should be suitable for onsite water treatment and the potential need for a Trade Waste Agreement from Sydney Water will be further investigated once Phase 2 test results are available".</p> <ul style="list-style-type: none"> ➤ As per a) above, a number of reports by Ramboll, Douglas Partners, Golder et al were commissioned (Refer Appendix 1) ➤ Other than Planning Approval related physical parameter impacts on receiving waters, no risk assessment had been undertaken of prescribed matter and/or chemicals of concern from an ANZECC or the ANZ Fresh and Marine Water Quality Guidelines.
2	Management Plan update
a)	JHCPBG indicated they were implementing requirements of a draft CSW&G Management Plan update - this was not provided/sighted during the audit.
b)	The CSW&G Management Plan had a number of project wide inaccuracies and references to obsolete documents etc. Plus varied ecosystem protection levels ranging from 80% to 95%.
c)	<p>In the case of Barangaroo the WFP Operation and Maintenance Manual did address most treatment/operational controls.</p> <ul style="list-style-type: none"> ➤ This was not referenced from the CSW&G Management Plan, and also had some limitations pertaining to Carbon Filters (another Audit Finding).
3	Authorised environmental releases
a)	The Remedial Action Plan requires that water will only be disposed when the contaminants of concern have been assessed and found to be below the required disposal thresholds (either with or without treatment).

No.	Audit evidence / comments
b)	Per the Construction Soil, Water & Groundwater Management Plan s7.2.3, JHCPBG had implemented a monthly Discharge Permit system to ensure that pH, Turbidity and Oil / Grease were verified before release. ➤ This did not include contaminants of concern identified in the Remedial Action Plan however.
c)	It is acknowledged that a monthly Station Box Seepage Inspection process had commenced utilising visual and olfactory observations to check for signs of contamination at source, and arrange for testing if need be.
d)	Sampling results sighted have confirmed that there are low levels of some prescribed material, but no hydrocarbon contaminants of concern to date, noting some analyses neglected to test for these though.
e)	Sampling frequency (and analytical results) to date has not been adequate to draw conclusions on contamination risk.
f)	At the present time, results do however support the Hydrological Interpretative Report's conclusion that initial groundwater is not likely to be contaminated, but that over time there is risk that this contamination will increase.
WATER MONITORING PROGRAMS	
4	Water Monitoring Program
a)	The Water Monitoring Program component of the JHCPBG Construction Soil, Water & Groundwater Management Plan is entirely focused on a narrow suite of general indicators of receiving water quality prior to and during the project delivery. ➤ Baseline data confirmation required by MCA C10 did not comprise contaminants of concern or facilitate direct discharge compliance
b)	JHCPBG Construction Soil, Water & Groundwater Management Plan s4.3.3 on Groundwater Quality states that "Based on this data and previous project experience in Sydney it is anticipated that in general only minor treatment using water treatment plants will be required to meet ANZECC 95th percentile default trigger values for freshwater"
c)	The RAP Addendum recommended: <i>"Grab" sampling of water in sumps in the base of the southern end of Station Box Excavation to identify changes in quality of groundwater inflow during dewatering. The sumps will be excavated for the proposed "sump and pump" dewatering method. Sampling in accordance with Appendix D of the RAP is proposed to be undertaken as part of the monthly inspections (3.1) whilst dewatering is ongoing, or upon identification of groundwater inflow with signs of concern not previously observed. (The total duration of sump sampling is expected to be 18-24 months).</i> ➤ This sump and pump strategy had not been implemented nor were samples taken on a monthly* basis *Post audit JHCPBG provided recent correspondence records between the Accredited Site Auditor and Contamination Consultants regarding JHCPBG's risk based approach to sample quarterly, not monthly as specified above.
d)	As required by the RAP an event of concern was noted on 31/7/2019, and a sample analysed (which is good). ➤ No sampling was undertaken of the WTP discharge to confirm treatment effectiveness though
e)	The 2019 RAP Addendum also recommends: <i>Analysis to include, as a minimum; the following suite of potential contaminants: organochlorine pesticides (OCP); polycyclic aromatic hydrocarbons (PAH), total recoverable hydrocarbons (TRH); benzene, toluene, ethylbenzene and xylenes (BTEX); monocyclic aromatic hydrocarbons (MAH), cyanide, ammonia, phenol and total metals (arsenic, cadmium, chromium, copper, lead, mercury, nickel and</i>

No.	Audit evidence / comments
	<p><i>zinc</i>), plus QA/ QC requirements in accordance with the RAP. (These records will be included in the validation report).</p> <ul style="list-style-type: none"> ➤ Analytical Laboratory Test Certificates did not always consistently analyse for the above-mentioned, with some gasworks related contaminants such as hydrocarbons omitted in one of the discharge tests.
f)	<p>With regards to the JHCPBG email trail dated 20/9/2018 to an EPA query around S120 obligations and groundwater contamination, it was observed that that:</p> <ul style="list-style-type: none"> ➤ Contaminants nominated to the EPA JHCPBG s intended to analyse were a much smaller subset of those above, which was recommended 6 months later to the dialogue.
5	EPL discharge compliance monitoring
a)	<p>At the time of audit monthly Water Filtration Plant WQ discharge datasets were attached to emails and not collated in project filing systems</p> <ul style="list-style-type: none"> ➤ Post audit supply hereof revealed some information problems with data exports from the WTP PLC's
b)	<p>Similarly, service provider records of monthly pH and Turbidity instrument calibrations were not collated in project filing systems</p>
WATER QUALITY information	
6	Compliance sampling and analysis records
a)	<p>Whilst there were 2x pH and 2x Turbidity meters at the discharge of the WTP, JHCPBG only took readings from these online instruments for issuance of the Discharge Permit and legislative compliance reporting purposes</p>
b)	<p>The JHCPBG Water Discharge procedure requires testing before "discharge off the premises" (bright red attention box in the top left-hand corner of the flowchart).</p>
CONSULTATION & REPORTING	
7	Reporting accuracy
a)	<p>Environmental Protection Licence 20971, M2.2 compliance with a "daily during discharge" was not evidenced by a single point notation on Environmental Dewatering Permits.</p>
b)	<p>There were also data and date inaccuracies which had not been identified during the review process e.g.</p> <ul style="list-style-type: none"> • Marrickville Environmental Dewatering Permit dated 22/8/19 sighted during the audit indicated a pH of 6.8 but the August Monthly Report indicated a value of 7.2 • Barangaroo Permit 0082 (for period 1/8/19 - 31/8/19 was 6.8 with report indicating this was sampled on 24/7/19)
8	Reporting timeframes
a)	<p>Email correspondence with John Holland appear to indicate that Monthly Environment Pollution Monitoring Report Reports had been published on the John Holland website within required timeframes.</p>
b)	<ul style="list-style-type: none"> ➤ The August 2019 Monthly Environment Pollution Monitoring Report was not made publically available within 14 days of month end as required by the Environmental Protection Licence. This was remedied by JHCPBG on 23rd of August when highlighted by the Independent Environmental Auditor during the drafting of <u>this</u> audit report. An obsolete EPL was removed and replaced as well
c)	<ul style="list-style-type: none"> ➤ There were also data and date inaccuracies which had not been identified during the review process e.g. <ul style="list-style-type: none"> • Marrickville Environmental Dewatering Permit dated 22/8/19 sighted during the audit indicated a pH of 6.8 but the August Monthly Report indicated a value of 7.2 • Barangaroo Permit 0082 (for period 1/8/19 - 31/8/19 was 6.8 with report indicating this was sampled on 24/7/19)

No.	Audit evidence / comments																				
	NON-COMPLIANCE, EXCEEDANCE & INCIDENT MANAGEMENT																				
9	Overflow alarms																				
	No additional notes																				
10	Protection of the Environment Operations Act s120 compliance records																				
a)	<p>With regards to the JHCPBG "tabled" email trail dated 20/9/2018 to an EPA query around S120 obligations and groundwater contamination, but also stating JHCPBGs approach and commitments:</p> <ul style="list-style-type: none"> ➤ The QEM IEA considers this irrelevant to evidence of day-to-day POEOA compliance ➤ Only matters specified in an EPL and/or due diligence records confirming compliance and/or s122 liability defence for discharges 365 days of the year should be considered 																				
b)	<p>JHCPBG email trail dated 22/10/2019 from Site Auditor (Ramboll) confirmed quarterly groundwater contaminant testing unless there were unexpected signs of concern during inspections. Plus need for photographs.</p> <ul style="list-style-type: none"> ➤ The IEA notes CLMA legal obligations and associated advice as being irrelevant to POEOA compliance. 																				
c)	<p>Results of the two (2) Analytical Tests conducted to date (1st half 2019) evidenced a few potential Default Guideline Values exceedances of 'prescribed matter' and/or contaminants of concern in the WFP discharge, this at a protection level for moderately disturbed ecosystems:</p> <table border="1" data-bbox="336 943 1099 1122"> <thead> <tr> <th>Date</th> <th>Pollutant</th> <th>Concentration</th> <th>DGV @ 95% **</th> </tr> </thead> <tbody> <tr> <td>26/02/19</td> <td>Copper</td> <td>0.100 mg/l</td> <td>0.0013</td> </tr> <tr> <td></td> <td>Zinc</td> <td>0.110 mg/l</td> <td>0.015</td> </tr> <tr> <td>25/06/19</td> <td>Copper</td> <td>0.002 mg/l</td> <td>0.0013</td> </tr> <tr> <td></td> <td>Cyanide</td> <td>0.007 mg/l</td> <td>0.004</td> </tr> </tbody> </table> <p>** Stated in s4.3.3 of the CSW&G Management Plan</p>	Date	Pollutant	Concentration	DGV @ 95% **	26/02/19	Copper	0.100 mg/l	0.0013		Zinc	0.110 mg/l	0.015	25/06/19	Copper	0.002 mg/l	0.0013		Cyanide	0.007 mg/l	0.004
Date	Pollutant	Concentration	DGV @ 95% **																		
26/02/19	Copper	0.100 mg/l	0.0013																		
	Zinc	0.110 mg/l	0.015																		
25/06/19	Copper	0.002 mg/l	0.0013																		
	Cyanide	0.007 mg/l	0.004																		
d)	<p>It should be noted that whilst Oil & Grease values are not specified in the EPL or the ANZ Guidelines for Fresh and Marine Water Quality, with industry and the EPA generally specifying a value of 10 mg/L. This concurs with the JHCPBG Water Treatment Plants specification which at 4.3.1.1 and 4.3.2.1 requires < 10 mg/L at 100% percent of time. However:</p> <ul style="list-style-type: none"> ➤ An Oil & Grease discharge concentration (HEM test) of 23 mg/L was observed in the Eurofins Barangaroo Certificate of Analysis 662637-W of 25/6/19. ➤ Eurofins Certificate of Analysis 659169-W, for 8 sites sampled for the January 2019 to June 2019 surface water period indicated an increase in the O&G concentrations in surrounding CSSI receiving waters for example, <ul style="list-style-type: none"> ○ Ranged from 10 to 41 mg/L with Barangaroo @ 15 mg/L ○ Previous data ranges were < 5 to 8 mg/L 																				
e)	<p>Four (4) Discharge Laboratory Analysis were undertaken during 2018 commissioning, prior to subsequent groundwater identification of contamination issues. Barangaroo Water Treatment Plant Commissioning Spreadsheet indicated almost all parameters were below threshold or limits of detection, however:</p> <ul style="list-style-type: none"> ➤ Envirolab Report 199784 dated 3/9.19 indicted sample SBR_COM_2 of 31/8/2018 had a pH 9.5 exceedance (> allowable 8.5). ➤ The abovementioned spreadsheet indicated a laboratory assay of pH 8.5 and a discharge of 20,000L on 3/9/19. JHCPBG stated (but no records were sighted to confirm) this water was recirculated through the plant until within specification in which point it was released. 																				
f)	<p>Water Filtration Plant WQ discharge data from 02-07-2019 to 26-08-2019 evidenced cessation of discharges occurring when sensors detected pH and turbidity exceedances (which is good). There was an apparent 2- 4 minute delay with occasional small flows indicated in the data, but this was probably attributable to data reading capability.</p>																				

No.	Audit evidence / comments
g)	Remedial Action Plan addendum of February 2019 (Planning Approval MCoA's E66, 67 et al requirement) specified a monthly minimum of before and after treatment analysis of contaminants of concern, being amended to a quarterly frequency by correspondence with the EPA Accredited Site Auditor, however: <ul style="list-style-type: none"> ➤ This was a risk-based approach from a Contaminated Land Management Act perspective ➤ The POEO Act prohibits water pollution at any time, including the 90 day period in between definitive analytical result confirmation
SITE (WTP) OPERATIONS & CONTROLS	
11	Operational of pollution controls
a)	Carbon Filters were installed at Barangaroo as an add-on to the 2017 WFP Specification / Request for Proposal to enable hydrocarbon and other groundwater contaminant removal.
b)	An Activated Carbon Technical Datasheet claimed removal of contaminants. <ul style="list-style-type: none"> ➤ There was no evidence to prove that this carbon was actually used and/or proven to remove identified contaminants.
c)	On the day of the audit, inlet valves to the carbon filters were closed, with the Operator PLC interface panel noted as separate to that in the Control Room and behind a locked door.
12	Turbidity meter calibration
	<ul style="list-style-type: none"> ➤ Monthly service provider Calibration Reports required retrieval from the service provider for <u>this</u> audit, and only indicated a "PASS", ➤ There were no Calibration Certificates indicating referenced standards used and 2 point adjustment data, or reference standards such as the 100.0 NTU defined by the WTP O&M Manual s10.5.
13	Discharge Flow Meter calibration
	No additional notes – no records
14	Project compliance records
	There was no flowmeter connected to the sump and pump line directing groundwater to the WTP. <ul style="list-style-type: none"> ➤ JHCPBG commentary on volumes varied from too little to enable recommend "sump and pump" approach, to quantity was too much to hold pending analysis
15	WTP operating compliance data
	JHCBBG response to the audit clarifications and/or queries were as follows:
a)	<i>Email dated 24/10/2019 entitled NTU data re Audit Findings from Aquatic Engineering to JHCPBG summary indicated that one of the sensors was faulty, a service visit being arranged and a reset and programming solution implemented. Additionally, data was analysed to demonstrate that 2nd sensor 2/B had provided assurance and not permitting discharge > 35 NTU.</i>
b)	<i>The maximum processing rate through the plant is 50 L/s. The discharge can exceed 100 L/s as a gravity line through a DN200 line. The readings recorded on the spreadsheet are the recorded totalisers from the HMI. The numbers on the HMI are reset with a power outage. They can also be manually reset by the operator, so they can take totals over a period. The flowmeter local displays retain their values and record total volumes since the plant was started.</i>
c)	<i>The tunnel water flow is an estimate only and is determined by a mass balance on the feed silos. This was done as it was not possible to put a flowmeter on the line coming from the tunnel due to the air scouring, which would give falsely high readings. The mass balance is upset when water enters the treatment plant via the off spec return tank, which isn't water being retreated or back wash water. I.e., water coming from the emergency tank, Centrate from the Sludge Treatment Plant.</i>

2.5 Audit Compliance context

The following Table provides a summary of audit notations around water monitoring, management and regulatory controls.

Activity / process:	Surface Water (downstream) Project-wide	Barangaroo Construction Water (Harbour discharge)	Barangaroo Groundwater directed through WTP (Harbour discharge)
Predominant water source	CSSI and other projects, plus surrounding urbanisation	Rainwater, tunnelling water and mobilised matter including silt	Groundwater and related seepage from off-site
Regulatory control	Planning Approval CSSI 15_7400	Planning Approval CSSI 15_7400 Environment Protection Licence 20971	POEO Act, section 120 General Regulation, schedule 5 <i>No specific approval</i>
Required testing frequency	Quarterly, plus 1x storm event	Daily during discharge	RAP Addendum requires "sump and pump" <i>Not always done</i>
➤ Actual testing	<i>As above</i>	<i>Testing not undertaken, on-line meter reading only</i>	<i>Quarterly, mostly input to WTP or based on unusual observations. Infrequent discharge testing</i>
Testing method	Grab, WQ Meter and Analytical Laboratory	Not done	Grab, Analytical Laboratory
Hold Point release	N/A	<i>Yes</i>	<i>Not implemented</i>
Checks & Calibrations	<i>WQ meter, on use Annual external WQ meter calibrations NATA Laboratory regime</i>	<i>pH meter calibrated Uncalibrated Turbidity meter</i>	Monthly inspections <i>no photographs maintained</i>
Administrative or Engineering controls	Site implementation of Soil & Water Management Plan	Water Treatment Plant process and discharge control set-points, alarms and interlocks. <i>A few potential exceedances</i>	Water Treatment Plant (no tradewaste / sewer discharge). Surveillance observations and testing as above <i>No engineering controls</i>
Reporting	Sydney Metro website	John Holland Website	<i>Not reported externally.</i>

Appendix 1: Audit documentation

The following indicates key systems, documents, reports, information and records that were reviewed, accessed or sighted during the audit process:

Documentation	Information / Records
1. MANAGEMENT & REGULATORY CONTROLS	
Sydney Metro Construction Environmental Management Framework version 3.0 16 Feb 2016	Ramboll Interim Audit Advice letter no. 6 - Remediation Action Plan, dated 31/5/2018
Construction Soil, Water & Groundwater Management Plan TSE-JCG-TPW-EM-PLN-002014 rev 8 dated 8/3/2018	Golder report entitled "Qualitative Assessment of possible contamination migration from former gasworks site to Station Box at Barangaroo" 1783731-041-TM revision 1 dated 18 April 2019.
Environmental Protection Licence 20971 variation 34 dated 24/6/19	Douglas Partners Remedial Action Plan addendum SMCSWTSE-SMD-SBR-EM-PLN-008121.02.INF.02.01 letter 27 February 2019
Environmental Protection Licence application dated 30/6/2017 and supporting document TPW-EN-RPT-097009 dated 29/6/2017	Section 10.3 of Douglas Partners Remedial Action Plan SMCSWTSE-SMD-SBR-EM-PLN-006276.00.INF.00.01 dated 7 May 2018
Monitoring & Protection Plan TSE-JCG-TPW-CN-PLN-002036 rev 6 dated 14/5/2019	JHCPBG email trail dated 22/10/2019 from Site Auditor (Ramboll) re groundwater contaminant testing frequency et al.
Contingency Groundwater Monitoring Procedure, SMCSWTSE-JCG-TPW-EM-MPR-003013	JHCPBG email trail dated 25/9/2018 from Site Auditor (Ramboll) re groundwater contaminant testing frequency.
	JHCPBG Monthly Environmental Reports - June, July, August 2019
	Construction Water:
Water Discharge procedure TSE-JCG-TPW-EN-MPR-003002 rev 01 dated 30/06/2017	Marrickville Environmental Dewatering Permit 0275 for period 5/7/19 - 5/8/19
Environmental Dewatering Permit (SMCSWTSE-JCG-TPW-EM-FRM-004006 rev 01 dated 17/4/18)	Marrickville Environmental Dewatering Permit 186 for period 06/8/19 - 31/8/19, pH 7.2
	Marrickville Environmental Dewatering Permit 0276 for period 3/9/19 - 30/9/19
	Barangaroo Environmental Dewatering Permit for period 1/7/19 - 31/7/19
	Barangaroo Environmental Dewatering Permit 0082 (for period 1/8/19 - 31/8/19)
	Barangaroo Environmental Dewatering Permit 083 for period 1/9/19 - 30/9/19

Documentation	Information / Records
2. WATER MONITORING PROGRAMS	
	Surface Water:
Water Quality Program (section 6) of Construction Soil, Water & Groundwater Management Plan TSE-JCG-TPW-EM-PLN-002014	Barangaroo Surface Water Monitoring Field Sheets, PW-EM-FRM-0789 dated 31/5/2019 et al.
	Water Monitoring Equipment Calibration Register updated 18/9/2019
	Australian Scientific Service & Calibration Report, Horiba U-52 Water Quality Meter, instrument TLYATESE 2017 dated 6/5/19
	Construction Water:
EPL Location of Discharge Points Register SMCSWTSE-SMD-TPW-EM-SCH-009508.11.INF.11.01	TDS TSS Correlation 2018 Spreadsheet
	Refer Item 6 below
	Contaminated Water:
Barangaroo Monthly Inspection (Seepage into Station Box Excavation) checklist (SMCSWTSE-JCG-TPW-EN-CLK-067587)	Barangaroo Monthly (SB seepage) Inspection forms dated 1/4/19, 7/5/19, 16/6/19, 15/7/19, 31/7/19 & 23/8/19
	Sydney Metro TSE IG Daily reports
3. WATER QUALITY DATA	
	Surface Water:
	Envirolab Services Certificate of Analysis 199007, 9 sites sampled 22/08/18 for the July 2018 to December 2018 period.
	Envirolab Services Certificate of Analysis 206335, 9 sites sampled 22/11/18 for the July 2018 to December 2018 period.
	Eurofins Certificate of Analysis 646853-W, 8 sites sampled 22/03/19 for the January 2019 to June 2019 period.
	Eurofins Certificate of Analysis 659169-W, 8 sites sampled 31/03/19 for the January 2019 to June 2019 period.
	Construction Water:
	Refer section 6 below for Envirolab Services Certificate of Analysis for WTP discharge / commissioning
	Aquatic Engineering monthly Water Treatment Plant WQ discharge dataset from 02-07-2019 to 26-08-2019
	Contaminated Water:
	Eurofins Certificate of Analysis 642457-W sample id SBR_COM_18 sampled 26/02/2019 of DISCHARGE

Documentation	Information / Records
	Eurofins Certificate of Analysis 662637-W sample id SBR_COM_24 sampled 25/06/2019 of DISCHARGE
	Eurofins Certificate of Analysis 668775-W sample id BN_GW sampled 31/07/2019 of GROUNDWATER in Station Box
	Eurofins Certificate of Analysis 675398-W sample id's SBX_SBX3, SBX_4 and SBX_5 sampled 6/9/2019 of GROUNDWATER in Station Box
	Eurofins Certificate of Analysis 676191-W sample id's SBX_SBX2, received 9/9/2019 of GROUNDWATER in Station Box (single analyte, Cyanide)
4. CONSULTATION & REPORTING	
	Original Construction Soil, Water & Groundwater Management Plan consultation records appended to this document
	Email from EPA dated 29/9/2017 re requested review of the above-mentioned.
	Email from Fire NSW dated 16/10/2017 3 above.
	Surface Water:
	WQ monitoring report 1 SMCSWTSE-SMD-1NL-EM-REP-009308.00.INF.00.01
	WQ monitoring report 2 SMCSWTSE-SMD-1NL-EM-REP-009309.00.INF.00.01
	WQ monitoring report 3 SMCSWTSE-SMD-1NL-EM-REP-009770.00.INF.00.01
	Construction Water:
	JH / EPL Website data incl Water Monitoring Data July 2019 (website)
	JH / EPL Website data incl Water Monitoring Data August 2019 (website)
	Contaminated Water:
	Results not reported
5. NON-COMPLIANCE, BREACH & INCIDENT MANAGEMENT	
Emergency Response Plan SMCSTSE-JCG-TSE-PM-PLN-002081 rev 05 dated 4/7/2019	JHCPBG email trail dated 20/9/2018 to EPA query around S120 obligations
Pollution Incident Response Management Plan Extract	PIRMP scenario testing of 12/12/18 for Barangaroo
6. SITE (WTP) OPERATIONS & CONTROLS	

Documentation	Information / Records
JHCPBG Request for Proposal for the Supply and Commissioning of Water Treatment Plants Revision 05 dated 29/6/17	Envirolab Services Certificate of Analysis for WTP commissioning dated 3 August 2018
	JGCPBG Spreadsheet Summary of Barangaroo WTP Commissioning, discharges 3-28 August 2018
Aquatic Engineering Australia "Sydney Metro 50 LPS Plants" Operation and Maintenance Manual P35-50LPS rev B dated May 18th, 2019	Jacobi Aquasorb 80 Activated Carbon Technical Datasheet
Water Treatment Plant Daily Inspection Checklist (SMCSWTSE-JCG-TPW-EMCLK-067282)	2019 WTP Daily Shift Check Sheet records e.g. 29/6, 9/9, 10/9, 12/9
WTP Daily Shift Check Sheet (SMCSWTSE-JCG-TPW-EM-FRM-004816)	Aquatic Engineering Australia Calibration Certificates and Calibration Reports for pH probes for January - September 2019
Aquatic Engineering Australia Barangaroo Water Treatment Plant Training package (undated).	Aquatic Engineering Australia Service Reports for Turbidity meters for January - September 2019
	Barangaroo WTP Training & Familiarisation records for Operators JC and MW dated 5/9/19.

Appendix 2: Audit Credentials

Audit process

This Independent Environment Audit comprised an off-site desktop review, an onsite and office audit and a post audit assessment of documentation and records. The audit assignment was undertaken by the identified QEM Consulting Pty Ltd Auditor below, with the second Auditor not directly involved in the audit conducting a peer review of the report prior to finalising.

The audit process including scoping and planning was undertaken in accordance with the principals of AS / NZS / ISO 19011:2018 – Guidelines for Auditing Management Systems.

Auditor information

Audit Organisation:	QEM Consulting Pty Ltd
Auditor & Report Author:	Larry Weiss
Auditor Qualification:	Exemplar Global EMS Auditor Accreditation no. 12355
Affiliations:	Member, Engineers Australia 938517
Report Reviewer:	Julie Dickson
Auditor Qualification:	Exemplar Global EMS Auditor Accreditation no. 13573
Affiliations:	EIANZ Certified Environmental Practitioner, no. 221

Audit disclaimer

It should be noted that this report is a snapshot in time, based on supplied records and documentation, as well as observations on the day only, and does not purport to be a definitive confirmation of overall or potential compliance or vice-versa.

Furthermore, this audit report should not be construed as providing any assessment or opinion on contamination from a Contamination Land Management Act perspective, with contamination only referenced as a component of liquid phase matter potentially being discharged or released into surrounding CSSI water catchments.

Auditor certification

The abovementioned Auditor certifies as having personally undertaken this Independent Audit and preparing the contents of this Independent Audit Report; and that the findings of the audit are reported truthfully, accurately and completely; and that he / she has exercised due diligence and professional judgement in conducting the audit. The signed Statement of Interests and Association in our services agreement with Sydney Metro confirm our Auditor's independence and absence of pecuniary interest in the audited project.

Report Author (& Auditor):

[L J Weiss](#)

Larry Weiss

Appendix 3: Audit Attendance Register

Name	Organisation	Role	Briefing Meeting	Opening Meeting	Site Inspection	Audit	Closing meeting
Steven Kotevich	JHCPBG	Construction Manager	Y			Y	Y
Matthew Deeks	Sydney Metro	Delivery Manager C&SW TSE IG	Y				
Andreas Mindt	JHCPBG	Project Manager		Y			
Krissy Vajda	JHCPBG	Manager, Environment, Approvals & Sustainability	Y	Y	Y	Y	Y
Robert Muir	JHCPBG	Project Environmental Manager	Y	Y	Y	Y	Y
Stuart Anstee	JHCPBG	Senior Environment Advisor	Y	Y	Y	Y	Y
Holly Hofland	JHCPBG	Environment Co-ordinator	Y	Y	Y	Y	Y
Matt Walsh	JHCPBG	Operator			y		
Michael Huber	JHCPBG	Plant Manager TBM/RH				Y	
Martin Douglas	JHCPBG	Assurance Manager	y				
Josh Bucholtz	Aquatic Engineering	Managing Director	Y		Y		
Jon Perry	Aquatic Engineering	Engineering Manager			Y		
Emily Russell	Sydney Metro	Environment & Sustainability C&SW TSE IG	Y	Y	Y	Y	Y
Fusun Onal	Aquas	Independent Certifier		Y	Y	Y	Y

----- END REPORT -----