Our ref: 00045970 Summary of Parks and Road Verge Results

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By Email Only

Dear Greg and Joanna

Interim Summary of Results for Orica Mercury Independent Review: Stage 2 Environmental Testing Regime

1 INTRODUCTION

1.1 BACKGROUND

WSP were engaged by the NSW Environment Protection Authority (EPA) to conduct Stage 2 of the Orica Mercury Independent Review. The Stage 2 works pertain to the testing of public and private lands within a 1.5km radius of the Orica plant for potential contamination. Following appointment, we prepared a Sampling and Analysis Quality Plan (SAQP) in January 2015 in accordance with our accepted scope of work. The investigations were conducted during February and March 2015 in accordance with that SAQP (WSP, 2015), which was approved and accepted by EPA and Steering Committee.

During initial planning for the Stage 2 assessment, the Steering Committee recommended a stepwise approach to the investigation, rather than immediately proceeding with all works approved in the tender. It was recommended that the testing of public lands (including parks, road verges and public waterways) should occur first and the information be used in discussions with the community regarding the subsequent testing of private properties.

This letter report presents the initial findings from the public land testing program. The report compares the obtained results with the adopted criteria presented in the SAQP (WSP, 2015).

Figure 1 in **Attachment A** shows the study area and key features mentioned in the report, with subsequent figures presenting test locations and results for specific aspects of the program. Tables of collated results are presented in **Attachment B**.

1.2 OBJECTIVES AND SCOPE OF WORKS

The project has been commissioned for the purposes of providing information and data that will enable the NSW EPA to:

- Determine if there is a significant public health risk and if so, the level of such health risk to the community associated with potential mercury, polychlorinated biphenyls (PCB), polyaromatic hydrocarbons (PAH), lead and/or chromium release;
- Determine if there are any instances of community exposure to mercury that are not currently being managed and controlled, and assess if there are communities and/or individuals at risk; and
- Assist in reassuring the community that appropriate actions are or have been taken through past and present projects managed by Orica and regulated by the EPA.

The objective of this letter is to provide an interim summary of results received to date (public lands testing), and inform future planning for assessments of private properties.

2 GUIDELINES ADOPTED

Selection of appropriate criteria was documented in the accepted SAQP (WSP, 2015). Guidelines were adopted for all media subject to assessment (soil, vapour, sediment, biota). The following tables summarises those thresholds for reference purposes in this letter report.

Table 2.1: Criteria for soil assessment (mg/kg)

Contaminant	NEPC, 2013	
Landuse Scenario	Health Based Investigation Levels – Standard Residential	Health Based Investigation Levels – Public Open Spaces
Metals and Inorganics		
Chromium (VI)	100	300
Lead	300	600
Mercury (inorganic)	40	80
Methyl Mercury	10	13
Organics		
Naphthalene	3*	Non limiting
Carcinogenic PAHs (BaP TEQ)	3	3
Total PAHs	300	300
Polychlorinated Biphenyls (PCBs)	1	1

Note: * Conservative screening value for vapour intrusion that may be adjusted based on location specific soil texture and/or depth.

Table 2.2: Criteria adopted for vapour screening (µg/m^3)

Contaminant	WHO, 2000	WHO, 2003
Guideline context	**Annual average**	**Tolerable concentration for long term inhalation**
Mercury Vapour	1	0.2

Table 2.3: Criteria adopted for sediment samples (mg/kg)

Contaminant	NEPC, 2013	ANZECC, 2000
Scenario	**Health Based Investigation Levels for Public Open Spaces**	**Interim Sediment Quality Guidelines**
Mercury (inorganic)	80	0.15 (Low) to 1.0 (High)
Methyl Mercury	13	-

Table 2.4: Criteria adopted for biota samples (mg/kg)

Contaminant	ANZFA 2011	
Type of fish	**Fish**	**Predatory fish ^**
Mercury	0.5#	1.0#

Notes:

1. ^ Predatory fish include gemfish, billfish (including marlin), southern bluefin tuna, barramundi, ling, orange roughly, rays and all species of shark (ANZFA, 2011)
2. # Assume total mercury

3 SOIL INVESTIGAITONS

3.1 PROGRAM OF WORKS

The soil drilling program was carried out from 10 to 27 February 2015. In total 148 soil boreholes (prefixed "BH") were drilled by hand auger across public parks within the investigation area in accordance with the strategy outlined in the SAQP (WSP, 2015).

At all locations a surface sample was collected from the upper 5 cm (0-0.05m) of soil. Generally boreholes were drilled to 0.5 metres depth (below ground level, bgl) with a second sample collected from 0.4 to 0.5m bgl (the target total depth).

Occasionally hand auger refusal occurred, due to the presence of rubble or due to borehole collapse in dry sand before 0.5m bgl could be reached. On these occasions, the second sample was collected from the bottom 10cm of soil extracted (e.g. 0.3-0.4m). On one occasion (BH116) a second sample was not collected as the hole could only be extended to 0.2m bgl.

At each sampling location a description of the soil was recoded and the planned samples collected in accordance with the SAQP (WSP, 2015). Samples were taken from the auger using a new pair of nitrile gloves and placed into laboratory prepared glass jars that were then stored on ice for transport to the laboratory. Primary sample analysis was conducted at ALS Environmental who is NATA accredited for the test methods and analytes required for this project. To demonstrate robustness and integrity with the sampling program, blind field duplicates were analysed at a second NATA accredited laboratory, Envirolab, in accordance with the requirements of the SAQP (WSP, 2015). Further details on sample quality assurance/quality control (QA/QC) are presented in Section 7.

The soil test locations are presented on Figures 2a, 2b and 2C in **Attachment A**.

Tabulated laboratory results from soil testing are presented as Table B1 and Table B2 in **Attachment B**.

Bore logs (descriptions of the soil materials encountered) are presented in **Attachment C** while the laboratory transcripts are available in **Attachment D**.

3.2 RESULTS OF SOIL TESTING

3.2.1 Stratigraphy encountered

In the shallow depths assessed during this study the soil layers typically comprised a loose grey brown topsoil with organic matter, leaf litter and grass roots, grading to a loose medium grained light grey sand or occasionally a yellow sand. This is consistent with natural soils of the Botany, Pagewood, Eastgardens and Matraville suburbs that are characterised by deep coarse to fine sand dominated soil profiles.

The majority of soil testing locations comprised a thin layer (0.1 to 0.2m) of fill material or disturbed natural soil likely associated with local road construction or levelling, overlying natural soils. Where foreign materials were observed in the soil profile (e.g. blue metal gravel, brick, plastic, bitumen, ash, coke or clinker) we described the layer as "Fill". Thus frequently the uppermost soil sample was described as "Fill", while the depth sample was often described as "Natural".

Various parks have been subjected to more substantial backfilling or landscaping in their construction (including Barwon Park, Pioneer Park, parts of Sir Joseph Banks Park, parts of Heffron Park, Garnet Jackson Reserve, Mutch Park and Rhodes Street Reserve). Frequently on these reserves the target depth of drilling (0.5m) did not extend beyond the fill material and so no natural soil was encountered.

Specific observations made during the drilling program are provided in the soil borelogs (**Attachment C**).

3.2.2 Mercury concentrations in soil

Laboratory results for total mercury are presented in Table B1 (**Attachment B**), with laboratory transcripts provided in **Attachment D**. Figure 2a and 2b (**Attachment A**) present the locations of the mercury testing in soil and compare the laboratory results with the adopted criteria.

In summary, mercury concentrations in soil ranged from non-detect (<0.1mg/kg) to 4.7mg/kg in the surface soils, and non-detect (<0.1mg/kg) to 2.7 in the samples collected at depth. The arithmetic average of surface samples was 0.24mg/kg while the average of subsurface samples was 0.14mg/kg. All results were an order of magnitude less than the adopted health-based criteria for "standard residential landuse" (40mg/kg), and were also less than the health-based criteria for "public open spaces" (80 mg/kg). The laboratory results are summarised in **Table 3.1**.

Table 3.1: Summary statistics of total mercury results

Chemical		Number of Results	Minimum (mg/kg)	Maximum (mg/kg)	Average (mg/kg)	95% UCL (mg/kg)
Total Mercury	Surface 0-0.05m	148	<0.1	4.7	0.24	0.35
	Depth 0.4-0.5m[#]	147	<0.1	2.7	0.14	0.23
	Criteria	-	40[*]/80[^]			

Notes:

1. * Criteria for Standard Residential
2. ^ Criteria for Public Open Spaces
3. [#] 0.4-0.5m was the intended depth. On occasions this depth could not be reached due to hole collapse or refusal in fill materials. Where this occurred the lowest 10cm of soil was tested instead. All such samples are included in these summary statistics.
4. 95% UCL = 95% upper confidence limit of the arithmetic average concentration.

3.2.3 Lead, Chromium, PAH and PCB concentrations

A secondary objective of the study was to assess the concentration of various other chemicals of concern in the vicinity of Dennison Street (south of Grace Campbell Reserve and north of Beauchamp Road) Grace Campbell Crescent and Nilson Avenue, west of Rhodes Street, and in the Rhodes Street Reserve.

The program involved testing of surface soils (0-0.05m) from 17 of the borehole locations for total lead, total chromium, PAHs and PCBs, in addition to mercury, as outlined in the SAQP (WSP, 2015). The locations of these tests are shown of Figure 2c (**Attachment A**).

Results for this additional analysis are presented in Table B2 (**Attachment B**), with laboratory transcripts provided in **Attachment D**.

In summary all respective results were less than the adopted health-based criteria for "standard residential landuse", and were also less than the adopted health-based criteria for "public open spaces". Summary statistics are presented in Table 3.2 (following page).

Table 3.2: Summary statistics of lead, chromium, PAH and PCB results

Chemical		Number of Results	Minimum (mg/kg)	Maximum (mg/kg)	Average (mg/kg)	95% UCL
Total Lead	Results	17	21	209	74	96
	Criteria	-	300*/600^			
Total Chromium	Results	17	2	12	5.6	6.7
	Criteria	-	100*/300^			
Naphthalene	Results	17	<0.5	<0.5	ID	ID
	Criteria	-	3*/NL^			
BaP TEQ	Results	17	<0.5	2.6	0.51	ID
	Criteria	-	3*/3^			
Total PAHs	Results	17	<0.5	19.9	2.8	ID
	Criteria	-	300*/300^			
Total PCBs	Results	17	<0.1	<0.1	ID	ID
	Criteria	-	1*/1^			

Notes:

1. * Criteria for Standard Residential
2. ^ Criteria for Public Open Spaces
3. 95% UCL = 95% upper confidence limit of the arithmetic average concentration.
4. ID Insufficient detectable data for meaningful statistic to be calculated
5. NL non limiting

4 MERCURY VAPOUR ASSESSMENT

4.1 PROGRAM OF WORKS

Mercury vapour concentrations were assessed using a hand-held field mercury vapour analyser (Lumex RA-915). The meter has a lower detection limit of 2ng/m^3 (equivalent to 0.002 µg/m^3). This is two orders of magnitude less than the adopted WHO criteria of 0.2µg/m^3. The calibration certificate for the mercury analyser is provided in **Attachment E**.

A program of testing of stormwater drains down-gradient of the FCAP was implemented. Vapour concentrations were recorded by holding the hand-held vapour analyser probe at the sample point for 30 seconds until the reading stabilised. This included testing from within the accessible drains at approximately 0.5m below the drain entrance to screen if significantly elevated mercury readings were being generated in the drainage network. The drain screening program also included recording readings at the stormwater drain opening, and at 1m elevation above the entrance to the drain. These additional tests were undertaken to provide a baseline comparison with the mercury vapour concentrations in the pit and to assess the potential risk of elevated mercury vapour being present in the breathing zone in the vicinity of stormwater pits/openings.

Mercury vapour concentrations were also screened at each soil test location (Section 3) to provide a wide range of air sampling results from across the surrounding suburbs, and during a range of atmospheric conditions. Tests were carried out at 1m above the surface and at the soil surface immediately above each borehole. This testing was conducted between 10 and 27 February 2015 in conjunction with the soil sampling program.

The drain sampling program was undertaken on 5 February 2015 and screening locations are presented on Figure 3a to 3c, **Attachment A**. Tests undertaken at or within stormwater drains are prefixed “Pit” while tests undertaken as part of the soil sampling program are prefixed “BH”. A number of the pits that were identified in the SAQP (WSP, 2015) as potential locations for testing were unable to be opened during the fieldwork or were located behind fences and therefore couldn’t be accessed.

Where this occurred it is shown on the figures (white dots). At each of these inaccessible locations the 1m high sample was collected as close as possible to the proposed sampling point to ensure the objectives of documenting vapour conditions across the study area was not compromised.

4.2 MERCURY VAPOUR RESULTS

Mercury screening results are provided in Table B3, **Attachment B**. The mercury vapour results for within pits, at pit entrances or the ground surface, and at 1m elevation above pits and boreholes were all below the adopted site criteria. Summary statistics of the vapour results are presented in Table 4.1.

Table 4.1: Summary statistics of total mercury results

Chemical		Number of Results	Minimum (µg/m^3)	Maximum (µg/m^3)	Average (µg/m^3)	95% UCL (µg/m^3)
Mercury Vapour	Inside accessible stormwater drains	19	0.007	0.034	0.020	0.024
	Drain Entrances or soil surface	172	ND	0.074	0.024	0.031
	1m above drains or surface soil	176	ND	0.076	0.023	0.039
	Criteria	-	0.2*/1^			

Notes:

1. ND = Non Detect
2. * Tolerable concentration for long term inhalation
3. ^ Annual average criteria

5 SEDIMENT TESTING

5.1 FIELD PROGRAM

Sediment testing within the Penrhyn Estuary occurred on 16 February 2015 and included collection of samples from 20 locations and described in the SAQP (WSP, 2015). The sediment samples were prefixed “Sed”. Samples Sed01 to Sed14 were collected using a hand operated dredge from either a dingy or kayak. The dredge collected a grab sample from the upper 5cm (0.05m) of sediment. Sediment samples Sed15 to Sed20 were collected by hand directly from the mudflat at low tide.

Each sample was taken using a new pair of nitrile gloves to reduce the potential for cross contamination, and placed into laboratory prepared glass jars and then into coolers with ice for transport to the laboratory. Primary sample analysis was conducted at ALS Environmental who is NATA accredited for the test methods and analytes. To demonstrate robustness and integrity with the sampling program, blind duplicates were analysed at a second NATA accredited laboratory, Envirolab, in accordance with the SAQP (WSP, 2015).

The sediment testing locations are presented on Figure 4 (**Attachment A**).

5.2 RESULTS OF SEDIMENT TESTING

The mercury sediment results are provided in Table B4, **Attachment B**. In summary mercury was detected in 14 of the 20 samples, and nine of these detections exceeded the adopted Interim Sediment Quality Guidelines (ISQG) – Low threshold (0.15mg/kg). Note this threshold is only 0.05 mg/kg higher than the laboratory limit of reporting. None of the results exceeded the ISQG – High threshold (1mg/kg). The average concentration was 0.21mg/kg which also exceeds the ISQG-Low threshold.

These two adopted ISQG criteria are for protection of ecological receptors, and the concentrations are considered to be conservative due to the known bio-accumulative nature of mercury.

The results were also compared against soil criteria for a recreational exposure scenario (refer Table 3.1), on the assumption that if no exclusion existed, people may access the sediments of the estuary at low tide. All results were well below these human health criteria for recreational exposure.

In accordance with the SAQP the two most elevated sediment samples were also analysed for methyl-mercury as this is a more toxic form of mercury and can develop in anoxic conditions such as estuaries. The results for methyl-mercury in the two samples was found to be less than the laboratory's limit of reporting (0.1mg/kg).

Summary statistics of the sediment results are presented in Table 4.1.

Table 5.1: Summary statistics of total mercury results

Chemical		Number of Results	Minimum (mg/kg)	Maximum (mg/kg)	Average (mg/kg)	95% UCL (mg/kg)
Total Mercury	Results	20	<0.1	0.9	0.21	0.3
	Criteria	-	0.15*/1^/80#			
Methyl Mercury	Results	2	<0.1	<0.1	ID	ID
	Criteria	-	13#			

Notes:

1. * Interim Sediment Quality Guidelines (Low) - ecological threshold.
2. ^ Interim Sediment Quality Guidelines (High) - ecological threshold.
3. # Health Based Investigation Levels for Public Open Spaces (i.e. recreational contact with sediment).
4. ID Insufficient detectable data for meaningful statistic to be calculated.

6 BIOTA TESTING

6.1 FIELD PROGRAM

Fish sampling was conducted within the Penrhyn Estuary on the 17 and 18 of February 2015 following the protocol outlined in the SAQP (WSP, 2015). As the uptake of mercury can vary within and between species, a range of fish (including fish at various life history stages) were targeted for analysis. This approach accounted for a range of factors/variables including age, diet, movement and micro habitat use, and thus the potential variation of concentrations within individual species and between species.

Considering previous surveys and recommendations of the Steering Committee the following species were targeted:

- sea mullet (Mugil cephalus)
- sand mullet (Myxus elongatus)
- yellow-fin bream (Acanthopagrus australis)
- silver biddy (Gerres subfasciatus)
- dusky flathead (Platycephalus fuscus)
- flat-tail mullet (Liza argentea)
- whiting (Sillago ciliata)
- luderick (Girella tricuspidata)
- trevalley (Pseudocaranx spp.)
- smooth toadfish (Tetractenos glaber)

Fish sampling was conducted by a licenced subcontractor via active (seine nets, hand reels) and passive (fyke nets) methods. Seine netting was conducted in 'wadable' water depths within the upper estuary on the ebbing tide. Double-winged fyke nets and blocker nets were deployed across the upper estuary channel at high tide and were set for several hours until reaches upstream had sufficiently drained.

To maintain consistency with previous investigations and where sufficient individuals were captured, 10 individuals from each species were assessed for mercury concentrations. Prior to tissue collection, fish were euthanised via overdose of Aqui-S® solution in accordance with Ecosure's NSW Fisheries Scientific Collection Permit and Animal Ethics Committee approval. They were then measured and weighed.

All samples were transferred to a chilled esky and kept on ice for delivery to a NATA accredited laboratory (Advanced Analytical Australia) for mercury analysis. As a minimum, 5g of sample from each individual was sent to the laboratory for analysis.

6.2 BIOTA STUDY RESULTS

The current survey resulted in the collection of 35 individuals, encompassing six species. With the exception of luderick (adult specimens only), various life history stages (i.e. juvenile and mature specimens) were also collected for each species.

Raw data for fish length, fish weight and tissue sample weight, and laboratory certificates are provided in Ecosure, 2015 (**Attachment F**). Results obtained can be summarised as follows:

- Mercury concentrations in all tissue samples was less than the ANZFSC (2011) maximum concentration of mercury within fish for human consumption (0.5 mg/kg);
- The maximum concentration recorded was 0.3 mg/kg within a yellow-fin bream sample;
- Two luderick samples recorded a mean concentration of 0.175 mg/kg ± 0.005 (se);
- Ten toadfish samples recorded a mean concentration of 0.100 mg/kg ± 0.010 (se);
- Eight whiting samples recorded a mean concentration of 0.068 mg/kg ± 0.007 (se);
- Four silver biddy samples recorded a mean concentration of 0.060 mg/kg ± 0.003 (se); and
- Ten sea mullet samples recorded a mean concentration of 0.056 mg/kg ± 0.005 (se).

7 QUALITY ASSURANCE / QUALTY CONTROL

Field quality control was maintained by following a rigorous sample collection, decontamination procedures, and sample documentation process as per the SAQP. This included collecting representative QA/QC samples for laboratory analyses to verify the quality of the data set. The sampling data quality objectives have been analysed and reported in terms of data precision, accuracy, representativeness, comparability and completeness. Section 7.1 provides a summary of the QA/QC evaluation.

7.1 EVALUATION OF QA/QC

A summary of project QA/QC findings is provided in Table 7.1 (following page).

Table 7.1: QA/QC evaluation summary (soil and groundwater testing)

Data Quality Objective	Sampling Frequency	Frequency Achieved?	DQI	95% DQI Met ?
Precision				
Intra-laboratory field duplicates	1/20	Actual rate 1/22 – 15 duplicates in total	<5xLOR: <100% RPD 5-10xLOR: <75% RPD or >5xLOR: <50% RPD	Generally "Yes" with exceptions noted and discussed in Section 0
Inter-laboratory field duplicates	1/20	Actual rate 1/22 – 15 duplicates in total		
Laboratory duplicates (ALS and Envirolab)	1/20	Yes	<5xLOR: no limit 5-10xLOR: <70% RPD or >5xLOR: <50% RPD	Yes
Laboratory method blanks	1 per batch	Yes	< LOR	Yes
Accuracy				
Laboratory matrix spikes	1/20	Yes	60 to 140%	Yes
Laboratory control samples	1/20	Yes	60 to 140%	Yes
Representativeness				
Sampling handling storage and transport appropriate for media and analytes	-	-	Yes	Samples chilled and transported in accordance with COC requirements.
Trip blank	1 per media	Yes	<LOR	Yes
Trip spike	1 per media	Yes	60 to 140%	Yes
Samples extracted and analysed within holding times.	-	-	Hold Times: 14 days - organics 6 months – inorganics	Yes
Comparability				
Standard operating procedures used for sample collection and handling (including decontamination)	All Samples	-	Yes	All sampling completed in accordance with WSP standard operating procedures. New sampling equipment and sampling gloves used for each sample.
	1 rinsate blank during program	Yes	<LOR	Yes
Standard analytical methods used for all analyses	All Samples	-	Yes	NATA accredited methods used.

Data Quality Objective	Sampling Frequency	Frequency Achieved?	DQI	95% DQI Met ?
Consistent field conditions, sampling staff and laboratory analysis	All Samples	-	Yes	All field work completed by WSP Environmental Scientists Philippa Childs, Aaron Young, Adeline Menet or Colin McKay. All laboratory analysis completed by NATA accredited laboratories Envirolab and ALS
Limits of reporting appropriate and consistent	All Samples	-	Yes	Yes
Completeness				
COC completed and appropriate	All Samples	-	Yes	Refer to Attachment D
Appropriate documentation	All Samples	-	Yes	Refer to Attachment D

Notes:

1. DQI – Data Quality Indicator
2. LOR – laboratory's limit of reporting
3. RPD – relative percentage difference
4. COC – Chain of custody documentation

7.2 FIELD QA/QC TESTING

The QA/QC results along with relative percentage difference calculations for soil and sediment analyses are provided in Tables B5 and B6 respectively, in Attachment B. The findings of Trip Blank and Trip Spike, and Rinsate Blank are provide in the ALS laboratory transcript ES1504242.

The following comments are made as a summary regarding the quality of the field and analytical components of this project:

- The Mercury analyser used during the investigation work was hired from Field Environmental Instruments Inc. The calibration certificate for the meter is included in Attachment E;
- Sample integrity and container requirements were documented as acceptable (refer to sample receipt notifications in Attachment D);
- Holding time compliances were documented as acceptable. All samples were received by the laboratory within the relevant holding times (refer to sample receipt notifications in **Attachment D**);
- The Trip Blank result for soil returned all non-detectable concentrations for the analytes tested which indicates cross contamination was unlikely;
- Trip Spike result for soil was within acceptable percentages which indicated that volatile losses in transit were unlikely;
- Due to the variable nature of much of the soil materials tested (often comprising disturbed natural or fill materials) we expected some variability in the results from duplicate pairs. However many of the inter-laboratory and intra-laboratory duplicates showed low levels of variability with the primary sample. This gives confidence that the field protocols were repeatable and consistent, and that the laboratory testing was precise. A few isolated elevated RPDs for lead and total PAHs were observed, as summarised below and are likely to be due to variability in the material tested rather than a failure in the sample collection or testing process. These results do not give cause for

concern in the program as all results both for primary samples, and duplicates were below the site criteria.

- Elevated RPDs as discussed above and presented in Table B5 and B6, Attachment B included;
  - Intralab Duplicate 8 where RPDs were elevated for “sum of PAHs” though all individual analyses met the DQIs. This sample also had an elevated RPD for lead.
  - Interlab Duplicate 8 where RPDs were elevated for “sum of PAHs” though all individual analyses met the DQIs.
  - All other duplicate pairs returned acceptable RPDs.
- The primary (ALS Environmental) and secondary (Envirlab) laboratories were NATA registered at the time of analysis, and accredited for the analysis performed.

In summary, the field QA/QC data is determined to be of sufficient quality to ensure validity of the conclusions reached for this validation program.

7.3 LABORATORY QA/QC TESTING

Laboratory QA/QC for both soil and groundwater analysis comprised chain-of-custody documentation, sample integrity and holding times, use of acceptable NATA-registered laboratory methods and laboratory QA/QC results. Laboratory QA/QC are detailed on the laboratory certificates provided in **Attachment D**.

ALS (Primary Laboratory) indicates that QA/QC compliance was acceptable.

All other laboratory QA/QC for soil and groundwater were met and are considered acceptable for the purpose of this investigation.

8 REFERENCES

Agriculture and Resource Management Council of Australia and New Zealand and the Australian and New Zealand Environment and Conservation Council (ANZECC), 2000 *Australian and New Zealand guidelines for fresh and marine water quality*

FAO WHO, 2011 *Joint FAO/WHO Food Standards Programme, Codex Committee on Contaminants In Foods*

National Environment Protection Council, 2013 *National Environment Protection (Assessment of Site Contamination) Amendment Measure 2013*.

WHO, 2000 *Air Quality Guidelines for Europe Second Edition* WHO Regional Publications, European Series, No. 91

WHO, 2003 *Concise International Chemical Assessment Document 50: Elemental mercury and inorganic mercury compounds: human health aspects. Geneva, World Health Organization, International Programme on Chemical Safety*.

WSP, 2015 *Sampling and Analysis Quality Plan Orica Botany Mercury Independent Review: Stage 2 - Environmental Testing Regime* (January 2015)

Australia New Zealand Food Standards Code (ANZFA), 2011, *Australia New Zealand Food Standards Code - Standard 1.4.1 - Contaminants and Natural Toxicants*.

9 REPORT LIMITATIONS

The findings of this report are governed by the Scope outlined in Section 1 and throughout the letter report. As with any type of investigation, the confidence in the findings and the reliance that can be placed on this report is limited by the Scope. WSP was engaged by the client as an independent

consultant to conduct the Scope outlined in this report and to objectively present the results of the investigation conducted. WSP does not have any commercial interest in the project and has not been engaged to advertise, promote or endorse any client interests.

This report has been prepared for a specific purpose (stated within) for the client. Any other party who intends to rely on this report, or any data presented in this report, must contact WSP prior to doing so. WSP will advise such parties in writing on the extent that they may rely on this report, or data presented in this report. WSP's advice for any such reliance will be based on the available knowledge and the expressed purpose for which the report is to be relied upon. Any party who relies on this report without written advice from WSP does so entirely at their own risk.

The findings of this investigation are based on some information provided by the client. WSP trusts that the information provided by these sources is accurate, complete and is not misleading and, unless the Scope states otherwise, we have not been engaged to audit the veracity of any information provided to us. So, while normal assessments of data reliability are made during the course of our work, we assume no responsibility or liability for any errors or any omissions in any information provided by sources outside of WSP. Where inaccurate, incomplete or misleading information is provided to us by external parties there could be significant impacts on the integrity of this report. As such no warranties, expressed or implied, can be made.

This report must not be reproduced or referenced unless in full.

Yours sincerely

for WSP Environmental

Colin McKay
Principal Environmental Scientist

Stephen Barnett
Principal Environmental Engineer

Attachment A: Figures
Attachment B: Tables of results
Attachment C: Borelogs
Attachment D: Laboratory Transcripts
Attachment E: Calibration Certificate for Lumex RA-915 Mercury Analyser
Attachment F: Ecosure, 2015