Water Quality Monitoring Plan
Guideline
GAS-1499-GL-EV-009

Kendall Bay Sediment Remediation Project
Environmental Services

December 2019

Document Approval

<table>
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<tr>
<th>Rev.</th>
<th>Date</th>
<th>Prepared by</th>
<th>Reviewed by</th>
<th>Approved by</th>
<th>Remarks</th>
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<tr>
<td>1.0</td>
<td>01/08/19</td>
<td>M. Clutterham</td>
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<td>Jayson Gaul</td>
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<td>2.0</td>
<td>07/08/19</td>
<td>A. Garland</td>
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<td>A. Garland</td>
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Approval position | Name       | Signature | Date
Project Manager   | Jayson Gaul | Signature | 9 December 2019

Document Distribution

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1 Purpose

The Water Quality Monitoring Plan (WQMP) has been prepared to define management and monitoring actions to be followed during remediation works to meet the key environmental objectives for water quality. Objectives of this WQMP are provided in Section 1.1 below.

This plan should be considered as a ‘live document’ that can be modified as the scope of the work changes, or as activities vary during works progress. There may be actual situations that arise in the field which were not anticipated at the time of writing this plan. An administrative mechanism will be implemented to provide a means of amending this plan and recommendations with specific instructions (i.e. field work instructions). It is proposed that amendments to the plan are to be approved by Jemena and relevant regulatory authorities prior to their implementation on site.

1.1 Objective of the Water Quality Monitoring Program

The objectives of this water quality monitoring plan are to:

- Ensure remediation works do not present an unacceptable impact to the water quality of Kendall Bay and the Parramatta River;
- Minimise turbidity levels within and surrounding the excavated/dredged area;
- Provide a procedure for monitoring of contaminant and turbidity levels surrounding the remediation of contaminated sediments at Kendall Bay;
- Provide trigger levels for stopping work, modifying work procedures and/or environmental controls. The trigger levels will consider the NSW water quality objectives;
- Minimise the disturbance to, and release of, potentially contaminated sediments to Kendall Bay including potential cross contamination; and,
- Return the water quality levels to normal following the completion of remediation works.
- Meet the obligations of the Environment Protection Licence (21302).

1.2 Potential Impacts on Water Quality

The sediments in the main impacted areas of Kendall Bay are black and oily and have a strong tar, hydrocarbon or naphthalene odour, characteristic of gasworks contamination. These sediments contain levels of polycyclic aromatic hydrocarbons (PAHs) and total recoverable hydrocarbons (TRHs) at concentrations greater than the site remediation criteria. For further information, refer to RAP.
Disturbance of the sediment during remediation has the potential to release these contaminants, hydrocarbon sheens and to cause increased turbidity to the waters of Kendall Bay. Note that all in situ stabilisation (ISS) works will be conducted inside three layers of environmental control including sheet piles, silt curtains and oil booms. Non-ISS remediation activities will also be conducted within environmental controls including silt curtains and oil booms where appropriate to contain sediment disturbance to the immediate work area. Silt curtains will not be moved until any turbidity generated has subsided and the corresponding risk of contaminant migration has been minimised. Refer to Section 2 of this Water Quality Monitoring Guideline for the specific controls implemented in each remediation area.

These controls would be installed before the commencement of works, they would remain in place for the duration of the works as appropriate, and they would only be removed once the works in each area have been completed and the final monitoring is completed as required.

Remediation works will also involve the use of chemicals for ISS works (e.g. cement, superplasticisers, retardants, etc.) and fuel for equipment required to conduct the remediation in both ISS and Non-ISS remediation areas (diesel, petrol, bio-degradable hydraulic oils, etc.). Strict procedures will be implemented to minimise the chance of leaks or spillage of these chemicals.

Sediments at the site comprise potential acid sulfate soil (PASS) which if removed from below water and left in the air to oxidise will form sulfuric acid which has the potential to impact water quality. Strict procedures will be implemented, including the rapid reinstatement of these materials below water and / or the transport of waste PASS offsite for treatment and / or disposal at an appropriately licensed facility, to minimise the chance of leaks or spillage of these chemicals (refer to Acid Sulfate Soil Management Plan prepared by Validation Consultant for further detail).

Potential impacts on water quality that may occur as part of the remediation works mentioned above include:

- Increased turbidity in the vicinity of the disturbed remediation area;
- Increased contaminant concentrations in the vicinity of the disturbed remediation area;
- Potential for hydrocarbon sheens in the vicinity of the disturbed remediation area;
- Increased acidity due to disturbance of potential acid sulfate soils (PASS); and
- Potential for spillage of reagents for ISS works.
2 Environmental Management

To protect water quality during the remediation works at Kendall bay, Ventia and Jemena will:

- prepare and implement a Remediation Works Environmental Management Plan including:
  - Excavation and Backfilling Management Plan;
  - Acid Sulfate Soils Management Plan (Completed by Jemena’s Validation Consultant);
  - Pollution Incident Response Management Plan.
- Prepare and implement a water and sediment management plan;
- Prepare and implement this Water Quality Monitoring Plan;
- Utilise sealed bins in barges for contaminated sediment and for transport of these contaminated materials on and offsite;
- Implement appropriate navigation measures, utilise suitable lifting techniques and appropriate equipment, and implement decontamination measures;
- Design the capping materials to satisfy appropriate performance criteria (i.e. cobble size); and
- Undertake Cap Inspection and Integrity Testing.

Stringent controls (providing three layers of protection) will be used to contain mobilised sediments from within each remediation areas as follows:

- In-situ stabilisation Remediation Areas (SA1 and NA2/3) - Sheet piling will be installed for the remediation works surrounding the ISS remediation areas in Kendall Bay on two sides around remediation area SA1 and three sides around remediation area NA2/3. The seawall will be utilised as the western environmental control and silt curtains, bubble curtains and temporary coffer dam walls will be used to complete the controls. A secondary impermeable silt curtain and a tertiary oil boom are to be installed around the sheet piles as additional environmental controls around the work areas as required. These environmental controls will be installed prior to the commencement of remediation works within these work areas. At the time of installation, the environmental controls will be placed such that no unacceptable breaches or gaps exist in the controls. The extent and position of the silt curtains and oil booms may be adjusted as necessary during the remediation works.

- Non-ISS Remediation Areas (SA2, SA3, SA4, SA5 and NA1) - Silt curtains and an oil boom are to be installed around the active disturbed non-ISS remediation areas. Primary and secondary silt curtains (or moon pool) and an oil boom will be
installed as required around the active work areas just outside of the reach of
the plant required to conduct the work. The silt curtains, moon pool and oil
boom will be installed prior to the commencement of remediation works in any
the non-ISS remediation areas. At the time of installation, the silt curtains, moon
pool and oil boom should be placed such that no unacceptable breaches or gaps
exist in the fabric. The extent and position of the curtains and oil boom may be
adjusted as necessary during the remediation works in any one area.

The details of the environmental controls and management actions to be utilised during
the project are provided below.

2.1 Sheet Piles, Silt Curtains and Oil Booms

Sheet piles, silt curtains and oil booms will be installed around the active remediation
areas as required to restrict the migration of disturbed sediments and hydrocarbon
sheens away from the work areas.

Silt curtains shall be held in place using floating booms at the surface and weighted
chains on the bottom. The outer silt curtain containment control will be held in place
using round tubular piles, clump weights or similar.

2.2 Bubble Curtains

Ventia have reviewed the challenges associated with access to remediation areas that
are surrounded by several environmental controls and have reflected on the learnings
adopted from the Trial in Kendall Bay. The type of plant and equipment required to
access the remediation areas are significant in size and as such, access conditions and
gates require significant consideration. For these reasons, Ventia have determined that
a bubble curtain represents the most appropriate solution for access into remediation
areas during the full-scale remediation works in Kendall Bay.

Ventia propose that 5 gates are required to manage access into work areas during the
project. These locations are summarised as follows:

1. Tennyson Road Wharf (cement loading / unloading berth area);
2. Tennyson Road Wharf (waste material bins and clean capping material loading /
   unloading berth area);
3. Kendall Bay - Outer Silt Curtain (Secondary Control);
4. Kendall Bay - Remediation Area SA1 Sheet Pile Wall (Primary Control); and
5. Kendall Bay - Remediation Area NA2/3 Sheet Pile Wall (Primary Control).

In these areas, access into the work zones will be via a gate in the curtain or sheet pile
wall. The curtain will have a vessel access gate at a point that minimises current effect
and optimises vessel access. The gate will be fitted with a full depth hinged impermeable curtain panel which will be closed during out of works periods (i.e. overnight, Sundays, Public Holidays or other periods where no vessel access is required). During periods of active works, a bubble curtain barrier will be operational to allow for continuous vessel movements into and out of the work areas. The barrier will consist of a row of air barrier line with air supplied from an air compressor.

Bubble barriers have been in use for over 50 years worldwide for control of oil and turbidity as both permanent and temporary installations, first locally installed in Fremantle WA in 1970 at 290m in length. Most recently a bubble barrier was used by Boskalis during the Port Kembla dredging operation for the hopper barge access gate in a 1,100 lineal metre silt curtain around the spoil ground in the outer harbour. The operation of the bubble barrier consists of compressed air delivered to a sub-surface perforated pipe that creates an underwater bubble curtain. The curtain effectively contains turbid and oily waters inside the remediation zones but allows easy access for barge movements. The silt curtain design takes into consideration the dominant tidal conditions and currents and allows for simplified access and egress for barges to the remediation works, but still maintains a high degree of control over potentially turbid waters.

2.3 **Supernatant Removal**

Supernatant will originate from free water sitting above the excavated sediments when they are placed in bins and washout water from the batch plant and will constitute small volumes each day. Any supernatant produced during the remediation works will be decanted and/or discharged by controlled pumping into the disturbed active remediation areas below the top of the water column. This will only be undertaken whilst the environmental controls are in place and continuous observations of turbidity around the discharge and environmental controls will be undertaken.

2.4 **Batch Plant Washout Water**

The ISS remediation works in Kendall Bay require the use of a grout batch plant to support the batching and delivery of grout for the ISS of impacted sediments. One of the regular routine maintenance activities associated with the operation of the grout batch plant is the washout and cleaning of the plant (vessels, tanks, pumps, pipes, valves and mixing chambers etc.) and the grout delivery lines to ensure they remain in a serviceable condition and do not become blocked or inoperable. For this reason, Ventia propose that the washout water is collected and pumped into a geotube which is positioned on a barge adjacent to the batch plant (or similar). The geotube will be designed to capture solid washout materials and allow the water to pass through (filter) the geotube bag before it is released into the active containment area in Kendall Bay. The geotube barge will be surrounded by two silt curtain controls (one immediately around the geotube barge, along with the outer silt curtain and oil boom) to allow any turbid water to settle out of the water column within these controls.
2.5 Barge Loading and Unloading (Staging Site & Batch Plant)

Material loading, and unloading is an important and regular operation that is required to deliver the remediation works in Kendall Bay. The methodology will involve the securing of the material barges to mooring piles located at the berth of the Staging Site (adjacent to the Tennyson Road wharf) and the securing of the material barge against the Batch Plant when loading or unloading materials in Kendall Bay. One important requirement is to minimise the gap between the loading and unloading areas and the barge or wharf and thereby minimising the potential for accidental release of materials during loading/unloading. Ventia propose to manage the securing of the barge with tight mooring lines (i.e. no slack lines) to ensure the accidental release of materials is managed during the loading and unloading of materials.

The loading and unloading of contaminated materials will require a higher level of control to ensure there are appropriate controls in place to manage the handling of these items and to prevent cross contamination. All waste materials from within remediation area SA1 and NA2/3 will be loaded into bins within a sheet pile wall structure and lids will be secured onto the bins prior to the materials leaving the work area. Prior to unloading the waste materials at the Tennyson Road berth, the bins will be inspected to ensure the lids are secured to the bins and a qualified dogman will be used to rig the load before the bins are lifted onto trucks. The outside of the bins will be washed at regular intervals to ensure large amounts of waste materials are not hung up on the outside of the bins.

Care shall be taken during barge loading/unloading operations to minimise the likelihood of spillages. The site superintendent, or nominated representative, shall visually monitor the loading/unloading operations.

Spillages shall be cleaned up following each loading/unloading event. Equipment for spill recovery and management will be readily accessible and available at Tennyson Road and on the Batch Plant, as required.

The loading/unloading area will be cleaned and visually inspected prior to removal of the environmental controls. The controls will remain open during the weekends and long periods of non-activity to allow for the natural tidal movement of water and to prevent damage to the controls.

2.6 Removal of Environmental controls

Sheet piles, silt curtains and oil booms should only be removed once it has been established that turbidity levels inside the controls are consistent with levels immediately outside the controls. The following requirements will need to be met prior to the removal of these environmental controls:

- All remediation works must have finished or been temporarily stopped; and
- To ensure minimisation of impacts, any suspended sediments within the water column have been allowed to settle and manual measurements of turbidity at
0.2m depth within the silt curtain are comparable to turbidity measurements outside the curtain.

Automated turbidity measurements around the controls will be collected every 15 minutes from a minimum of two near field locations close to the controls and two background locations. The monitoring locations proposed for the Kendall Bay project are shown in Appendix 2 of this plan. Measurements will be collected using a calibrated turbidity meter.

2.7 Daily Equipment Inspections

Daily inspections of equipment and environmental controls will be completed at the commencement of each works day. During this inspection, an observation of the environmental conditions outside of the controls will be assessed for evidence of chemical spills (such as oily sheens) and the presence of highly turbid water from the works area. Inspection results are to be documented and retained with project records.

Additionally, all vessels used will be operated and maintained in a manner that minimises the potential for leaks or spills. All vessels will be operated in accordance with the requirements of the Australian Maritime Safety Authority (AMSA) and the requirements of applicable international conventions.

3 Water Quality Assessment

The remediation works will comply with Section 120 of the POEO Act, which prohibits the pollution of waters.

3.1 Turbidity Assessment Criteria

Table 1 below presents the preliminary assessment criteria to be adopted for turbidity assessment.

<table>
<thead>
<tr>
<th>Analyte</th>
<th>Assessment Criteria</th>
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<tbody>
<tr>
<td>Turbidity</td>
<td>Ventia have not yet developed a specific relationship between Turbidity (mg/L) and TSS (NTU) for the project. A trigger value for TSS of 50mg/L (50 NTU) above background levels will be applied until this relationship has been established. Ventia notes the EPA’s requirement for the proponent to adopt a turbidity value equivalent to 50mg/L suspended solids (50 NTU) until any TSS-turbidity relationship is developed is Section 14 (a) of the EPA letter dated 6th November 2018 regarding further information required to complete the EPA’s review of the EIS. Ventia confirms it will complete the TSS-Turbidity relationship in accordance with the recommendations outlined in the US Army Corps of Engineers guidelines: “Improved Methods for Correlating</td>
</tr>
</tbody>
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Turbidity and Suspended Solids for Monitoring” (Thackston and Palermo, 2000).

Jemena’s Validation Consultant (WSP) conducted an assessment prior to the trial and determined a background turbidity of 50 NTU was appropriate, however following the results from the trial, it is considered appropriate to re-establish the background turbidity level outside the influence of the work activities during full-scale remediation works. Two background water quality monitoring buoys will be used to re-establish background turbidity every 15 minutes during remediation works which have the potential to impact water quality. One background turbidity monitoring buoy will be installed prior to mobilisation into Kendall bay to collect additional information and further assess background water quality conditions.

TRH
No visual sheens/films of oil/grease outside of the tertiary silt curtain containment barrier.

3.2 Water Quality Sampling Analytes

The selected water analytes for baseline analysis, surface water sampling (monthly during active remediation, and every week for first month of ISS) and stormwater monitoring is presented in Table 2 (below). In addition to the analytes in Table 2, water will be tested in the field with a calibrated water quality meter by Jemena’s Validation Consultant (WSP) for pH, electrical conductivity (EC), turbidity, dissolved oxygen (DO), redox potential and temperature. Refer to the Validation, Sampling, Analysis & Quality Plan (VSAQP) prepared by Jemena’s Validation Consultant (WSP) for water quality sampling assessment criteria.

<table>
<thead>
<tr>
<th>Analyte</th>
<th>Analytical Technique</th>
<th>Method Reference</th>
<th>Sample Preservation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dissolved Heavy Metals (As, Cd, Cr, Cu, Hg, Pb, Ni, Zn)</td>
<td>ICP-MS-ORS</td>
<td>APHA 3120 (USEPA 200.8, USEPA 3005A(prep), USEPA 6020A)</td>
<td>pH &lt;2 (HNO3)</td>
</tr>
<tr>
<td>Total Recoverable Hydrocarbons</td>
<td>Purge and Trap/GC-MS</td>
<td>USEPA 8020A, 8260 + 8000</td>
<td>Cool to &lt;6°C</td>
</tr>
<tr>
<td>Benzene, Toluene, Ethylbenzene, Xylenes, Naphthalene</td>
<td>Purge and Trap/GC-MS</td>
<td>USEPA 8260, 5030 (P/T)</td>
<td>pH &lt;2 (H2SO4 or HCl) or sodium bisulfate (NaHSO4 + cool to &lt;60°C)</td>
</tr>
<tr>
<td>Polycyclic Aromatic Hydrocarbons</td>
<td>GC/MS</td>
<td>USEPA 8270</td>
<td>Cool to &lt;60°C</td>
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Table 2: Water sampling analytical program

<table>
<thead>
<tr>
<th>Analyte</th>
<th>Analytical Technique</th>
<th>Method Reference</th>
<th>Sample Preservation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Cyanide</td>
<td>Diffusion/Distillation</td>
<td>ISO 14403-2/APHA 4500CN-</td>
<td>pH (&gt;12 NaOH) + cool to &lt;60°C</td>
</tr>
<tr>
<td>Total Suspended Solids</td>
<td>Colorimetric</td>
<td></td>
<td>Cool to &lt;60°C</td>
</tr>
<tr>
<td></td>
<td>Gravimetric</td>
<td>APHA 2540D</td>
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</tbody>
</table>

4 Water Quality Monitoring Program

The management and monitoring to be completed within designated areas are outlined in Table 3 below.

Table 3: Overview of Water Quality Monitoring

<table>
<thead>
<tr>
<th>Area</th>
<th>Management or Mitigation Measure</th>
<th>Monitoring</th>
</tr>
</thead>
<tbody>
<tr>
<td>Remediation Areas</td>
<td>Installation of a sheet pile wall, silt curtains, moon pool and an oil boom around the remediation areas.</td>
<td>Visual inspection of the environmental controls surrounding the work areas and the localised controls installed on barges.</td>
</tr>
<tr>
<td></td>
<td>Use of best practice environmental controls during remediation works to minimise uncontrolled disturbances to the seabed.</td>
<td>Visual daily inspection for oil sheens or turbidity.</td>
</tr>
<tr>
<td></td>
<td>Free water will be decanted back into the primary environmental curtain (i.e. within sheet pile wall control of primary silt curtain control).</td>
<td>15-minute metered measurements of Turbidity during active remediation works which have the potential to impact water quality at the following locations:</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Upstream of the treatment extents (background location)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Directly upstream to the secondary silt curtain (nearfield)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Directly downstream of the secondary silt curtain (nearfield)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Downstream of the work extents (background location)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Manual &amp; visual inspections are to be conducted within the remediation areas prior to the removal of the environmental controls.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Water quality sampling and analysis will also be undertaken by Jemena’s validation consultant (WSP) as detailed in Section 4.1.2 of this plan.</td>
</tr>
</tbody>
</table>
Table 3: Overview of Water Quality Monitoring

<table>
<thead>
<tr>
<th>Area</th>
<th>Management or Mitigation Measure</th>
<th>Monitoring</th>
</tr>
</thead>
<tbody>
<tr>
<td>Barge Loading / Unloading Area</td>
<td>Barge to be secured as close as possible to the unloading area. Unloading / loading of barges with reagents (i.e. marine cement) required for the stabilisation of contaminated sediments will be completed within a silt curtain control during loading / unloading operations. Supernatant water from the washout of the batch plant will be discharged into a geotube to filter out and capture solid materials. The filtered water will be released within the three levels of environmental control within Kendall Bay. Supernatant present at the time of treatment will be retained within the amended spoil through the addition of Portland cement. Supernatant captured at the Tennyson Road berth will be captured in a tank and disposed offsite at a licensed waste water treatment facility. Visual inspection of the unloading of the barges to be conducted during unloading operations and after a major rainfall event.</td>
<td></td>
</tr>
<tr>
<td>Background</td>
<td>Water quality sampling and analysis will also be undertaken by the validation consultant as detailed in section 4.1.2.</td>
<td></td>
</tr>
</tbody>
</table>

4.1.1 Turbidity Monitoring

Water quality monitoring of turbidity undertaken during remediation works will be undertaken using automated turbidity metres which will be permanently located at four positions within and surrounding Kendall Bay. Automated turbidity measurements around the active work areas will be collected every 15 minutes from a minimum of two near field locations and two background locations. The monitoring locations proposed for the Kendall Bay project are shown in Appendix 2 of this plan. Measurements will be collected using a calibrated turbidity meter. The turbidity metres will provide real-time information to Ventia’s project personnel to allow proactive action to be taken to manage water quality impacts.

Environmental monitoring works (continuous turbidity monitoring) will commence immediately prior to the commencement of excavation and obstruction removal works in remediation areas SA1 and NA2/3 within Kendall Bay. The commencement of
turbidity monitoring works during the installation of environmental controls around the outside of the remediation areas is considered unnecessary, which was demonstrated during the installation of these controls during the trial phase of the project. The trial works demonstrated that the excavation and mixing of materials within the remediation areas are the work activities that require environmental control.

The measurements will be recorded and retained as part of the project records, along with details of the reason for the monitoring and the actions arising from the monitoring.

Any breaches of the environmental controls are to be reported to the Jemena Project Manager immediately.

4.1.2 Water Quality Sampling and Analysis

Water quality sampling and analysis will be undertaken by Jemena’s Validation Consultant (WSP) monthly during active remediation in accordance with their Validation Sampling, Analysis and Quality Plan (VSAQP). It is noted that sampling shall be conducted weekly during the first month of the in-situ stabilisation works. In summary, water quality sampling will comprise:

Surface water and storm event monitoring at:

- Five primary river water sampling locations (three from within Kendall Bay, one from upstream in Majors Bay and one from downstream in Exile Bay); and
- Three primary stormwater samples from stormwater outlets within Kendall Bay (following rainfall, as considered necessary).

Sufficient QA/QC samples will be collected during ongoing monitoring to ensure adequate data quality is maintained (refer to VSAQP).

Each sample collected during the river water monitoring events will be collected from a boat, at a depth of 0.2 m below the surface and will be located with a hand-held GPS. Stormwater samples will be collected by hand from the flowing water at the outlet pipe during low tide (to ensure that pipes are accessible for sampling).

Field parameters including the following will be collected at each location:

- Observations of weather conditions water colour and turbidity, floating debris, wave and water current behaviour, time of sampling, etc.;
- pH;
- Electrical Conductivity (EC);
- Redox Potential;
- Dissolved Oxygen (DO);
- Temperature;
• Turbidity; and
• Suspended Solids.

Samples will be collected in appropriately preserved glass or plastic jars/bottles supplied by the NATA accredited laboratory.

Samples will be stored in cooler boxes with ice bricks and upon completion of sampling, transferred under appropriate Chain of Custody documentation and within holding time to the laboratory for analysis. Samples will be analysed for Dissolved Heavy Metals (As, Cd, Cr, Cu, Hg, Pb, Ni, Zn), TRH, PAH, Benzene, Toluene, Ethylbenzene, Xylenes, Total Cyanide and Total Suspended Solids.

Upon completion of the remediation works and removal of all infrastructure and controls from the site, the Validation Consultant will undertake a single final round of post-remediation surface water monitoring. As specified in the June 2018 RAP, the purpose of this round of monitoring is to assess the environmental conditions after the completion of the remediation works and to obtain a data set that can be compared to the pre-remediation monitoring to assess changes to conditions during, and as a result of the remediation works.

The monitoring methodologies, sample locations and meteorological conditions (where practical) will be the same as during the remedial works monitoring events to maintain consistency in data collection methodologies and allow data across the monitoring period to be comparable.

4.1.3 Corrective Action

Where visual or metered water quality testing indicates a breach of the environmental controls, the remediation works in the immediate area of the breach shall be reviewed and where the active remediation works were found to be the cause of the breach, the works will cease immediately. Works will not recommence until the following conditions are met:

• The controls have been repaired/replaced or otherwise made good;
• Three consecutive measurements (i.e. in a 45 min period) where turbidity measurements in the vicinity of the non-compliant area are within 50 NTU from WSP’s pre-trial assessment determined background (50 NTU) and / or re-established background measurement when measured outside of the secondary containment barrier (within 5 metres). As discussed in Table 1 of this Water Quality Guideline, Ventia have not yet developed a specific relationship between Turbidity (mg/L) and TSS (NTU) for the project. A trigger value for TSS of 50mg/L (50 NTU) above background levels will be applied until this relationship has been established;
• The cause of the problem is established, and corrective measures implemented to prevent recurrence.
5  Recording of Information

Water quality monitoring information collected during active remediation activities will be recorded, by Ventia (real time turbidity monitoring) and Jemena’s Validation Consultant (WSP, for water quality sampling and analysis), in the site documentation and will be available on request. Records of any environmental incident investigations and corrective actions will be recorded in Ven-Safe and will be available on site.

Results of water quality sampling will be reported by Jemena’s Validation Consultant (WSP) and turbidity monitoring will be reported by Ventia. These monitoring reports will be provided to the EPA and the Planning Secretary monthly and will include a review of all monitoring data collected, interpretation of the results and details of any relevant site management responses. Monthly reports will be submitted on the 15th day of each month and must cover the preceding calendar month, commencing from the start of remediation works in Kendall Bay (i.e. pre-excavation and obstruction removal works in Remediation Area NA2/3 or SA1).

6  Water Quality Exceedance Response Protocol

When water quality exceedances are detected during the monitoring program, a management response will be initiated to address the issue. The Air and Water Quality Trigger Action Response Plan (US-050055-ENV-GL-012) describes in detail the process that will be followed. The process is summarised below:

**Trigger** - Automated or manual turbidity measurements or visual observation which highlight an exceedance in conditions. Once notified, a YELLOW, AMBER or RED Trigger Level will result in immediate investigation of the cause of the potential exceedance and if it is determined the exceedance is significant and due to remediation works, appropriate actions and responses will be undertaken to mitigate the impact. In the event of verification of a RED trigger exceedance the Jemena Project Manager will be notified immediately.

**Assessment and Evaluation** - Ventia and/or Jemena will conduct an assessment of the works. The assessment may include visual inspections, manual turbidity measurement and/or water sampling. A Turbidity Screening Form (US-050055-ENV-FO-004), or similar, will be used to record any manual turbidity measurements associated with any visual observation of significant turbidity outside the environmental controls caused by the remediation works. Photos can be attached to the report to register turbidity observations. Refer to **Appendix 1** - Turbidity Screening Form.

Should the exceedance be deemed a result of the remediation program, Ventia will implement appropriate action (see below). In addition, non-remediation related activities will also be assessed as potential sources of impact, including performance of monitoring equipment, boating activities, weather events etc.

**Actions** - reasonable and feasible contingency measures will be implemented by Ventia following consultation with Jemena. Actions may include changes to the remediation
method, reprogramming of specific works, increased monitoring, revision of assessment criteria or repair of equipment.

Contingency measures will be selected based on the nature and scale of the exceedance detected and will be determined in consultation with Jemena.

**Reporting** - upon notification of the trigger exceedance the documentation will be completed (as required) and the Jemena Project Manager notified. Completed documents are to be submitted to Jemena. Details of the corrective actions and measures implemented to prevent recurrence of the exceedance are to be included in the reports.

**Implementation and Review** - Following review of the factors contributing to the exceedance, the Remediation Works Environmental Management Plan should be revised with any measures required, if any, to prevent recurrence.

7 Emergency Response Protocol

In the event of an emergency, the Jemena Project Manager should be contacted immediately. Other relevant contact details that may be required in the event of an emergency are listed in the Table 4 below.

Specific and immediate responses to emergencies and environmental incidents will be determined by Ventia in conjunction with Jemena.

<table>
<thead>
<tr>
<th>Table 4: Emergency Contacts</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Organisation</strong></td>
</tr>
<tr>
<td>Police, Fire, Ambulance</td>
</tr>
<tr>
<td>Jemena Project Manager</td>
</tr>
<tr>
<td>Pollution Hotline</td>
</tr>
<tr>
<td>Ventia Project Manager</td>
</tr>
<tr>
<td>Ventia Site Superintendent</td>
</tr>
<tr>
<td>First Aid Officer</td>
</tr>
</tbody>
</table>

8 Related documents

<table>
<thead>
<tr>
<th>Document</th>
<th>Version</th>
</tr>
</thead>
<tbody>
<tr>
<td>Remediation Works Environmental Management Plan</td>
<td>US-050055-ENV-MP-001</td>
</tr>
</tbody>
</table>
Definitions

The following terms and conventions are referred to in this document.

<table>
<thead>
<tr>
<th>Term</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>ENV</td>
<td>Environment</td>
</tr>
<tr>
<td>LEAD</td>
<td>Lead, Engage, Analyse, Discuss</td>
</tr>
<tr>
<td>NTU</td>
<td>Nephelometric Turbidity Units</td>
</tr>
<tr>
<td>PAH</td>
<td>Polycyclic Aromatic Hydrocarbons</td>
</tr>
<tr>
<td>PASS</td>
<td>Potential Acid Sulfate Soils</td>
</tr>
<tr>
<td>pH</td>
<td>Figure expressing the acidity or alkalinity of a solution</td>
</tr>
<tr>
<td>RWEMP</td>
<td>Remediation Works Environmental Management Plan</td>
</tr>
<tr>
<td>SHEQ</td>
<td>Safety Health Environment Quality</td>
</tr>
<tr>
<td>TRH</td>
<td>Total Recoverable Hydrocarbons</td>
</tr>
<tr>
<td>TSS</td>
<td>Total Suspended Solids</td>
</tr>
<tr>
<td>Ven-Safe</td>
<td>Ventia’s Incident Reporting Database</td>
</tr>
<tr>
<td>WQMP</td>
<td>Water Quality Monitoring Plan</td>
</tr>
</tbody>
</table>
# Field Turbidity Screening Form

<table>
<thead>
<tr>
<th>Project Name</th>
<th>Date</th>
<th>Time</th>
</tr>
</thead>
<tbody>
<tr>
<td>Project No.</td>
<td>Operator</td>
<td></td>
</tr>
<tr>
<td>Site Location</td>
<td>Weather</td>
<td></td>
</tr>
</tbody>
</table>

Drew Diagram Below

Indicate which way is North

<table>
<thead>
<tr>
<th>Signed:</th>
<th>Date:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Position:</td>
<td>Turbidity (NTU):</td>
</tr>
</tbody>
</table>

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Appendix 2 - Water Quality Turbidity Monitoring Locations

Key
- Automated Turbidity Monitoring Location
- Attended colour monitoring
- Attended noise monitoring

Monitoring location details:
1. Transported tidal background water quality meter and visual inspection as required.
2. Kendall Bay background water quality meter and visual inspection as required.
3. Near tidal north water quality meter and visual monitoring point.
4. Near tidal south water quality meter and visual monitoring point.
5. Periodic colour and noise monitoring location along path.