Hutchison Ports Australia

2016

HSEQ Management System

Water Quality Monitoring Report – SICTL

Version 01

SICTL

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Register of Amendments					
Ver No	**Page no**	**Date**	**Description of amendments**	**Prepared by**	**Approved by**
01		14-06-2016	Initial Draft of Report	Jennifer Stevenson / Blair Moses	

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Water Quality Monitoring Report

1 Environmental Protection Licence Particulars

Table 1: EPL Particulars

Parameter	Data
License number	20322
Anniversary date	14 October
Licensee	Sydney International Container Terminals Pty Ltd
Premises	150-160 Foreshore Rd Banksmeadow NSW 2019 Gate B 150- B 153 Sirius Rd, Botany NSW 2019
Scheduled activity	Chemical storage
Fee based activity	General chemical storage
Scale	0 – 5000kL
Ancillary activity	Shipping facilitates

2 Introduction and Purpose

SICTL as operator of the new container terminal in Port Botany, and as holder of an Environmental Protection Licence is compelled to undertake a water quality monitoring program for the Stormwater Quality Improvement Devices installed at the new terminal. The effectiveness of these devices over the reporting period is documented here.

This report is an example of the commitment of Hutchison Ports Australia and Sydney International Container Terminals Pty Limited to comply with the Environmental Protection Licence (EPL) in addition to the Consent Conditions and manage environmental risks proactively to achieve good operational and community outcomes. The content of this report aims to achieve partial fulfilment of EPL condition E2.1.

The Initial Water Quality Monitoring Report (dated 24 April 2014 and published on the SICTL website) contained the analysis of the first three water sampling results (batches 1-3).

This reporting period spans from March 2014 – June 2016 and contains analysis of samples taken over three separate rain events (batches 4-6).

3 Water Quality Management On-Site

The design of SICTL's drainage system incorporates separator units called Stormwater Quality Improvement Devices (SQIDs) made by two manufacturers, SPEL and Humes. Diagrams of these units are shown below:

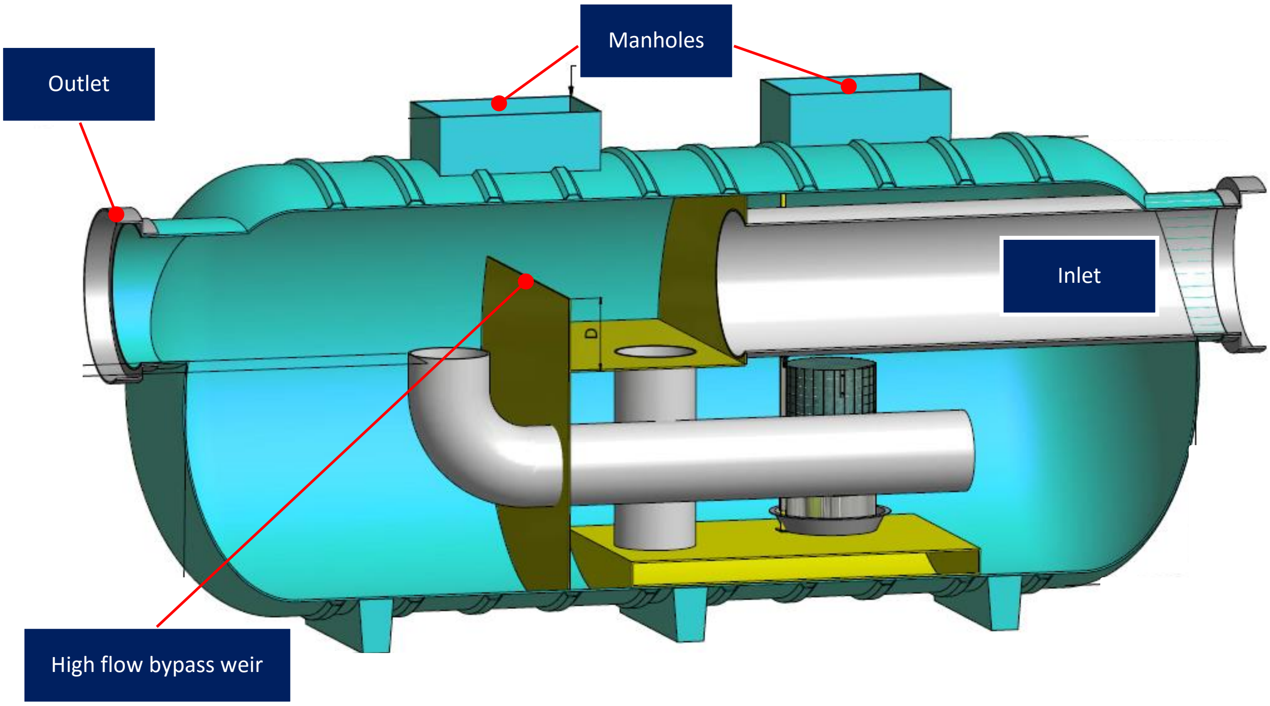

Figure 1 Cut away diagram of the SPEL Environmental 'Stormceptor' separator unit.

Figure 2 A SPEL Environmental 'Stormceptor' installed during construction of the SICTL Terminal in 2013.

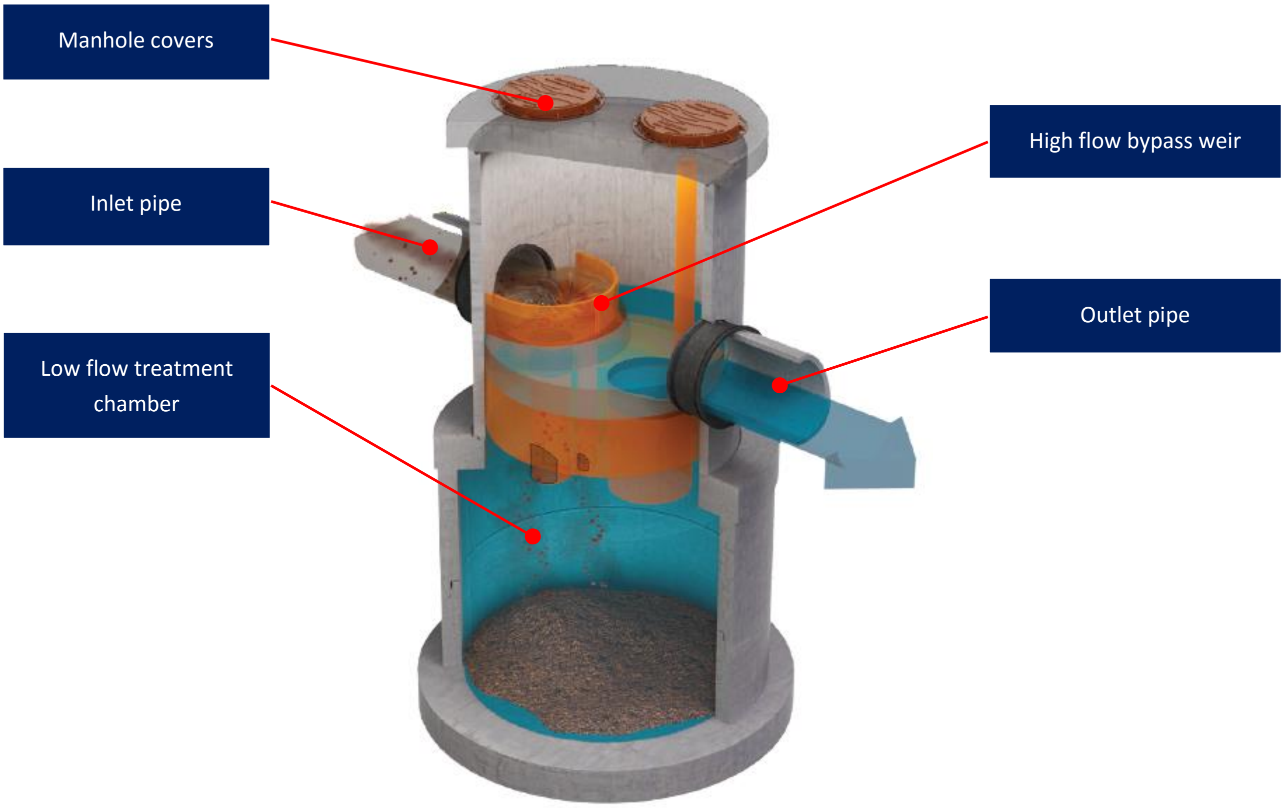

Figure 3 Cut away diagram of the Humes 'Aquaceptor' separator unit.

These units continually separate sediments and heavy metals from stormwater flows and trap these pollutants so they are not discharged. Inspections and cleanouts of the separator units shall be conducted as determined by SICTL (and with consultation with the manufacturer) at those intervals recommended through the analysis of the effectiveness and efficiency of the separator units.

Figure 4 SQID 7 being cleaned out by vacuum truck in December 2013 prior to handover.

4 Water Quality Monitoring Program

4.1 Stormwater Discharge Locations

A total of forty nine (49) stormwater outlets were constructed as part of the new container terminal. Forty two of these discharge stormwater from the SICTL terminal with the remaining seven servicing the Patricks Stevedores container terminal on the adjacent property. For convenience, the outlet side of each Stormwater Quality Improvement Device is deemed to be its discharge point as it connects directly to the outlet pipe. Using the outlet side of the SQIDs allows for easier and safer access to the discharge points for sampling. The downstream inverts of the outlet pipes are located within the waters of Botany Bay or Penrhyn Estuary and are usually below the water line during high tides.

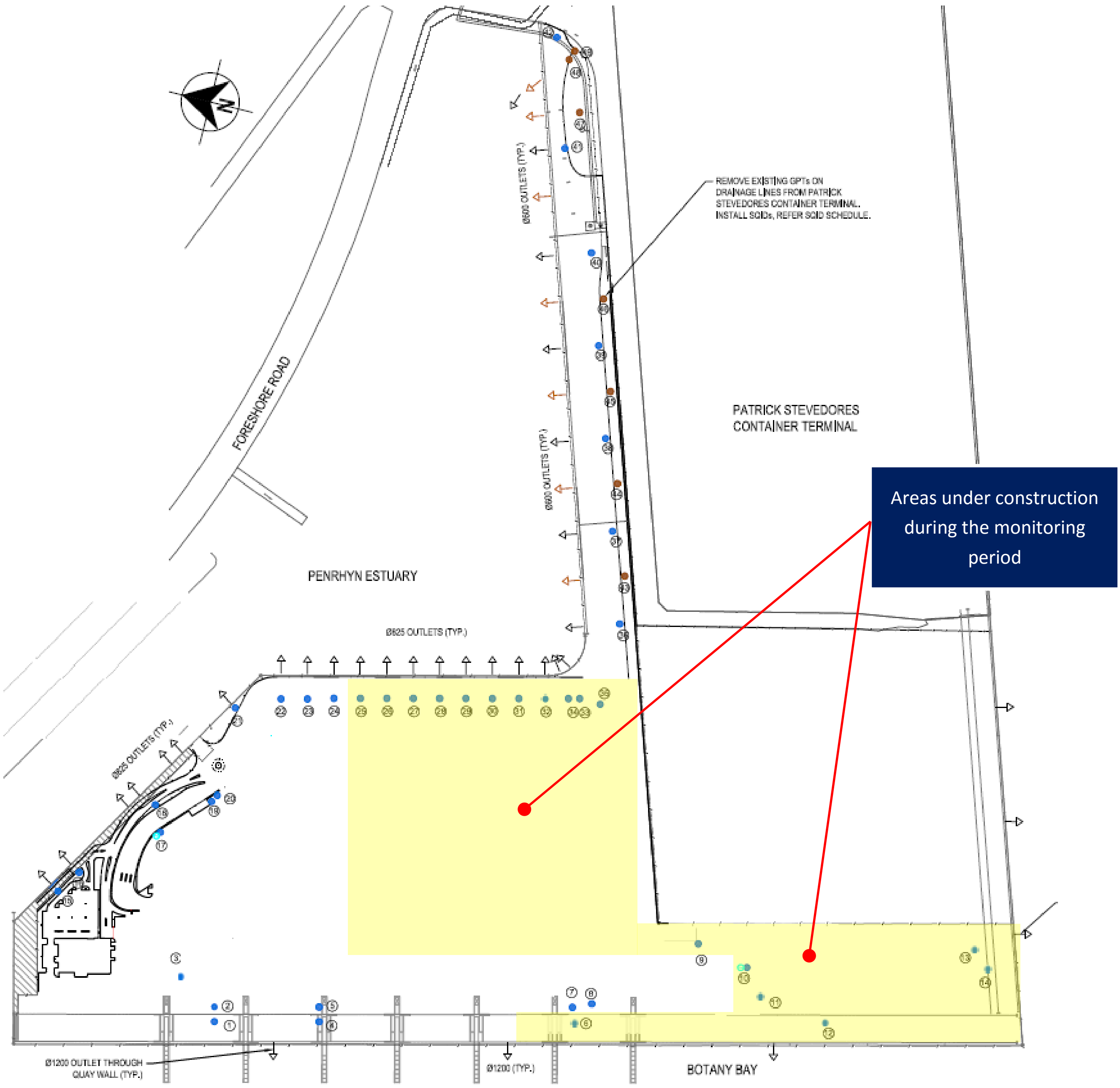

Figure 5 Overview map showing all SICTL stormwater discharge locations.

Table 3: Overview of SQID catchments and discharge points.

SQID number	Description
1, 2 and 4 to 14	Quay apron catchment draining to Botany Bay through quay wall. SQID number 10 is a Humes 'Aquaceptor' unit.
3 and 15 to 21	Plant refuelling area, main buildings, internal roadways, truck marshalling area and general parking area catchments discharging to the Flushing Channel.
22 to 35	All Automated Stacking Area catchments draining to Penrhyn Estuary.
36 to 42	All Rail siding area catchments draining to Penrhyn Estuary. These SQIDs are all the Humes 'Aquaceptor' type.
43 to 49	Outlets from Patricks Stevedores catchments interleaved with SICTL Rail siding outlets discharging into Penrhyn Estuary. Patrick's SQIDs are located within the SICTL Lease area and are coloured brown to set them apart from the SICTL SQIDs coloured blue. These SQIDs are not sampled.

4.2 Stormwater Sampling Locations

The stormwater sampling locations were selected on the basis of best-representing the various catchments characteristic of the SICTL terminal. During the monitoring period, certain areas were under construction or commissioning at different times and were not able to be included for sample collection (refer to figure 5).

Batch 4 – 18 September 2014

The choice of samples in this batch represent a cross-section of the SICTL operations, including waterside, landside and rail operations. Hard pavement surface areas such as the Truck Marshalling Area and the entrance to the rail siding have also been sampled, as well as the Dangerous Goods Spill Containment area.

SQID 4 = Wharf - Berth 2 (SPEL Environmental 'Stormceptor')

SQID 10 = DG Spill Containment (Humes 'Aquaceptor')

SQID 17 = Truck Marshalling Area (SPEL Environmental 'Stormceptor')

SQID 22 = ASC Block 1 (SPEL Environmental 'Stormceptor')

SQID 35 = Rail Gate – access to rail area (SPEL Environmental 'Stormceptor')

SQID 39 = Rail Siding and container staging area (Humes Aquaceptor)

Batch 5 – 11 June 2015

The sampling selection for Batch 5 is a duplicate of Batch 4.

Batch 6 – 1 June 2016

SQID 17 = Truck Marshalling Area (SPEL Environmental 'Stormceptor')

SQID 22 = ASC Block 1 (SPEL Environmental 'Stormceptor')

SQID 35 = Rail Gate – access to rail area (SPEL Environmental 'Stormceptor')

4.3 Sampling of the Inlets and Outlets of the Separator Units

Sampling Methodology

All sampling was performed by SICTL Employees with assistance from SICTL Maintenance personnel using a 3m sampling pole. The inlet samples were obtained using a sampling bottle which was then decanted into the testing bottle. A separate outlet sampling bottle was then used to draw the water for testing and then decanted into the testing bottle.

Three specimens were drawn from both the inlet and outlet side of each SQIDs to create a composite sample of each side (referred to under one sample number), each sample consisted of:

- One 1L plastic bottle for pH, Total Suspended Solids (TSS), Turbidity (NTU), total Nitrogen (TN) and total Phosphorus (TP);
- One 125mL plastic bottle for heavy metals Arsenic, Cadmium, Chromium, Copper, Nickel, Zinc, Mercury and Lead;
- One 1L or 500mL glass bottle for oil and grease (containing hydrochloric acid preservative)

All bottles were labelled with the relevant sample number in the below format:

batch_number / SQID_number / sequence_number

The above convention provides for full traceability and straightforward identification of every sample. All batches were collected on the same days they were drawn. All batches were accompanied with chain of custody forms back to SGS Environmental Services for testing.

Table 4: Overview batch sizes.

Batch number	Summary
Batch 4	19 samples drawn (57 bottles), consisting of: • 10 samples from 6 SQIDs (Stormceptors and Aquaceptor)
Batch 5	11 samples drawn (33 bottles), consisting of: • 11 samples from 6 SQIDs (Stormceptors and Aquaceptor)
Batch 6	6 samples drawn (18 bottles), consisting of: • 6 samples from SPEL Stormceptor

SQID number 10 (Humes Aquaceptor) – Special Notes

All SPEL Stormceptor SQIDs that were selected for testing were sampled on both the inlet and the outlet sides without any problems. The Humes Aquaceptors (SQID 10 and 39) that were samples, has only one chamber as the design of this device is simpler than the SPEL units which feature a weir to separate the two halves. This drop-inlet style of chamber employed by Humes acts like the outlet side of the SPEL units because the solid pollutants that enter have had a chance to settle out of the retained water and are no longer in suspension (as they would be during inflow). Given this type of design, the only way to obtain a sample of water representative of the inflow conditions would be to sample the inflow during an actual storm event as runoff is entering the unit. With the resources available and timing required, this was neither practicable nor safe to perform.

With only one reliable item of data available for this SQID it is difficult to deduce removal efficiency based on field results. A solution that was trialled was to take the inflow data from the closest catchment within the same batch whose characteristics would most closely match the catchment draining to SQID 10 and use these to calculate the removal efficiency. The catchment of SQID 4 was chosen for this comparison however not enough confidence in the data and the calculations could be demonstrated by using just one Aquaceptor unit. For this reason, this approach was abandoned.

In consultation with the NSW EPA, and after a detailed review of the available data, it was decided to simply report the outflow discharge parameters for the Aquaceptor units as this provides a reliable measure of the pollutants discharged.

4.4 Analysis of the Inlets and Outlets of the Separator Units

Analysis Methodology

The main focus of the analysis of these results in the following sections is to compare the **outlet side** of each SQID against the **inlet side** to test the effectiveness and efficiency of the separator units.

Analysis of pH Results

The pH outlet results were generally within the range of pH 6.9 to 8.3. Possible reasons for the outliers as well as the slight overall rise above background may be:

- Increased truck traffic in these areas;
- Identified elevated PH levels in stockpile of soil that has remained at SICTL may have experienced runoff that feeds the stormwater system
- Generally drier weather preceding the sampling period which could allow for a build-up of contaminants.

Analysis of Turbidity Results

The Turbidity results were generally within the range of 0.9 to 11 NTU with what appears to be a sampling error with squid 17 on batch 6 with a reading of 84 on the inlet and 62 on the outlet side. It must be noted that these SQIDs drain areas trafficked by trucks and light vehicles. Possible reasons for the outliers as well as the overall results higher than background may be:

- Increased truck traffic in these areas;
- Generally drier weather preceding the sampling period which could allow for a build-up of contaminants.

Analysis of Total Suspended Solids Results

The Total Suspended Solids results were generally within the range of <5 to 13 mg/L with one outliers of 21 mg/L registered from SQIDS 17. This SQIDs is in a drain are trafficked by trucks and light vehicles. Possible reasons for the outliers as well as the overall results higher than background may be:

- Increased truck traffic in these areas;
- Generally drier weather preceding the sampling period which could allow for a build-up of contaminants.

Analysis of Heavy Metals Results

4.4.1.1 Arsenic

The Arsenic results were generally within the range of <1 to 1 µg/L with the majority of the samples below the Limit of Reporting of 1 µg/L.

It must be remembered that the units of measure for this parameter are **micrograms** per litre. One microgram = 0.0000001 gram (one millionth of a gram).

4.4.1.2 Chromium

The Chromium results were generally within the range of <1 to 5 µg/L with the majority of samples below the Limit of Reporting of 1 µg/L.

It must be remembered that the units of measure for this parameter are **micrograms** per litre. One microgram = 0.0000001 gram (one millionth of a gram).

4.4.1.3 Copper

The Copper results were generally within the range of <1 to 5 µg/L with 5 outliers of 4 - 5 µg/L registered from SQIDS 17, 22 & 39. The draining areas feeding the SQIDs 17,22 & 39 are areas trafficked mainly by trucks.

it must be remembered that the units of measure for this parameter are **micrograms** per litre. One microgram = 0.0000001 gram (one millionth of a gram).

4.4.1.4 Nickel

The Nickel results were generally within the range of <1 to 2 mg/L.

4.4.1.5 Zinc

The Zinc results were generally within range of 13 to 46 µg/L with 4 outliers of 84 to 370 µg/L The outliers have been identified as SQIDs 4 and 22. The elevation could be attributed by the stacking of shipping containers in these areas, and increased traffic at the port.

It must be remembered that the units of measure for this parameter are **micrograms** per litre. One microgram = 0.0000001 gram (one millionth of a gram).

4.4.1.6 Cadmium, Mercury, Lead and Oil & Grease

All results for these pollutants across three batches were consistently less than the limits of reporting of:

- 0.1µg/L. for Cadmium;
- 0.0001mg/L for Mercury;
- 1µg/L. for Lead, and
- 5mg/L for Oil & Grease.

These nil results indicate that these heavy metal and hydrocarbon pollutants are not generated by (and are not being discharged from) the SICTL terminal.

4.5 Evaluation of the efficiency of the Stormceptor and Aquaceptor units

This section discusses the measured efficiency of the SPEL Stormceptor SQIDs based on the calculation of inlet values minus outlet values. Due to construction timetabling, only one Humes Aquaceptor unit (SQID 10) was able to be sampled within the allocated sampling period. From this SQID and only an outlet value was derived making efficiency and trend analysis difficult.

Generally, most values that were registered are low and below the required threshold, isolated high values are usually uncharacteristic of the trend of the bulk of the data and have been deemed outliers. There were no upward or high value trends in any of the data.

4.6 Recommendations

Based on the results described within this report overall, SICTL has confidence in the operation and efficiency of the SQID units installed at the SICTL terminal. A major component of this confidence is the mitigation-in-depth approach adopted by SICTL to not rely upon the SQIDs units as an end-of-line control.

Regular sweeping combined with litter removal, gross pollutants and spill controls contributed to the generally low inflow values observed.

SICTL will continue with the water quality sampling and testing in accordance with the Environmental Protection Licence and consult with the NSW EPA at regular intervals to discuss progress and any issues potentially affecting the quality of stormwater that may arise.

Further reporting may be negotiated between SICTL and NSW EPA upon review of future data.

5 Ongoing Monitoring and Reporting

SICTL is continuing with ongoing stormwater monitoring in accordance with the EPL conditions at six monthly intervals.

All monitoring results obtained by SICTL under the various environmental monitoring programs are made public on the corporate website at http://www.hutchisonports.com.au/Sydney-Monitoring-Reporting . Stormwater quality monitoring is conducted at six monthly intervals. The figure below shows the location of the SICTL monitoring data.

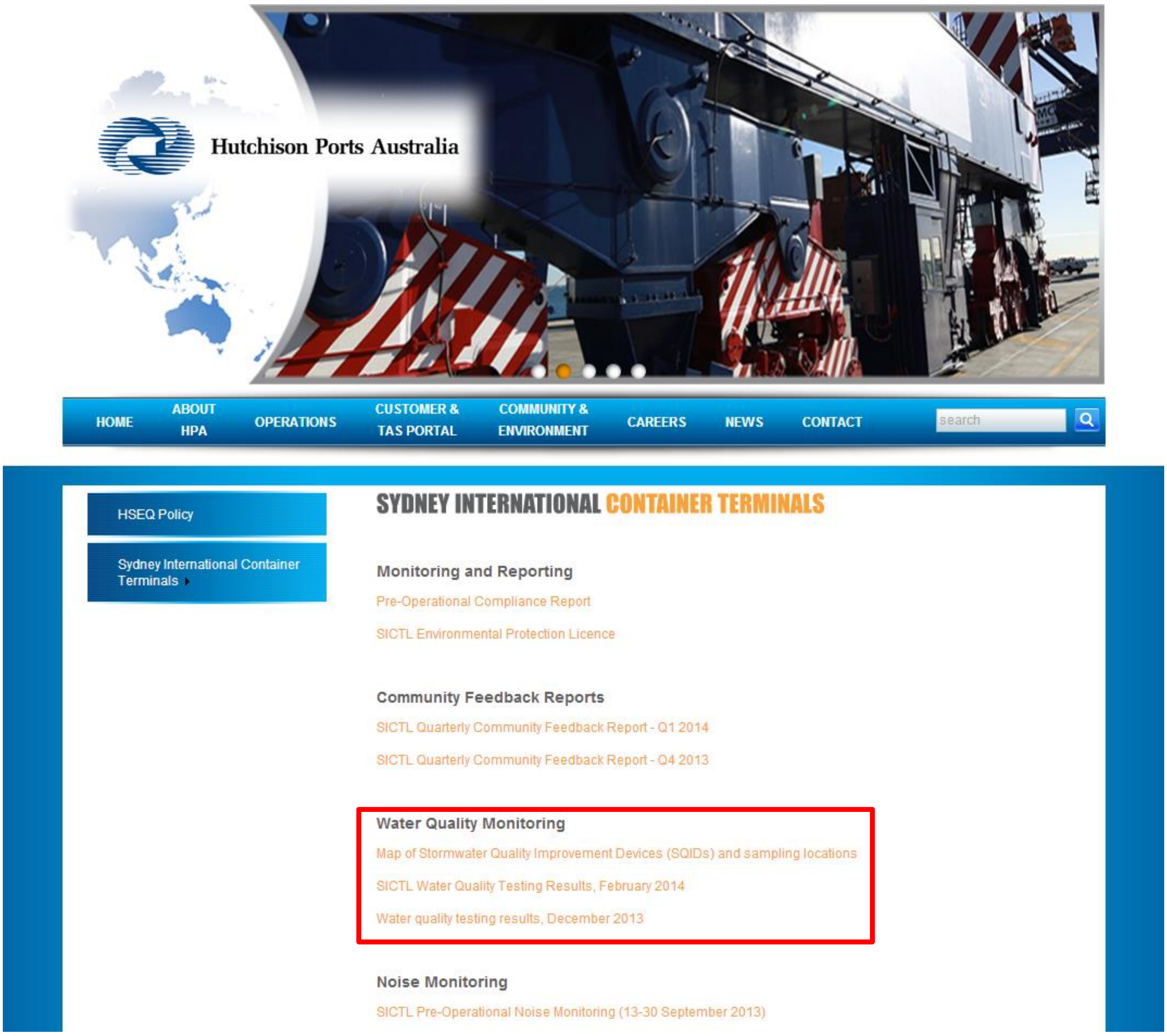

Figure 32 The Monitoring and Reporting page on the Hutchison Ports Australia website.

6 Supporting Documentation and Records

HSEQ5.1.7f Stormwater Management Sub-Plan – SICTL

6.1 Water Quality Register (Summary of Results)

Water Quality Testing Register

Licensee: Sydney International Container Terminals Limited

Licensed Premises Address: Port Botany Gate 150 - 153, Sirius Rd off Foreshore Rd, Botany NSW 2019

Environment Protection Licence number: 20322

http://www.epa.nsw.gov.au/prpoeoapp/ViewPOEOLicence.aspx?DOCID=33975&SYSUID=1&LICID=20322

Legend: Input cell | Output cell | Result pending | 123 = inlet | 456 = outlet

Sampling date	Sampling time	Days After Rain Event	Batch number	SQID number (Sampling location)	Sample Sequence Number	Sample ID	Lab NTU	Lab pH	TSS mg/ L	TP mg/ L	TN mg/ L	Arsenic µg/L	Cadmium µg/L	Chromium µg/L	Copper µg/L	Nickel µg/L	Zinc µg/L	Mercury mg/L	Lead µg/L	Oil & Grease mg/L	Comments
1-Jun-16	11:00:00	1	6	17	123	6/17/123	84	7.5	28	<0.05	0.48	<1	<0.1	<1	4	<1	8	<0.0001	<1	<5	Inlet side of SQID
1-Jun-16	11:00:00	1	6	17	456	6/17/456	62	7.6	21	<0.05	0.51	<1	<0.1	<1	5	<1	14	<0.0001	<1	<5	Outlet side of SQID
1-Jun-16	11:10:00	1	6	22	123	6/22/123	11	7.8	8	<0.05	0.73	<1	<0.1	<1	5	<1	78	<0.0001	<1	7	Inlet side of SQID
1-Jun-16	11:10:00	1	6	22	456	6/22/456	8.3	7.9	8	<0.05	0.67	<1	<0.1	<1	4	<1	84	<0.0001	<1	<5	Outlet side of SQID
1-Jun-16	11:20:00	1	6	35	123	6/35/123	8.7	8.1	<5	<0.05	0.35	<1	<0.1	<1	1	<1	17	<0.0001	<1	17	Inlet side of SQID
1-Jun-16	11:20:00	1	6	35	456	6/35/456	9.1	8.3	5	<0.05	0.27	<1	<0.1	<1	<1	<1	13	<0.0001	<1	<5	Outlet side of SQID
11-Jun-15	11:00:00	1	5	4	123	5/4/123	1.6	7.1	<5	<0.05	0.74	<1	<0.1	<1	2	2	310	<0.0001	<1		Inlet side of SQID
11-Jun-15	11:00:00	1	5	4	456	5/4/456	1.8	7	<5	<0.05	0.89	<1	<0.1	<1	2	2	370	<0.0001	<1	<5	Outlet side of SQID
11-Jun-15	11:45:00	1	5	10	123	5/10/123	1.5	6.8	<5	<0.05	0.43	<1	<0.1	<1	<1	<1	22	<0.0001	<1		Inlet side of SQID
11-Jun-15	11:45:00	1	5	10	456	5/10/456	1.6	7.4	<5	0.09	0.53	1	<0.1	<1	1	<1	46	<0.0001	<1	<5	Outlet side of SQID
11-Jun-15	12:20:00	1	5	17	123	5/17/123	8	7.1	<5	0.06	1.1	<1	<0.1	<1	3	<1	42	<0.0001	<1		Inlet side of SQID
11-Jun-15	12:20:00	1	5	17	456	5/17/456	11	7.1	6	<0.05	1.6	<1	<0.1	<1	4	<1	39	<0.0001	<1	<5	Outlet side of SQID
11-Jun-15	12:15:00	1	5	22	123	5/22/123	6	7.2	<5	<0.05	1.8	<1	<0.1	<1	8	2	280	<0.0001	<1		Inlet side of SQID
11-Jun-15	12:15:00	1	5	22	456	5/22/456	5.5	7	<5	0.07	1.5	<1	<0.1	<1	4	1	120	<0.0001	<1	<5	Outlet side of SQID
11-Jun-15	13:15:00	1	5	35	123	5/35/132	2.9	7.4	<5	<0.05	0.78	<1	<0.1	2	2	<1	20	<0.0001	<1		Inlet side of SQID
11-Jun-15	13:15:00	1	5	35	456	5/35/456	2.4	7.2	<5	<0.05	0.77	<1	<0.1	2	3	<1	33	<0.0001	<1	<5	Outlet side of SQID
11-Jun-15	12:00:00	1	5	39	456	5/39/456	0.9	7.3	<5	<0.05	0.83	<1	<0.1	1	<1	<1	20	<0.0001	<1	<5	Outlet side of SQID
18-Sep-14	11:00:00	1	4	4	123	4/4/123	8.8	7.6	28	<0.05	1.5	<1	<0.1	3	3	2	180	<0.0001	<1	<5	Inlet side of SQID
18-Sep-14	11:00:00	1	4	4	456	4/4/456	6.6	7.4	10	0.2	0.78	<1	<0.1	1	2	1	140	<0.0001	<1	<5	Outlet side of SQID
18-Sep-14	11:10:00	1	4	10	456	4/10/456	1	7.6	<5	<0.05	0.55	<1	<0.1	4	2	1	27	<0.0001	<1	<5	Outlet side of SQID
18-Sep-14	11:15:00	1	4	17	123	4/17/123	5.7	7	11	<0.05	1.2	<1	<0.1	2	4	<1	42	<0.0001	<1	<5	Inlet side of SQID
18-Sep-14	11:15:00	1	4	17	456	4/17/456	3.1	6.9	7	0.18	0.98	<1	<0.1	1	3	<1	40	<0.0001	<1	<5	Outlet side of SQID
18-Sep-14	11:25:00	1	4	22	123	4/22/123	2	7.8	8	<0.05	0.3	<1	<0.1	<1	2	<1	66	<0.0001	<1	<5	Inlet side of SQID
18-Sep-14	11:25:00	1	4	22	456	4/22/456	3.3	7.3	<5	<0.05	0.92	<1	<0.1	2	2	<1	41	<0.0001	<1	<5	Outlet side of SQID
18-Sep-14	11:35:00	1	4	35	123	4/35/123	3.4	7.6	<5	<0.05	0.78	<1	<0.1	7	3	<1	33	<0.0001	<1	<5	Inlet side of SQID
18-Sep-14	11:35:00	1	4	35	456	4/35/456	1.6	7.6	<5	<0.05	0.61	<1	<0.1	5	2	<1	25	<0.0001	<1	<5	Outlet side of SQID
18-Sep-14	11:45:00	1	4	39	456	4/39/456	5.8	7.3	13	<0.05	1.2	<1	<0.1	4	4	2	44	<0.0001	<1	<5	Outlet side of SQID