Remediation and validation report

327 Boorowa Street, Young NSW

Ref: R12147val
Date: 19 December 2012

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Interested authorities:	Young Shire Council
Report number:	R12147val
Date:	19 December 2012

Executive summary

Background

A new commercial centre is proposed for 327 Boorowa Street, Young NSW. The site was formally used as a Department of Infrastructure Planning and Natural Resources (DIPNR) machinery storage depot with fuel storage facilities.

A preliminary contamination investigation of the site was undertaken by Envirowest Consulting Pty Ltd in August 2005 (Report R5164c). The investigation identified five localised areas of soil contamination on the site from past activities. The contamination was associated with a vehicle service ramp, fibro shed, diesel AST and two surface stained bare areas. The levels of TPH (C10-C36) in these areas exceeded the adopted thresholds and are unsuitable for commercial land-use. TPH (C10-C36) was identified as the contaminant of concern. Remediation of the contaminated areas was recommended. Additional recommendations from the preliminary contamination report were analysis of the soil beneath the fibro shed for organochlorine chlorine pesticides (OCP) and metals and a site inspection for fibro fragments after the removal of the shed.

A Remediation Action Plan (RAP) was prepared in May 2012 (Report R12147rap) to develop an effective plan to remediate the site for the proposed commercial land-use.

Remediation works at the site were conducted by Mellross Homes in November 2012. Remediation method was removal of the fibro shed and excavation of the contaminated areas and disposal as general solid waste in accordance with the remediation action plan (RAP).

A validation assessment is required to ensure the excavations undertaken in the contamination areas previously identified have been remediated successfully.

Additional analysis of the soil beneath the removed fibro shed for OCP and metals was conducted. A site inspection for the presence of residual fibro potentially containing asbestos was conducted.

The south western section of the site is presently used by Department Primary Industries (DPI) for machinery and chemical storage. The DPI section is fenced off and will not currently be part of the new commercial centre. A preliminary contamination investigation of the DPI area is reported separately.

Objectives of the investigation

Validation of the five excavated areas by soil sampling and analysis

Analysis of soil under the removed fibro shed for OCP and metals

Site inspection for the presence of residual fibro fragments in the area of the removed shed

Summary

Remediation of the TPH (C10-C36) impacted soil was undertaken by Mellross Homes by excavation in five areas of contamination previously identified. The contaminated material was transported off-site as general solid waste. Remediation included removal of the fibro shed.

Validation sampling was undertaken after excavation to confirm successful remediation. Validation was conducted by soil sampling of the excavated areas to confirm the absence of contaminants.

Additional analysis of the soil below the removed fibro shed was conducted for OCP and metals. The soil surface under the former fibro shed was inspected for the presence of residual fibro.

Conclusion

No contamination was identified in the samples collected from the five excavated areas. Levels of TPH (C10-C36) in the validation soil samples collected were below detection limits and less than the adopted land-use threshold.

Levels of OCP and metals in the soil samples collected from below the former fibro shed were at environmental background levels or below detection limits.

No asbestos cement (AC) fragments were observed on the surface in the area surrounding the former fibro shed.

Recommendations

Remediation objectives have been achieved.

The investigation area is suitable for commercial land-use.

CONTENTS

1. Introduction

A contamination investigation undertaken by Envirowest Consulting Pty Ltd (Report number R5164c) in August 2005 identified elevated levels of TPH (C10-C36) in five locations in the yard area at 327 Boorowa Street, Young NSW. The source of the TPH contamination is expected to be from the former AST on-site or fuel pump spills that have migrated into the soil. Sampling indicated the TPH is confined to the 0-500mm layer. The levels of TPH (C10-C36) exceed the EPA (1994) sensitive land-use thresholds. Remediation of the site is required to reduce the level of TPH (C10-C36) to below the appropriate thresholds.

The report recommended additional analysis of the soil beneath the fibro shed for organochlorine chlorine pesticides (OCP) and metals and a site inspection for fibro fragments after the removal of the shed.

A Remediation Action Plan (RAP) was prepared in May 2012 (R12147rap) to develop an effective plan to remediate the site for the proposed commercial land-use.

Remediation works at the site were conducted by Mellross Homes in November 2012. Remediation involved removal of the fibro shed and excavation of the contaminated areas and appropriate disposal as general solid waste in accordance with the remediation action plan (RAP).

A preliminary investigation of the DPI area located in the south western section of the lot is required to determine potential contamination areas. A preliminary contamination investigation of the DPI area is reported separately.

2. Scope of work

Envirowest Consulting Pty Ltd was commissioned by Mellross Homes to undertake validation assessment and additional investigations at 327 Boorowa Street, Young NSW. The assessment included:

- Validation of the remediated areas by soil sampling in the excavated areas
- Additional analysis of soil beneath the fibro shed (removed) for OCP and metals
- A site inspection in the area of the removed fibro shed for the presence of residual fibro potentially containing asbestos was conducted
- Preliminary contamination investigation in the DPI area located in the south western section of the lot.

The investigation will be undertaken according to NSW OEH and NEPC guidelines including *Guidelines for consultants reporting on contaminated sites*, *National Environment Protection (Assessment of Site Contamination) Measure 1999* and *POEO (Petroleum Storage) Regulations 2008.*

3. Site identification

Address	327 Boorowa Street Young NSW

Owner(s)	Mellross Homes
Deposited plans	Lot 2399 DP754611
Australian Map Grid	Zone 55H, E618259m, N6202824m
Locality map	Figure 1
Aerial photograph	Figure 2
Site plan	Figure 3
Photograph(s)	Figure 4

4. Site description

4.1 Zoning

The site is zoned as IN1 – General Industrial under the Young Shire Council Local Environmental Plan 2011.

4.2 Site visit and description

Site inspections were made in 23 November 2012. The site is located at 327 Boorowa Street, Young NSW and is a commercial site which has been used for a depot. The site is located in an industrial estate of Young NSW.

4.3 Land-use

The yard area of the site was vacant at the time of inspection and undergoing site levelling and tree removal. The excavation pits in the remediated areas remained open to enable validation. The south western section of the site was used for a DPI machinery and chemical storage area.

4.4 Council records

A development application was made prior to the construction of a shed in the south east corner currently utilised by the DPI. No other records of development applications are known.

4.5 Information sources

- *Preliminary contamination investigation of 327 Boorowa Street, Young NSW*) was reported in August 2005 (Envirowest Consulting report number R5164c).
- *Remediation Action Plan of 327 Boorowa Street, Young NSW*) was reported in May 2012 (Envirowest Consulting report number R12147rap).
- Information from Mellross Homes
- Site inspection 23 November 2012 by Andrew Ruming of Envirowest Consulting
- Aerial photograph 2010
- NSW Office of Environment and Heritage (OEH) records of public notices under the CLM Act 1997
- Young Shire Council LEP 2011

4.6 Chronological list of site uses

The southern area was occupied by DIPNR and has site has been vacant for 10 years. Between 1950 and 1995 the site was used as a depot for the Soil Conservation Service for the storage and maintenance of machinery including bulldozers.

A gravel circular driveway is located in the DIPNR part of the site providing access to the sheds. Areas south and north of the driveway in the DIPNR area contained grasses and trees and were not used for the parking of machinery.

An area in the centre of the site is used of the storage of building materials including timber, iron and bricks. These materials are associated with a neighbouring land-use. The length of time the building materials have been stored on the site is unknown.

The north-eastern area on the site was used for the grazing of cattle and horses on the inspection date. This is the only known land-use in this area.

No mines, sheep dips, stockyards or contaminating industrial activities are known to have been located on the site.

A small section in the west of the site is fenced and utilised by the DPI for the storage of machinery and chemicals. This area was fenced and a shed constructed on the site in 1988. Two additional smaller sheds were constructed in 2002 and used for the storage farm chemical used for trial work.

4.7 Buildings and infrastructure

One large and two small iron sheds are located on the land leased by the DPI.

One iron shed with a concrete floor is located on the DIPNR area. One fibro shed with slatted timber raised floor and bunding under is located near the centre of the DIPNR area. The fibro shed is suspected of being bonded asbestos. A service ramp for vehicles is located in the DIPNR area.

A former above ground diesel storage tank was located on the site. This has been removed.

4.8 Contaminants of concern

The contaminant of concern for remediation areas is TPH (C10-C36).

Additional analysis of the area under the removed fibro shed was undertaken for OCP and metals. The area was also inspected for the presence of fibro which may potentially contain asbestos.

4.9 Relevant complaint history

Nil

4.10 Contaminated site register

The site is not listed on the NSW OEH register of contaminated sites.

4.11 Neighbouring land-use

North – Railway line and pasture
East – Residential
South – Pasture
West – Pasture

4.12 Integrity assessment

The site history was obtained from a site inspection and history review. The information is consistent with the current site condition and to the best of the assessor's knowledge is accurate.

5. Site condition and environment

5.1 Surface cover

The site was mostly cleared due to earthworks for site development.

5.2 Topography

The site is a gently inclined lower slope with an inclination of 4% and a south westerly aspect.

5.3 Soils and geology

The soil types on the site are red and yellow podzolics. Typical profiles consist of yellowish brown sandy clay loam topsoils with yellow red sandy clay subsoils with quartz gravel.

Fertility is moderate and the soils are moderately erodible requiring banks and gully control structures. No erosion was observed on the site. Soil salinity problems are absent.

The site is underlain by Granite and Granodiotrite.

5.4 Surface water and groundwater

The soil is highly permeable. Surface water flows south west and to Burrangong Creek located approximately 0.5km downslope. No intermittent drainage lines are located on the site.

No bores are located on the site. Groundwater depth in the locality is located around 10 metres.

6. Previous assessments

Envirowest Consulting Pty Ltd (2005) *Preliminary contamination investigation of 327 Boorowa Street, Young NSW* (Report number R5164c)

A preliminary contamination investigation of the site was undertaken by Envirowest Consulting Pty Ltd and reported in August 2005 (Report number R5164c).

Results indicated five areas of soil contamination (Figure 2) requiring remediation activities:

1. Vehicle service ramp: TPH (C10-C36) was greater than the threshold criteria around sampling location 1 at the vehicle service ramp. The level of TPH (C10-C36) in this area was 39,250mg/kg where 1,0000mg/kg is the sensitive land-use threshold. The level of lead in this location was elevated and below the commercial land-use threshold of 1,500mg/kg.
2. Fibro shed: TPH (C10-C36) was greater than the threshold criteria around sampling location 4 at the fibro shed. The level of TPH (C10-C36) in this area was 75,300mg/kg where 1,000mg/kg is the sensitive land-use threshold.
3. Diesel AST: TPH (C10-C36) was greater than the threshold criteria around sampling location 5 around the diesel AST at the fibro shed. The level of TPH (C10-C36) in this area was 12,870mg/kg where 250mg/kg is the sensitive land-use threshold.
4. South east of diesel AST: TPH (C10-C36) was greater than the threshold criteria around sampling location 8 at a bare area south east of the diesel AST. The level of TPH (C10-C36) in this area was 18,920mg/kg where 1,000mg/kg is the sensitive land-use threshold.

5. South of diesel AST: TPH (C10-C36) was greater than the threshold criteria around sampling location 9 at a bare area south of the diesel AST. The level of TPH (C10-C36) in this area was 17,190mg/kg where 1,000mg/kg is the sensitive land-use threshold.

Remediation of the five contaminated areas was recommended. Additional analysis of the soil below the fibro shed was recommended after demolition and removal. Additional investigation of the DPI yard area located in the south western section of the lot was recommended.

Envirowest Consulting Pty Ltd (2012) *Remediation Action Plan, 327 Boorowa Street, Young NSW* (Report number R12147rap)

A Remediation Action Plan of the site was undertaken by Envirowest Consulting Pty Ltd and reported in May 2012 (Report number R12147rap). The objectives of the RAP were:

- Set remediation goals based on land-use threshold
- Propose a cost effective and workable remediation method
- Establish a validation procedure for the site
- Ensure remediation works comply with:

  Guidelines for Consultants Reporting on Contaminated sites (EPA 1997)
  Guidelines for NSW site auditor scheme (EPA 2006)
  The Contaminated Land Management Act (1997)
  Remediation of Contaminated Land State Environmental Planning Policy (SEPP55)

The preferred remediation method was excavation of TPH (C10-C36) contaminated material around and under the vehicle service ramp, fibro shed, diesel AST and bare areas south east and south of the diesel AST will be transported to an approved landfill as general solid waste.

Vertical and lateral extent of the contaminated areas will initially be determined at the time of excavation by visual and olfactory evidence. Vertical and lateral extent of the contaminated areas will be confirmed by laboratory analysis. Excavation of contaminated material shall continue until the analytical results indicate the material remaining is below the adopted criterion.

Validation of the remediated areas will be required by sampling and laboratory analysis.

7. Description of contamination

The investigation carried out in August 2005 (Envirowest Report R5164c) identified soil staining or bare areas in five areas in the yard area on the site from oil and diesel spills. The suspected contaminated areas were under the vehicle service ramp, under the fibro shed, around the diesel AST and two areas near the AST. Elevated levels of TPH (C10-C36) were detected in the soil samples where staining or bare soil was observed. The levels were greater than the sensitive land-use threshold of 1000 mg/kg. The lateral and vertical extent of the five contaminated areas was not determined.

The fibro from the shed on the site is likely to contain bonded asbestos.

8. Remediation method

The method of remediation is excavation and off-site disposal. This has been determined to be the most cost effective and practicable method. Excavation and off-site disposal is considered the preferred option for remediation of the TPH impacted area. A relatively small volume of soil is impacted and transport off-site is the most timely, technically practical and cost effective method of remediation.

9. Remediation works

The preliminary contamination investigation identified five areas of soil contamination (TPH C10-C36) requiring remediation activities:

1 Vehicle service ramp
2 Fibro shed
3 Diesel AST
4 South east of diesel AST
5 South of diesel AST

The preferred method was excavation and transport off-site to Young landfill.

Excavation works were undertaken by Mellross Homes in November 2012. The identified contaminated areas were excavated and extended as determined by evidence of contamination by visual appearance and odour.

The final excavations were:

1 Vehicle service ramp excavation pit 4m by 3m by 0.6m depth (7.2m^3)
2 Fibro shed excavation pit 7m by 3m by 0.8m depth (16.8m^3)
3 Diesel AST excavation pit 7m by 2m by 0.6m depth (8.4m^3)
4 South east of diesel AST excavation pit 8m by 2m by 0.5m depth (8m^3)
5 South of diesel AST excavation pit 8m by 2m by 0.5m depth (11.2m^3)

A total of approximately 52m^3 of soil was stockpiled from the 5 excavation areas. The soil was transported off-site to Young landfill as general solid waste.

Validation of the excavation pits is described in the following sections.

10. Validation assessment

10.1 Data quality objectives (DQO)

The development of data quality objectives is recommended by OEH NSW to provide a systematic framework for site validation. All validation and sampling shall be carried out in accordance with NSW EPA (DEC) guidelines: *Contaminated Sites – Sampling Design Guidelines, Contaminated Sites – Guidelines for Assessing Service Station Sites* and *Contaminated Sites – Guidelines for Consultants Reporting on Contaminated Sites*.

10.1.1 State the problem

A contamination investigation undertaken by Envirowest Consulting Pty Ltd in May 2012 (Report number R12147c) identified elevated levels of TPH (C10-C36) in the soil in the yard area at 327 Boorowa Street, Orange.

The remediation method is to excavate and appropriately dispose the impacted soil off-site. Validation sampling is required to determine the success of the remediation.

10.1.2 Identify the decision

The proposed land-use is commercial and the levels of contaminants following remediation should be less than the assessment criteria listed in Section 9. The decision problem is: *Is the site suitable for commercial land-use?*

10.1.3 Identify the inputs decision

The sampling design for the excavated pits is a systematic pattern on an approximately 6m grid pattern over the walls and base of the excavation. The sampling density is sufficient to detect a potential hot spot with a diameter of 3.5m.

The soil samples will be analysed for the contaminants of concern. The guidelines will be the sensitive land-use thresholds (EPA 1994).

If soil contamination has been identified following remediation, further excavation, sampling and analysis following the guidelines above will be required.

10.1.4 Define the boundaries of the study

The investigation areas are those areas which have been remediated through excavation. The size of this area will be determined by validation sampling and analysis. The size of the remediated area will be increased if further contamination is discovered during the validation investigation.

10.1.5 Develop a decision rule

The guidelines will be the sensitive land-use thresholds (EPA 1994).

10.1.6 Specify acceptable limits on the decision errors

The 95% upper confidence limit of average levels of samples collected is less than the threshold levels.

10.1.7 Optimize the design for obtaining data

Soil sampling will be undertaken as described in Section 7.2.

Data quality indicators are described in Appendix 2.

10.2 Sampling design

The walls and floor of the excavation pit were inspected for visual and olfactory evidence of contamination. The final excavation was validated by visual appearance and soil sampling for laboratory analysis.

The pit was sampled using systematic sampling on an approximate grid of 6m. Nine samples were collected from the walls and base of the excavation pits. The sampling density can detect a potential hot spot with a diameter of 3.5m at a 95% level of confidence.

10.3 Sampling methods

Detailed soil sampling protocols are presented in Appendix 1. Soil samples were collected from the fresh excavation using a spade. The soil was transferred to a solvent rinsed glass jar with a teflon lid quickly to minimise volatile vapour loss. Discrete samples were collected.

Tools were decontaminated between sampling locations to prevent cross contamination by: brushing to remove caked or encrusted material, washing in detergent and tap water, rinsing in deionised water rinsing with clean tap water and allowing to air dry or using a clean towel.

All sample containers were placed immediately into a cooler containing ice. A chain of custody form accompanied the transport of samples.

10.4 Analytes

Table 1 details the schedule of samples and analysis.

The contaminant of concern is total petroleum hydrocarbons (TPH C10-C36).

Additional samples were analysed for OCP and metals from the former fibro shed area.

Table 1. Schedule of samples collected

Laboratory sample id.	Location id (Figure 2)	Sampling date	Description	Analysis undertaken
MH1	1	23/11/12	Vehicle service ramp base	TPH(C10-C36)
MH2	2	23/11/12	Fibro shed base	TPH(C10-C36), metals, OCP
MH3	3	23/11/12	Fibro shed wall	TPH(C10-C36), metals, OCP
MH4	4	23/11/12	Diesel AST base	TPH(C10-C36)
MH5	5	23/11/12	Diesel AST wall	TPH(C10-C36)
MH6	6	23/11/12	South east of diesel AST base	TPH(C10-C36)
MH7	7	23/11/12	South east of diesel AST wall	TPH(C10-C36)
MH8	8	23/11/12	South of diesel AST base	TPH(C10-C36)
MH9	9	23/11/12	South of diesel AST wall	TPH(C10-C36)

11. Quality assurance and quality control

11.1 Sampling design

A systematic sampling pattern is required to validate the site. Samples from the excavated areas were collected on an approximate 6 metre grid pattern. At least 1 sample was collected from each excavation area. The sampling density is in accordance with the NSW EPA (1995) recommendations.

The number of locations tested is thought to provide an adequate assurance that the soils sampled are representative of the area sampled. The sampling program was designed to minimise sampling and measurement errors.

Data quality objectives and data quality indicators are presented in Appendix 2.

11.2 Field procedures

The collection of samples was undertaken in accordance with industry accepted standard protocols (NEPC 1999). The details of the samples collected are presented in Table 1. Discrete samples were collected and analysed.

Sampling equipment was decontaminated between each sampling event. Samples were stored and transported under refrigeration in insulated containers. Appropriate storage duration was observed. A chain of custody form tracked the samples to the laboratory.

A single sampler was used to collect the samples using standard methods. Soil collected from the pit was a fresh sample from the hand shovel. After collection the samples were immediately placed in new glass sampling jars and placed in a cooler.

One intra laboratory sample was collected which is greater than the NEPM (1999) recommended frequency of one per batch or 5%. Intra laboratory duplicate was from the same sampling location and analysed for the same analytes. Details on field sampling procedures are presented in Appendix 1.

11.3 Laboratory

Chemical analyses were conducted in the laboratories of ALS, Smithfield, NSW which is NATA registered for the tests undertaken. The laboratories have quality assurance and quality control programs. The quality control program for analysis of samples in each laboratory batch was greater than the recommended frequency of 5%. The laboratory reports including quality control evaluations are presented in the Appendix 3.

11.4 Data evaluation

The quality control and quality assurance report is presented in Appendix 2. The quality assurance/quality control reports for the data are presented in the laboratory reports.

It is concluded the analytical results are representative and the data is usable for the purposes of the investigation.

12. Assessment criteria

12.1 Remediated area

Land-use of the site is commercial. The NSW DECCW does not provide threshold levels for hydrocarbons under different land-uses. NSW EPA (1994) *Guidelines for Assessing Service Station Sites* provides soil hydrocarbon thresholds for sensitive land-uses. The EPA (1994) hydrocarbon thresholds will be used for comparison of the soil results and are considered appropriate initial threshold for commercial and residential sites.

The adopted investigation levels of the soil for sensitive land-use (EPA 1994) are listed in Table 2.

Table 2. Soil assessment criteria (mg/kg)

Analyte	Sensitive land-use (EPA 1994)
TPH (C10-C36)	1,000

12.2 Additional sampling

Additional sampling for OCP and metals was undertaken in the area of the removed fibro shed. The additional sampling was recommended in the preliminary contamination assessment and remediation action plan due to access restrictions. The assessment criteria for the additional samples is health investigation level (HIL F) which is applicable for commercial land-use (DEC 2006). The adopted assessment criteria for the analytes evaluated is outlined in Table 3.

Table 3. Soil assessment criteria (mg/kg)

Analyte	Commercial land-use (DEC 2006)
Arsenic	500
Cadmium	100
Chromium	600,000
Copper	5,000
Lead	600
Nickel	3,000
Zinc	35,000
OCP	1,000

13. Results and discussion

13.1 Excavated areas

Five areas on the site were excavated. The excavations were undertaken in November 2012. The excavations in each area were extended as determined by evidence of contamination by visual appearance and odour.

The excavated areas had a total approximate volume of 52m^3. The excavation pits sizes are listed in Section 9. No soil staining, odour or evidence of residual contamination was observed during inspection of the final excavated areas.

All soil samples collected from excavated areas contained levels of TPH (C10-C36) below detection limits and less than the sensitive land-use threshold (Table 4).

Table 4. Soil analysis results, bowser area (mg/kg)

Sample id.	Location (Figure 2)	Description	TPH(C10-C36)
MH1	1	Vehicle service ramp base	ND
MH2	2	Fibro shed pit base	ND
MH3	3	Fibro shed pit wall	ND
MH4	4	Diesel AST base	ND
MH5	5	Diesel AST wall	ND
MH6	6	South east of diesel AST base	ND
MH7	7	South east of diesel AST wall	ND
MH8	8	South of diesel AST base	ND
MH9	9	South of diesel AST wall	ND
Sensitive land-use thresholds (EPA 1994)			*1,000*

ND = not detected

13.2 Shed validation

Samples were collected under the removed fibro shed. Access to the area below the fibro shed was restricted during the preliminary investigation undertaken in August 2005. Analysis was undertaken for OCP and metals as these were potential contaminants of concern.

The OCP and metal levels in the soil samples collected from the area of the removed shed were below detection limits or less than the assessment criteria (Table 5).

Table 5. Soil analysis results (mg/kg)

Sample id.	Location	Description	Arsenic	Cadmium	Chromium	Copper	Lead	Nickel	Zinc	OCP
MH2	2	Fibro shed pit base	ND	ND	14	7	7	3	5	ND
MH3	3	Fibro shed pit wall	ND	ND	9	ND	ND	ND	ND	ND
Commercial land-use thresholds (EPA 1994)			*500*	*100*	*600,000*	*5,000*	*600*	*3,000*	*35,000*	*1000*

ND = not detected

13.3 Fibro shed inspection

The fibro shed previously located on the site was likely to contain bonded asbestos. The shed was demolished and removed off-site in November 2012. The fibro was disposed of in accordance with WorkCover and Young Shire Council guidelines.

A site inspection of the soil surface at the removed shed area did not identify any residual fibro fragments on the surface.

14. Site characterisation

14.1 Environmental contamination

No contaminated soil was identified in the excavated areas.

No OCP, elevated levels of metals or asbestos cement were detected in the area of the removed fibro shed.

14.2 Chemical degradation products

Not applicable as no contamination was detected in the remediated areas. Potential contamination areas were identified in the DPI area. Further investigations in the DPI area are recommended after cessation of site occupancy and cleanup.

14.3 Exposed populations

Not applicable as no contamination was detected in the remediated areas.

15. Conclusions and recommendations

15.1 Summary and conclusion

Remediation of the TPH (C10-C36) impacted soil was undertaken by Mellross Homes by excavation in five areas of contamination previously identified. The contaminated material was transported off-site as general solid waste. Remediation included removal of the fibro shed.

Validation sampling was undertaken after excavation to confirm successful remediation. Validation was conducted by soil sampling of the excavated areas to confirm the absence of contaminants.

Additional analysis of the soil below the removed fibro shed was conducted for OCP and metals. The soil surface under the former fibro shed was inspected for the presence of residual fibro.

No contamination was identified in the samples collected from the five excavated areas. Levels of TPH (C10-C36) in the validation soil samples collected were below detection limits and less than the adopted land-use threshold.

Levels of OCP and metals in the soil samples collected from below the former fibro shed were at environmental background levels or below detection limits.

No asbestos cement (AC) fragments were observed on the surface in the area surrounding the former fibro shed.

15.2 Assumptions used in reaching the conclusions
It is assumed the site history is accurate and no significant undetected contamination is located in areas not investigated on the site.

15.3 Extent of uncertainties in the results
Soil sampling in excavated areas was designed to detect contamination with a radius of 4.5m at a 95% level of confidence.

15.4 Suitability of proposed use
The site is suitable for commercial land-use. Further investigations are required in the DPI area after ceasing occupation of the site.

15.5 Limitations and constraints on the use of the site
Nil.

15.6 Recommendation for further work
Remediation objectives have been achieved.

The investigation area is suitable for commercial land-use.

16. Report limitations and intellectual property
This report has been prepared for the use of the client to achieve the objectives given the client requirements and cost constraints. The level of confidence of the conclusion reached is governed by the scope of the investigation and the availability and quality of existing data. Where limitations or uncertainties are known, they are identified in the report. No liability can be accepted for failure to identify conditions or issues which arise in the future and which could not reasonably have been predicted using the scope of the investigation and the information obtained.

The investigation identifies the actual subsurface conditions only at those points where samples are taken, when they are taken. Data derived through sampling and subsequent laboratory testing are interpreted by geologists, engineers or scientists who then render an opinion about overall subsurface conditions, the nature and extent of the contamination, its likely impact on the proposed development and appropriate remediation measures. Actual conditions may differ from those inferred to exist, because no professional, no matter how well qualified, and no sub surface exploration program, no matter how comprehensive, can reveal what is hidden by earth, rock or time. The actual interface between materials may be far more gradual or abrupt than a report indicates. Actual conditions in areas not sampled may differ from predictions. It is thus import to understand the limitations of the investigation and recognise that we are not responsible for these limitations.

17. References

DEC (2006) *Contaminated Sites: Guidelines for the NSW Site Auditors Scheme* (NSW Environment Protection Authority, Chatswood)

DECC (2009) *Waste Classification Guidelines, Part 1: Classifying Waste* (Department of Environment and Climate Change, Sydney)

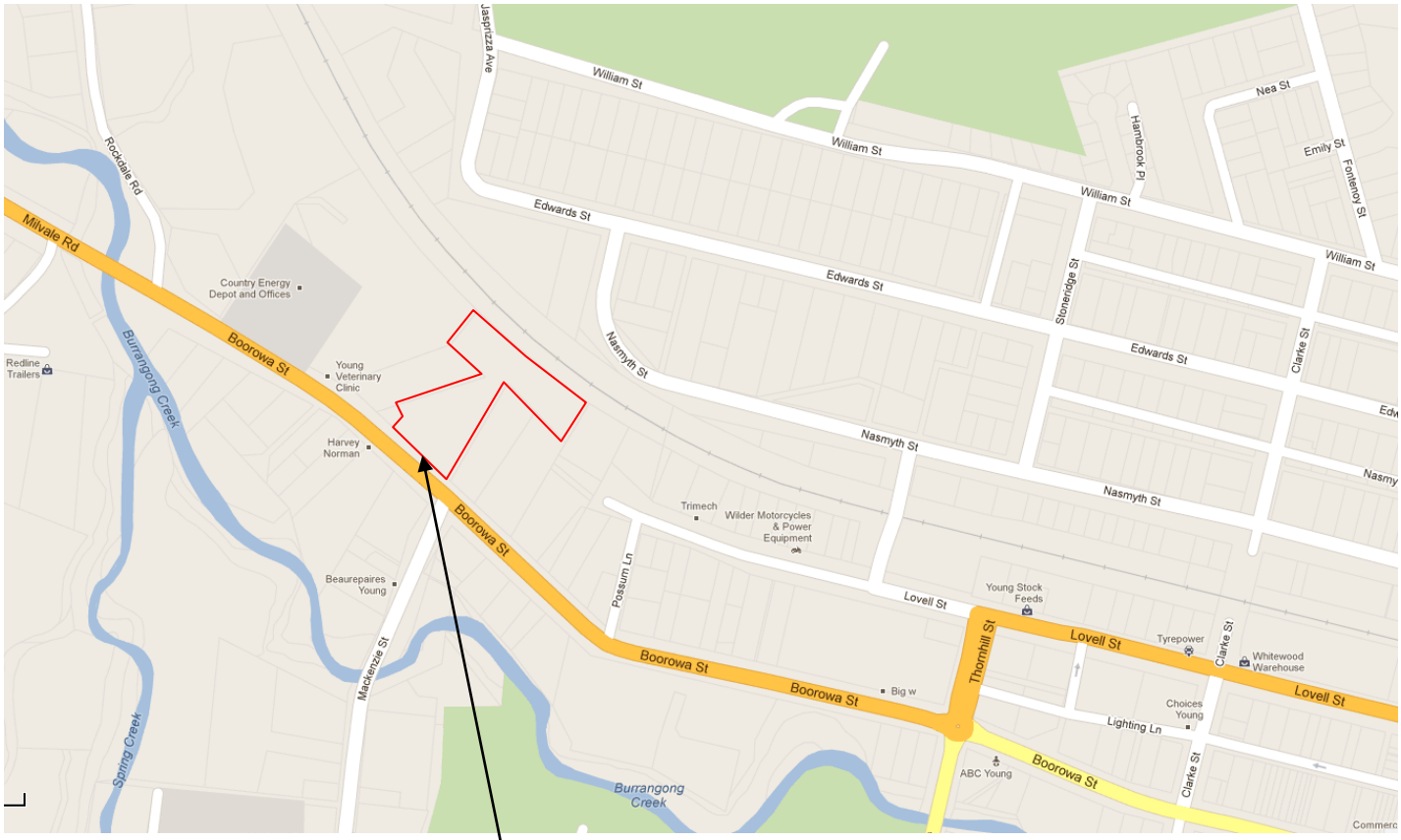
EPA (1995) *Contaminated sites: Sampling Design Guidelines* (NSW Environment Protection Authority, Chatswood)

EPA (1997) *Guidelines for Consultants Reporting on Contaminated Sites* (NSW Environment Protection Authority: Chatswood)

NEPC (1999) *National Environment Protection (Assessment of Site Contamination) Measure 1999* (National Environment Protection Council Service Corporation, Adelaide)

North

Figures



Site assessed

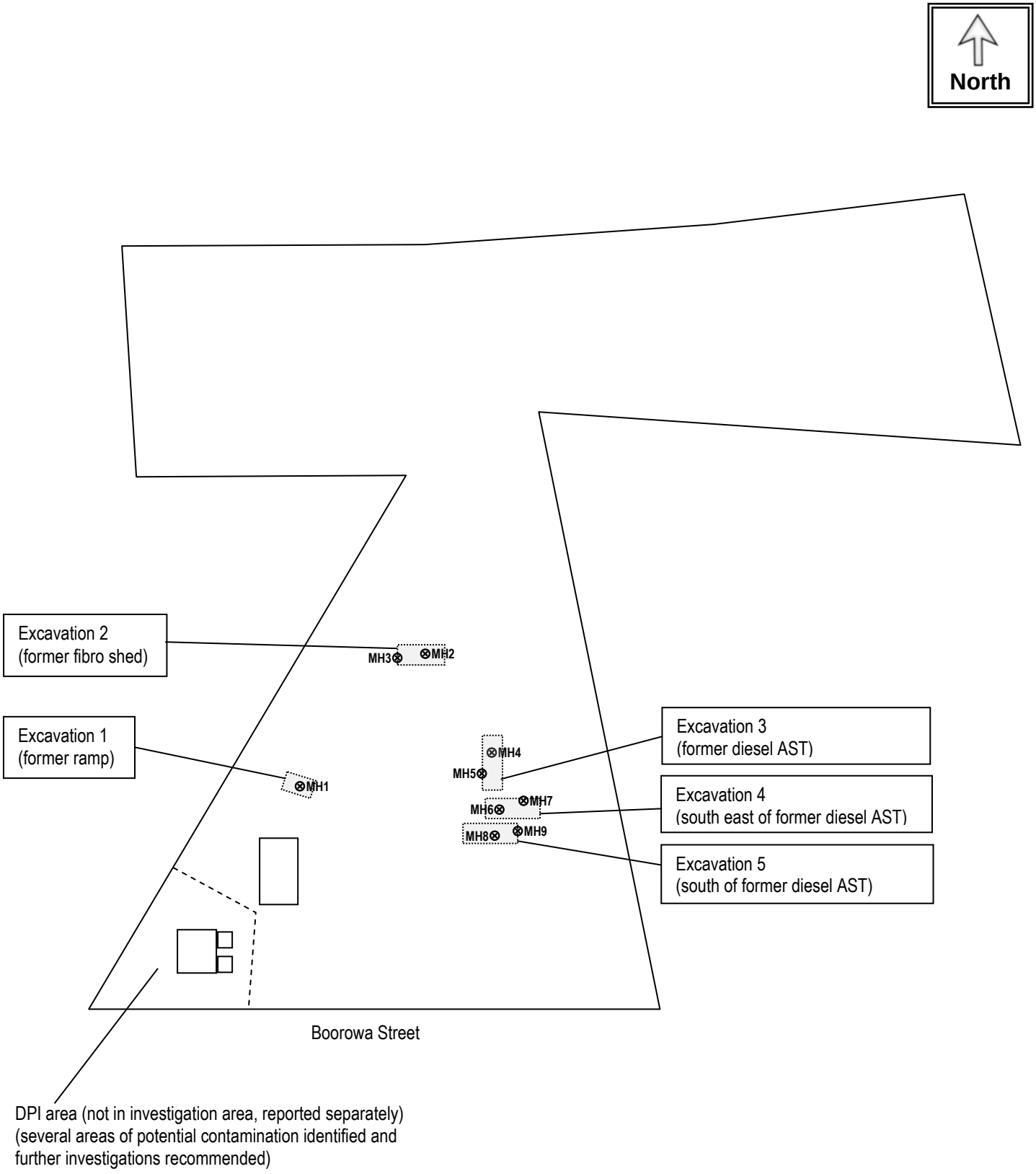
Figure 1: Locality map		
327 Boorowa Street, Orange NSW		
	Envirowest Consulting Pty Ltd	
Job – R12147val	Drawn by: AR from Google Maps	Date: 15/12/2012

North

Site assessed prior to remediation

DPI area (reported separately)

Figure 2. Aerial photograph		
327 Boorowa Street, Orange NSW		
	Envirowest Consulting Pty Ltd	
Job – R12147val	Drawn by: AR from SIX maps	Date: 15/12/2012



Legend

⊗ Sampling location

Slope

Existing building

Fence

Excavated remediated area

Approximate Scale 1: 900

0 9 18 36m

Figure 3. Site plan and sampling locations		
327 Boorowa Street, Orange NSW		
	Envirowest Consulting Pty Ltd	
Job – R12147val	Drawn by: AR	Date: 15/12/2012

Figure 4. Photographs of the site and works

Excavation for the area south east of the former AST

Excavation area of the former fibro shed

Ramp area excavation

Appendix 1. Soil sampling protocols

1. Sampling

The samples will be collected from the auger tip, spade, hand auger or excavator bucket immediately on withdrawal.

The time between retrieval of the sample and sealing of the sample container was kept to a minimum.

The material was collected using single use disposal gloves or a stainless steel spade which represented material which had not been exposed to the atmosphere prior to sampling.

All sampling jars were filled as close to the top as possible to minimise the available airspace within the jar.

2. Handling, containment and transport

Daily sampling activities will be recorded including sampling locations, numbers, observations, measurements, sampler, date and time and weather condition.

The sampling jars will be new sterile glass jars fitted with plastic lid and airtight Teflon seals, supplied by the laboratories for the purpose of collecting soil samples for analysis. Sample containers will be marked indelibly with the sample ID code to waterproof labels affixed to the body of the container.

All samples will be removed from direct sunlight as soon as possible after sampling and placed in insulated containers. Samples were stored in a refrigerator at 4°C prior to transportation to the laboratory in insulated containers with ice bricks in accordance with AS4482.1.

Handling and transportation to the laboratory will be accompanied with a chain of custody form to demonstrate the specimens are properly received, documents, processed and stored.

Maximum holding time for extraction (AS4482.1) are:

Analyte	Maximum holding time
Metals	6 months
Mercury	28 days
Sulfate	7 days
Oragnic carbon	7 days
OCP, OPP, PCB	14 days
TPH, BTEX, PAH, phenols	14 days

3. Decontamination of sampling equipment

Sampling tools will be decontaminated between sampling locations by

- Removing soil adhering to the sampling equipment by scraping, brushing or wiping
- Washing with a phosphate-free detergent
- Rinsing thoroughly with clean water
- Repeating if necessary
- Dry equipment with disposable towels or air

Appendix 2. Quality control and quality assurance report

1. Data quality indicators (DQI) requirements

1.1 Completeness

A measure of the amount of usable data for a data collection activity. Greater than 95% of the data must be reliable based on the quality objectives. Where greater than two quality objectives have less reliability than the acceptance criterion the data may be considered with uncertainty.

1.1.1 Field

Consideration	Requirement
Locations and depths to be sampled	Described in the sampling plan. The acceptance criterion is 95% data retrieved compared with proposed. Acceptance criterion is 100% in crucial areas.
SOP appropriate and compiled	Described in the sampling plan.
Experienced sampler	Sampler or supervisor
Documentation correct	Sampling log and chain of custody completed

1.1.2 Laboratory

Consideration	Requirement
Samples analysed	Number according to sampling and quality plan
Analytes	Number according to sampling and quality plan
Methods	EPA or other recognised methods with suitable PQL
Sample documentation	Complete including chain of custody and sample description
Sample holding times	Metals 6 months, OCP, PAH, TPH, PCB 14 days

1.2 Comparability

The confidence that data may be considered to be equivalent for each sampling and analytical event. The data must show little or no inconsistencies with results and field observations.

1.2.1 Field

Consideration	Requirement
SOP	Same sampling procedures to be used
Experienced sampler	Sampler or supervisor
Climatic conditions	Described as may influence results
Samples collected	Sample medium, size, preparation, storage, transport

1.2.2 Laboratory

Consideration	Requirement
Analytical methods	Same methods, approved methods
PQL	Same
Same laboratory	Justify if different
Same units	Justify if different

1.3 Representativeness

The confidence (expressed qualitatively) that data are representative of each media present on the site.

1.3.1 Field

Consideration	Requirement
Appropriate media sampled	Sampled according to sampling and quality plan or in accordance with the EPA (1995) sampling guidelines.
All media identified	Sampling media identified in the sampling and quality plan.

1.3.2 Laboratory

Consideration	Requirement
Samples analysed	Blanks

1.4 Precision

A quantitative measure of the variability (or reproduced of the data). Is measured by standard deviation or relative percent difference (RPD). A RPD analysis is calculated and compared to the practical quantitation limit (PQL) or absolute difference AD.

- Levels greater than 10 times the PQL the RPD is 50%
- Levels between 5 and 10 times the PQL the RPD is 75%
- Levels between 2 and 5 times the PQL the RPD is 100%
- Levels less than 2 times the PQL, the AD is less than 2.5 times the PQL

Data not conforming to the acceptance criterion will be examined for determination of suitability for the purpose of site characterisation.

1.4.1 Field

Consideration	Requirement
Field duplicates	Frequency of 5%, results to be within RPD or discussion required indicate the appropriateness of SOP

1.4.2 Laboratory

Consideration	Requirement
Laboratory and inter lab duplicates	Frequency of 5%, results to be within RPD or discussion required. Inter laboratory duplicates will be one sample per batch.
Field duplicates	Frequency of 5%, results to be within RPD or discussion required
Laboratory prepared volatile trip spikes	One per sampling batch, results to be within RPD or discussion required

1.5 Accuracy

A quantitative measure of the closeness of the reported data to the true value.

1.5.1 Field

Consideration	Requirement
SOP	Complied
Inter laboratory duplicates	Frequency of 5%. Analysis criterion 60% RPD for levels greater than 10 times the PQL 85% RPD for levels between 5 to 10 times the PQL 100% RPD at levels between 2 to 5 times the PQL Absolute difference, 3.5 times the PQL where levels are, 2 times PQL
Field blanks	Frequency of 5%, <5 times the PQL, PQL may be adjusted
Rinsate blanks	Frequency of 5%, <5 times the PQL, PQL may be adjusted

1.5.2 Laboratory

Recovery data (surrogates, laboratory control samples and matrix spikes) data subject to the following control limits:

- 60 to 140% acceptable data
- 20-60% discussion required, may be considered acceptable
- 10-20% data should considered as estimates
- 10% data should be rejected

Consideration	Requirement
Method blanks	Frequency of 5%, <5 times the PQL, PQL may be adjusted
Matrix spikes	Frequency of 5%, results to be within +/-40% or discussion required
Matrix duplicates	Sample injected with a known concentration of contaminants with tested. Frequency of 5%, results to be within +/-40% or discussion required
Surrogate spikes	QC monitoring spikes to be added to samples at the extraction process in the laboratory where applicable. Surrogates are closely related to the organic target analyte and not normally found in the natural environment. Frequency of 5%, results to be within +/-40% or discussion required
Laboratory control samples	Externally prepared reference material containing representative analytes under investigation. These will be undertaken at one per batch. It s to be within +/-40% or discussion required
Laboratory prepared spikes	Frequency of 5%, results to be within +/-40% or discussion required

2. Laboratory analysis summary

One analysis batch was undertaken over the sampling program. A total of 10 (including 1 field duplicate) soil samples were submitted for analytical testing. The samples were collected in the field by an environmental scientist from Envirowest Consulting Pty Ltd, placed into laboratory prepared receptacles as recommended in NEPM (1999). The samples preservation and storage was undertaken using standard industry practices (NEPM 1999). A chain of custody form accompanied transport of the samples to the laboratory.

Laboratory analysis schedule

Sample ID	Number of samples	Duplicate	Analyses	Date collected	Substrate	Laboratory report
MH1 to MH9, MHH	10	1	TPH (C10-C36), OCP, metals	23/11/2012	Soil	ES1228084

Analytical methods

Analyte	Laboratory methods
Metals	APHA USEPA SW846-6010
Leachable metals	APHA USEPA SW846-6010
Mercury	APHA 3112
TPH(C6-C9)	USPEA SW 846-8260B
TPH(C10-C36)	USEPA SW 846-8270B
OC/OP Pesticides, PAH, PCB	USEPA SW 846-8270B
BTEX	USEPA SW 846-8260B

3. Field quality assurance and quality control

3.1 Inter laboratory duplicates

One field duplicate sample was collected over the investigation program. The frequency was greater than the recommended frequency of 5%. The following table outlines the sample collected and differences in replicate analyses and acceptance limits for replicate analyses.

Field duplicate frequency

Sample id.	Number of samples	Duplicate	Frequency (%)	Date collected	Substrate	Laboratory report
MH1 to MH9, MHH	10	1	10	23/11/2012	Soil	ES1228084

Relative percent differences between field duplicates

Laboratory report	Duplicate sample comparison	Analyte	Difference in replicate analyses (%)	Acceptance limits (%)
ES1228084	MH8, MHH	TPH (C10-C36)	0	40

4. Laboratory quality assurance and quality control

Sample holding times are recommended in NEPM (1999). The time between collection and extraction for all samples was less than the criteria listed below:

Analyte	Maximum holding time
Metals	6 months
Mercury	28 days
Sulfate	7 days
OCP, OPP, PCB	14 days
TPH, BTEX, PAH	14 days

The laboratory interpretative reports are presented with the individual laboratory reports. Assessment is made of holding time, frequency of control samples and quality control samples. Some minor non-conformities were identified including holding times for the trip spike control and various analyte recoveries were less than or greater than the data quality objective.

5. Data quality indicators (DQI)

5.1 Completeness

A measure of the amount of usable data for a data collection activity (total to be greater than 90%)

5.1.1 Field

Consideration	Accepted	Comment
Locations to be sampled	Yes	In accordance with sampling methodology, described in the report.
SOP appropriate and compiled	Yes	In accordance with sampling methodology
Experienced sampler	Yes	Environmental scientist
Documentation correct	Yes	Chain of custody completed

5.1.2 Laboratory

Consideration	Accepted	Comment
Samples analysed	Yes	In accordance with chain of custody and analysis plan
Analytes	Yes	All analytes in accordance with chain of custody and analysis plan
Methods	Yes	Analysed in NATA accredited laboratory with recognised methods and suitable PQL
Sample documentation	Yes	Completed including chain of custody and sample results and quality results
Sample holding times	Yes	Metals < 6 months Mercury < 28 days OCP, OPP, PAH, TPH, PCB, BTEX < 14 days

5.2 Comparability

The confidence that data may be considered to be equivalent for each sampling and analytical event.

5.2.1 Field

Consideration	Accepted	Comment
SOP	Yes	Same sampling procedures used and each batch sampled on one date
Experienced sampler	Yes	Experienced environmental scientist
Climatic conditions	Yes	Sampling log
Samples collected	Yes	Suitable size and storage

5.2.2 Laboratory

Consideration	Accepted	Comment
Analytical methods	Yes	Same methods all samples
PQL	Yes	Suitable for analytes
Same laboratory	Yes	-
Same units	Yes	-

5.3 Representativeness

The confidence (expressed qualitatively) that data are representative of each media present on the site

5.3.1 Field

Consideration	Accepted	Comment
Appropriate media sampled	Yes	Sampled according to sampling and quality plan
All media identified	Yes	Soil sampling media identified in the sampling and quality plan

5.3.2 Laboratory

Consideration	Accepted	Comment
Samples analysed	Yes	Undertaken in NATA accredited laboratory.

5.4 Precision

A quantitative measure of the variability (or reproduced of the data)

5.4.1 Field

Consideration	Accepted	Comment
SOP	Yes	Complied
Field duplicates	Yes	Greater than 5% frequency

5.4.2 Laboratory

Consideration	Accepted	Comment
Laboratory duplicates	Yes	Frequency of 5%, results to be within +/-40% or discussion required.
Field duplicates (intra and inter laboratory)	Yes	Frequency of 5%, results to be within +/-40%.
Laboratory prepared volatile trip spikes	N/A	No trip spikes analysed

5.5 Accuracy

A quantitative measure of the closeness of the reported data to the true value

5.5.1 Field

Consideration	Accepted	Comment
SOP	Yes	Complied
Field blanks	N/A	Frequency of 5%, <5 times the PQL, PQL may be adjusted
Rinsate blanks	N/A	Frequency of 5%, <5 times the PQL, PQL may be adjusted

5.5.2 Laboratory

Consideration	Accepted	Comment
Method blanks	Yes	Frequency of 5%, <5 times the PQL, PQL may be adjusted
Matrix spikes	Yes	Frequency of 5%, results to be within +/-40%
Matrix duplicates	Yes	Frequency of 5%, results to be within +/-40%.
Surrogate spikes	Yes	Frequency of 5%, results to be within +/-40%
Laboratory control samples	Yes	Frequency of 5%, results to be within +/-40%.
Laboratory prepared spikes	Yes	Frequency of 5%, results to be within +/-40% or discussion required.

Minor outliers were observed. Outliers are not considered significant.

6. Conclusion

All media appropriate to the objectives of this investigation have been adequately analysed and no area of significant uncertainty exist.

It is concluded the data is usable for the purposes of the investigation.

Quality control and assurance is undertaken to ensure the representativeness and integrity of samples, and the accuracy and reliability of analysis results.

Appendix 3. ALS environmental laboratory report ES1228084 and chain of custody form

Environmental Division

CERTIFICATE OF ANALYSIS

Work Order	: **ES1228084**	Page	: 1 of 6
Client	: **ENVIROWEST CONSULTING**	Laboratory	: Environmental Division Sydney
Contact	: MR ANDREW RUMING	Contact	: Client Services
Address	: PO BOX 9158 ORANGE NSW, AUSTRALIA 2800	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
E-mail	: andrew@envirowest.net.au	E-mail	: sydney@alsglobal.com
Telephone	: +61 63614954	Telephone	: +61-2-8784 8555
Facsimile	: +61 02 63603960	Facsimile	: +61-2-8784 8500
Project	: 12147-1	QC Level	: NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Order number	: 12147-1		
C-O-C number	: 12147-1	Date Samples Received	: 28-NOV-2012
Sampler	: AR	Issue Date	: 06-DEC-2012
Site	: 12147-1		
		No. of samples received	: 10
Quote number	: SY/400/11	No. of samples analysed	: 10

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. All pages of this report have been checked and approved for release.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results
- Surrogate Control Limits

NATA Accredited Laboratory 825

Accredited for compliance with ISO/IEC 17025.

Signatories

This document has been electronically signed by the authorized signatories indicated below. Electronic signing has been carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
Celine Conceicao	Senior Spectroscopist	Sydney Inorganics
Pabi Subba	Senior Organic Chemist	Sydney Organics
Wisam Marassa	Inorganics Coordinator	Sydney Inorganics

General Comments

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
^ = This result is computed from individual analyte detections at or above the level of reporting

Analytical Results

Sub-Matrix: **SOIL** (Matrix: **SOIL**)

Compound	CAS Number	LOR	Unit	Client sample ID	MH1	MH2	MH3	MH4	MH5
				Client sampling date / time	23-NOV-2012 15:00	23-NOV-2012 15:00	23-NOV-2012 15:00	23-NOV-2012 15:00	23-NOV-2012 15:00
					ES1228084-001	ES1228084-002	ES1228084-003	ES1228084-004	ES1228084-005
EA055: Moisture Content									
Moisture Content (dried @ 103°C)	----	1.0	%		**11.2**	**6.6**	**6.5**	**3.9**	**3.0**
EG005T: Total Metals by ICP-AES									
Arsenic	7440-38-2	5	mg/kg		----	<5	<5	----	----
Cadmium	7440-43-9	1	mg/kg		----	<1	<1	----	----
Chromium	7440-47-3	2	mg/kg		----	**14**	**9**	----	----
Copper	7440-50-8	5	mg/kg		----	**7**	<5	----	----
Lead	7439-92-1	5	mg/kg		----	**7**	<5	----	----
Nickel	7440-02-0	2	mg/kg		----	**3**	<2	----	----
Zinc	7440-66-6	5	mg/kg		----	**5**	<5	----	----
EP068A: Organochlorine Pesticides (OC)									
alpha-BHC	319-84-6	0.05	mg/kg		----	<0.05	<0.05	----	----
Hexachlorobenzene (HCB)	118-74-1	0.05	mg/kg		----	<0.05	<0.05	----	----
beta-BHC	319-85-7	0.05	mg/kg		----	<0.05	<0.05	----	----
gamma-BHC	58-89-9	0.05	mg/kg		----	<0.05	<0.05	----	----
delta-BHC	319-86-8	0.05	mg/kg		----	<0.05	<0.05	----	----
Heptachlor	76-44-8	0.05	mg/kg		----	<0.05	<0.05	----	----
Aldrin	309-00-2	0.05	mg/kg		----	<0.05	<0.05	----	----
Heptachlor epoxide	1024-57-3	0.05	mg/kg		----	<0.05	<0.05	----	----
^ **Total Chlordane (sum)**	----	0.05	mg/kg		----	<0.05	<0.05	----	----
trans-Chlordane	5103-74-2	0.05	mg/kg		----	<0.05	<0.05	----	----
alpha-Endosulfan	959-98-8	0.05	mg/kg		----	<0.05	<0.05	----	----
cis-Chlordane	5103-71-9	0.05	mg/kg		----	<0.05	<0.05	----	----
Dieldrin	60-57-1	0.05	mg/kg		----	<0.05	<0.05	----	----
4.4`-DDE	72-55-9	0.05	mg/kg		----	<0.05	<0.05	----	----
Endrin	72-20-8	0.05	mg/kg		----	<0.05	<0.05	----	----
beta-Endosulfan	33213-65-9	0.05	mg/kg		----	<0.05	<0.05	----	----
^ **Endosulfan (sum)**	115-29-7	0.05	mg/kg		----	<0.05	<0.05	----	----
4.4`-DDD	72-54-8	0.05	mg/kg		----	<0.05	<0.05	----	----
Endrin aldehyde	7421-93-4	0.05	mg/kg		----	<0.05	<0.05	----	----
Endosulfan sulfate	1031-07-8	0.05	mg/kg		----	<0.05	<0.05	----	----
4.4`-DDT	50-29-3	0.2	mg/kg		----	<0.2	<0.2	----	----
Endrin ketone	53494-70-5	0.05	mg/kg		----	<0.05	<0.05	----	----
Methoxychlor	72-43-5	0.2	mg/kg		----	<0.2	<0.2	----	----

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	MH1	MH2	MH3	MH4	MH5
				Client sampling date / time	23-NOV-2012 15:00	23-NOV-2012 15:00	23-NOV-2012 15:00	23-NOV-2012 15:00	23-NOV-2012 15:00
Compound	CAS Number	LOR	Unit		ES1228084-001	ES1228084-002	ES1228084-003	ES1228084-004	ES1228084-005
EP068A: Organochlorine Pesticides (OC) - Continued									
^ Sum of Aldrin + Dieldrin	309-00-2/60-57-1	0.05	mg/kg		----	<0.05	<0.05	----	----
^ Sum of DDD + DDE + DDT	----	0.05	mg/kg		----	<0.05	<0.05	----	----
EP080/071: Total Petroleum Hydrocarbons									
C10 - C14 Fraction	----	50	mg/kg		<50	<50	<50	<50	<50
C15 - C28 Fraction	----	100	mg/kg		<100	<100	<100	<100	<100
C29 - C36 Fraction	----	100	mg/kg		<100	<100	<100	<100	<100
^ C10 - C36 Fraction (sum)	----	50	mg/kg		<50	<50	<50	<50	<50
EP080/071: Total Recoverable Hydrocarbons - NEPM 2010 Draft									
>C10 - C16 Fraction	----	50	mg/kg		<50	<50	<50	<50	<50
>C16 - C34 Fraction	----	100	mg/kg		<100	<100	<100	<100	<100
>C34 - C40 Fraction	----	100	mg/kg		<100	<100	<100	<100	<100
^ >C10 - C40 Fraction (sum)	----	50	mg/kg		<50	<50	<50	<50	<50
EP068S: Organochlorine Pesticide Surrogate									
Dibromo-DDE	21655-73-2	0.1	%		----	107	94.2	----	----
EP068T: Organophosphorus Pesticide Surrogate									
DEF	78-48-8	0.1	%		----	123	102	----	----

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Client sample ID	MH6	MH7	MH8	MH9	MHH
			Client sampling date / time	23-NOV-2012 15:00	23-NOV-2012 15:00	23-NOV-2012 15:00	23-NOV-2012 15:00	23-NOV-2012 15:00
Compound	CAS Number	LOR	Unit	ES1228084-006	ES1228084-007	ES1228084-008	ES1228084-009	ES1228084-010
EA055: Moisture Content								
Moisture Content (dried @ 103°C)	----	1.0	%	6.5	1.4	7.1	7.0	7.4
EP080/071: Total Petroleum Hydrocarbons								
C10 - C14 Fraction	----	50	mg/kg	<50	<50	<50	<50	<50
C15 - C28 Fraction	----	100	mg/kg	<100	<100	<100	<100	<100
C29 - C36 Fraction	----	100	mg/kg	<100	<100	<100	<100	<100
^ C10 - C36 Fraction (sum)	----	50	mg/kg	<50	<50	<50	<50	<50
EP080/071: Total Recoverable Hydrocarbons - NEPM 2010 Draft								
>C10 - C16 Fraction	----	50	mg/kg	<50	<50	<50	<50	<50
>C16 - C34 Fraction	----	100	mg/kg	<100	<100	<100	<100	<100
>C34 - C40 Fraction	----	100	mg/kg	<100	<100	<100	<100	<100
^ >C10 - C40 Fraction (sum)	----	50	mg/kg	<50	<50	<50	<50	<50

Surrogate Control Limits

Sub-Matrix: **SOIL**		Recovery Limits (%)	
Compound	*CAS Number*	*Low*	*High*
EP068S: Organochlorine Pesticide Surrogate			
Dibromo-DDE	21655-73-2	49	145
EP068T: Organophosphorus Pesticide Surrogate			
DEF	78-48-8	32	142

Environmental Division

QUALITY CONTROL REPORT

Work Order	: **ES1228084**	Page	: 1 of 7
Client	: **ENVIROWEST CONSULTING**	Laboratory	: Environmental Division Sydney
Contact	: MR ANDREW RUMING	Contact	: Client Services
Address	: PO BOX 9158 ORANGE NSW, AUSTRALIA 2800	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
E-mail	: andrew@envirowest.net.au	E-mail	: sydney@alsglobal.com
Telephone	: +61 63614954	Telephone	: +61-2-8784 8555
Facsimile	: +61 02 63603960	Facsimile	: +61-2-8784 8500
Project	: 12147-1	QC Level	: NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Site	: 12147-1		
C-O-C number	: 12147-1	Date Samples Received	: 28-NOV-2012
Sampler	: AR	Issue Date	: 06-DEC-2012
Order number	: 12147-1		
		No. of samples received	: 10
Quote number	: SY/400/11	No. of samples analysed	: 10

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. All pages of this report have been checked and approved for release.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percentage Difference (RPD) and Acceptance Limits
- Method Blank (MB) and Laboratory Control Spike (LCS) Report; Recovery and Acceptance Limits
- Matrix Spike (MS) Report; Recovery and Acceptance Limits

NATA Accredited Laboratory 825

Accredited for compliance with ISO/IEC 17025.

Signatories

This document has been electronically signed by the authorized signatories indicated below. Electronic signing has been carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
Celine Conceicao	Senior Spectroscopist	Sydney Inorganics
Pabi Subba	Senior Organic Chemist	Sydney Organics
Wisam Marassa	Inorganics Coordinator	Sydney Inorganics

General Comments

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

Key : Anonymous = Refers to samples which are not specifically part of this work order but formed part of the QC process lot
CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
RPD = Relative Percentage Difference
# = Indicates failed QC

Laboratory Duplicate (DUP) Report

The quality control term Laboratory Duplicate refers to a randomly selected intralaboratory split. Laboratory duplicates provide information regarding method precision and sample heterogeneity. The permitted ranges for the Relative Percent Deviation (RPD) of Laboratory Duplicates are specified in ALS Method QWI-EN/38 and are dependent on the magnitude of results in comparison to the level of reporting: Result < 10 times LOR:- No Limit; Result between 10 and 20 times LOR:- 0% - 50%; Result > 20 times LOR:- 0% - 20%.

Sub-Matrix: **SOIL**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EA055: Moisture Content (QC Lot: 2623466)									
ES1228084-001	MH1	EA055-103: Moisture Content (dried @ 103°C)	----	1.0	%	11.2	11.0	2.0	0% - 50%
ES1228087-006	Anonymous	EA055-103: Moisture Content (dried @ 103°C)	----	1.0	%	29.4	30.2	2.5	0% - 20%
EG005T: Total Metals by ICP-AES (QC Lot: 2626628)									
ES1227890-001	Anonymous	EG005T: Cadmium	7440-43-9	1	mg/kg	<1	<1	0.0	No Limit
		EG005T: Chromium	7440-47-3	2	mg/kg	11	12	0.0	No Limit
		EG005T: Nickel	7440-02-0	2	mg/kg	11	12	0.0	No Limit
		EG005T: Arsenic	7440-38-2	5	mg/kg	20	22	7.3	No Limit
		EG005T: Copper	7440-50-8	5	mg/kg	10	10	0.0	No Limit
		EG005T: Lead	7439-92-1	5	mg/kg	8	8	0.0	No Limit
		EG005T: Zinc	7440-66-6	5	mg/kg	52	54	2.9	0% - 50%
ES1228115-003	Anonymous	EG005T: Cadmium	7440-43-9	1	mg/kg	<1	<1	0.0	No Limit
		EG005T: Chromium	7440-47-3	2	mg/kg	30	31	0.0	0% - 50%
		EG005T: Nickel	7440-02-0	2	mg/kg	17	18	0.0	No Limit
		EG005T: Arsenic	7440-38-2	5	mg/kg	<5	5	0.0	No Limit
		EG005T: Copper	7440-50-8	5	mg/kg	17	18	0.0	No Limit
		EG005T: Lead	7439-92-1	5	mg/kg	12	12	0.0	No Limit
		EG005T: Zinc	7440-66-6	5	mg/kg	72	74	3.3	0% - 50%
EP068A: Organochlorine Pesticides (OC) (QC Lot: 2627419)									
EP1209945-002	Anonymous	EP068: alpha-BHC	319-84-6	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Hexachlorobenzene (HCB)	118-74-1	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: beta-BHC	319-85-7	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: gamma-BHC	58-89-9	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: delta-BHC	319-86-8	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Heptachlor	76-44-8	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Aldrin	309-00-2	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Heptachlor epoxide	1024-57-3	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: trans-Chlordane	5103-74-2	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: alpha-Endosulfan	959-98-8	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: cis-Chlordane	5103-71-9	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Dieldrin	60-57-1	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: 4.4`-DDE	72-55-9	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Endrin	72-20-8	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: beta-Endosulfan	33213-65-9	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: 4.4`-DDD	72-54-8	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Endrin aldehyde	7421-93-4	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Endosulfan sulfate	1031-07-8	0.05	mg/kg	<0.05	<0.05	0.0	No Limit

Sub-Matrix: **SOIL**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Client sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Recovery Limits (%)*
EP068A: Organochlorine Pesticides (OC) (QC Lot: 2627419) - continued									
EP1209945-002	Anonymous	EP068: Endrin ketone	53494-70-5	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: 4.4`-DDT	50-29-3	0.2	mg/kg	<0.2	<0.2	0.0	No Limit
		EP068: Methoxychlor	72-43-5	0.2	mg/kg	<0.2	<0.2	0.0	No Limit
EP1209945-008	Anonymous	EP068: alpha-BHC	319-84-6	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Hexachlorobenzene (HCB)	118-74-1	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: beta-BHC	319-85-7	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: gamma-BHC	58-89-9	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: delta-BHC	319-86-8	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Heptachlor	76-44-8	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Aldrin	309-00-2	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Heptachlor epoxide	1024-57-3	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: trans-Chlordane	5103-74-2	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: alpha-Endosulfan	959-98-8	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: cis-Chlordane	5103-71-9	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Dieldrin	60-57-1	0.05	mg/kg	7.88	7.96	1.0	0% - 20%
		EP068: 4.4`-DDE	72-55-9	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Endrin	72-20-8	0.05	mg/kg	0.15	0.12	19.2	No Limit
		EP068: beta-Endosulfan	33213-65-9	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: 4.4`-DDD	72-54-8	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Endrin aldehyde	7421-93-4	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Endosulfan sulfate	1031-07-8	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: Endrin ketone	53494-70-5	0.05	mg/kg	<0.05	<0.05	0.0	No Limit
		EP068: 4.4`-DDT	50-29-3	0.2	mg/kg	<0.2	<0.2	0.0	No Limit
		EP068: Methoxychlor	72-43-5	0.2	mg/kg	<0.2	<0.2	0.0	No Limit
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 2624806)									
ES1228077-107	Anonymous	EP071: C15 - C28 Fraction	----	100	mg/kg	<100	<100	0.0	No Limit
		EP071: C29 - C36 Fraction	----	100	mg/kg	<100	<100	0.0	No Limit
		EP071: C10 - C14 Fraction	----	50	mg/kg	<50	<50	0.0	No Limit
ES1228084-004	MH4	EP071: C15 - C28 Fraction	----	100	mg/kg	<100	<100	0.0	No Limit
		EP071: C29 - C36 Fraction	----	100	mg/kg	<100	<100	0.0	No Limit
		EP071: C10 - C14 Fraction	----	50	mg/kg	<50	<50	0.0	No Limit
EP080/071: Total Recoverable Hydrocarbons - NEPM 2010 Draft (QC Lot: 2624806)									
ES1228077-107	Anonymous	EP071: >C16 - C34 Fraction	----	100	mg/kg	<100	<100	0.0	No Limit
		EP071: >C34 - C40 Fraction	----	100	mg/kg	<100	<100	0.0	No Limit
		EP071: >C10 - C16 Fraction	----	50	mg/kg	<50	<50	0.0	No Limit
ES1228084-004	MH4	EP071: >C16 - C34 Fraction	----	100	mg/kg	<100	<100	0.0	No Limit
		EP071: >C34 - C40 Fraction	----	100	mg/kg	<100	<100	0.0	No Limit
		EP071: >C10 - C16 Fraction	----	50	mg/kg	<50	<50	0.0	No Limit

Method Blank (MB) and Laboratory Control Spike (LCS) Report

The quality control term Method / Laboratory Blank refers to an analyte free matrix to which all reagents are added in the same volumes or proportions as used in standard sample preparation. The purpose of this QC parameter is to monitor potential laboratory contamination. The quality control term Laboratory Control Sample (LCS) refers to a certified reference material, or a known interference free matrix spiked with target analytes. The purpose of this QC parameter is to monitor method precision and accuracy independent of sample matrix. Dynamic Recovery Limits are based on statistical evaluation of processed LCS.

Sub-Matrix: **SOIL**

				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Recovery Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result	Concentration	LCS	Low	High
EG005T: Total Metals by ICP-AES (QCLot: 2626628)								
EG005T: Arsenic	7440-38-2	5	mg/kg	<5	21.7 mg/kg	107	84	128
EG005T: Cadmium	7440-43-9	1	mg/kg	<1	4.64 mg/kg	100	79	119
EG005T: Chromium	7440-47-3	2	mg/kg	<2	43.9 mg/kg	101	70	130
EG005T: Copper	7440-50-8	5	mg/kg	<5	32.0 mg/kg	111	83	127
EG005T: Lead	7439-92-1	5	mg/kg	<5	40.0 mg/kg	102	81	117
EG005T: Nickel	7440-02-0	2	mg/kg	<2	55.0 mg/kg	107	79	127
EG005T: Zinc	7440-66-6	5	mg/kg	<5	60.8 mg/kg	104	78	130
EP068A: Organochlorine Pesticides (OC) (QCLot: 2627419)								
EP068: alpha-BHC	319-84-6	0.05	mg/kg	<0.05	0.5 mg/kg	85.4	60.8	116
EP068: Hexachlorobenzene (HCB)	118-74-1	0.05	mg/kg	<0.05	0.5 mg/kg	103	59.4	115
EP068: beta-BHC	319-85-7	0.05	mg/kg	<0.05	0.5 mg/kg	92.8	59.8	117
EP068: gamma-BHC	58-89-9	0.05	mg/kg	<0.05	0.5 mg/kg	87.3	59.8	118
EP068: delta-BHC	319-86-8	0.05	mg/kg	<0.05	0.5 mg/kg	78.1	65.8	114
EP068: Heptachlor	76-44-8	0.05	mg/kg	<0.05	0.5 mg/kg	96.7	65.6	115
EP068: Aldrin	309-00-2	0.05	mg/kg	<0.05	0.5 mg/kg	89.0	67	113
EP068: Heptachlor epoxide	1024-57-3	0.05	mg/kg	<0.05	0.5 mg/kg	92.0	65.6	113
EP068: trans-Chlordane	5103-74-2	0.05	mg/kg	<0.05	0.5 mg/kg	91.8	60.7	113
EP068: alpha-Endosulfan	959-98-8	0.05	mg/kg	<0.05	0.5 mg/kg	90.3	65.8	116
EP068: cis-Chlordane	5103-71-9	0.05	mg/kg	<0.05	0.5 mg/kg	89.0	57.3	120
EP068: Dieldrin	60-57-1	0.05	mg/kg	<0.05	0.5 mg/kg	92.1	67.4	116
EP068: 4.4`-DDE	72-55-9	0.05	mg/kg	<0.05	0.5 mg/kg	92.2	67.5	114
EP068: Endrin	72-20-8	0.05	mg/kg	<0.05	0.5 mg/kg	91.9	63	121
EP068: beta-Endosulfan	33213-65-9	0.05	mg/kg	<0.05	0.5 mg/kg	104	66.1	117
EP068: 4.4`-DDD	72-54-8	0.05	mg/kg	<0.05	0.5 mg/kg	104	65.3	116
EP068: Endrin aldehyde	7421-93-4	0.05	mg/kg	<0.05	0.5 mg/kg	68.6	57.3	115
EP068: Endosulfan sulfate	1031-07-8	0.05	mg/kg	<0.05	0.5 mg/kg	82.7	63.6	119
EP068: 4.4`-DDT	50-29-3	0.2	mg/kg	<0.2	0.5 mg/kg	86.3	58.4	127
EP068: Endrin ketone	53494-70-5	0.05	mg/kg	<0.05	0.5 mg/kg	96.6	63.6	117
EP068: Methoxychlor	72-43-5	0.2	mg/kg	<0.2	0.5 mg/kg	93.4	50.4	132
EP080/071: Total Petroleum Hydrocarbons (QCLot: 2624806)								
EP071: C10 - C14 Fraction	----	50	mg/kg	<50	200 mg/kg	100	59	131
EP071: C15 - C28 Fraction	----	100	mg/kg	<100	300 mg/kg	104	74	138
EP071: C29 - C36 Fraction	----	100	mg/kg	<100	200 mg/kg	100	63	131
EP080/071: Total Recoverable Hydrocarbons - NEPM 2010 Draft (QCLot: 2624806)								

Sub-Matrix: **SOIL**

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report: Result	Laboratory Control Spike (LCS) Report: Spike Concentration	Spike Recovery (%): LCS	Recovery Limits (%): Low	Recovery Limits (%): High
EP080/071: Total Recoverable Hydrocarbons - NEPM 2010 Draft (QCLot: 2624806) - continued								
EP071: >C10 - C16 Fraction	----	50	mg/kg	<50	250 mg/kg	102	59	131
EP071: >C16 - C34 Fraction	----	100	mg/kg	<100	350 mg/kg	102	74	138
EP071: >C34 - C40 Fraction	----	100	mg/kg	<100	----	----	----	----
		50	mg/kg	----	150 mg/kg	88.0	63	131

Matrix Spike (MS) Report

The quality control term Matrix Spike (MS) refers to an intralaboratory split sample spiked with a representative set of target analytes. The purpose of this QC parameter is to monitor potential matrix effects on analyte recoveries. Static Recovery Limits as per laboratory Data Quality Objectives (DQOs). Ideal recovery ranges stated may be waived in the event of sample matrix interference.

Sub-Matrix: **SOIL**

Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Matrix Spike (MS) Report: Spike Concentration	SpikeRecovery(%): MS	Recovery Limits (%): Low	Recovery Limits (%): High
EG005T: Total Metals by ICP-AES (QCLot: 2626628)							
ES1227890-001	Anonymous	EG005T: Arsenic	7440-38-2	50 mg/kg	117	70	130
		EG005T: Cadmium	7440-43-9	50 mg/kg	98.9	70	130
		EG005T: Chromium	7440-47-3	50 mg/kg	105	70	130
		EG005T: Copper	7440-50-8	250 mg/kg	108	70	130
		EG005T: Lead	7439-92-1	250 mg/kg	100	70	130
		EG005T: Nickel	7440-02-0	50 mg/kg	103	70	130
		EG005T: Zinc	7440-66-6	250 mg/kg	106	70	130
EP068A: Organochlorine Pesticides (OC) (QCLot: 2627419)							
EP1209945-002	Anonymous	EP068: gamma-BHC	58-89-9	0.5 mg/kg	97.9	70	130
		EP068: Heptachlor	76-44-8	0.5 mg/kg	100	70	130
		EP068: Aldrin	309-00-2	0.5 mg/kg	88.5	70	130
		EP068: Dieldrin	60-57-1	0.5 mg/kg	96.2	70	130
		EP068: Endrin	72-20-8	2 mg/kg	92.2	70	130
		EP068: 4.4`-DDT	50-29-3	2 mg/kg	80.6	70	130
EP080/071: Total Petroleum Hydrocarbons (QCLot: 2624806)							
ES1228077-107	Anonymous	EP071: C10 - C14 Fraction	----	640 mg/kg	106	73	137
		EP071: C15 - C28 Fraction	----	3140 mg/kg	106	53	131
		EP071: C29 - C36 Fraction	----	2860 mg/kg	105	52	132
EP080/071: Total Recoverable Hydrocarbons - NEPM 2010 Draft (QCLot: 2624806)							
ES1228077-107	Anonymous	EP071: >C10 - C16 Fraction	----	850 mg/kg	134	73	137
		EP071: >C16 - C34 Fraction	----	4800 mg/kg	104	53	131
		EP071: >C34 - C40 Fraction	----	2400 mg/kg	87.5	52	132

Matrix Spike (MS) and Matrix Spike Duplicate (MSD) Report

The quality control term Matrix Spike (MS) and Matrix Spike Duplicate (MSD) refers to intralaboratory split samples spiked with a representative set of target analytes. The purpose of these QC parameters are to monitor potential matrix effects on analyte recoveries. Static Recovery Limits as per laboratory Data Quality Objectives (DQOs). Ideal recovery ranges stated may be waived in the event of sample matrix interference.

Sub-Matrix: **SOIL**

				Matrix Spike (MS) and Matrix Spike Duplicate (MSD) Report						
				Spike	Spike Recovery (%)		Recovery Limits (%)		RPDs (%)	
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Concentration	MS	MSD	Low	High	Value	Control Limit
EP080/071: Total Petroleum Hydrocarbons (QCLot: 2624806)										
ES1228077-107	Anonymous	EP071: C10 - C14 Fraction	----	640 mg/kg	106	----	73	137	----	----
		EP071: C15 - C28 Fraction	----	3140 mg/kg	106	----	53	131	----	----
		EP071: C29 - C36 Fraction	----	2860 mg/kg	105	----	52	132	----	----
EP080/071: Total Recoverable Hydrocarbons - NEPM 2010 Draft (QCLot: 2624806)										
ES1228077-107	Anonymous	EP071: >C10 - C16 Fraction	----	850 mg/kg	134	----	73	137	----	----
		EP071: >C16 - C34 Fraction	----	4800 mg/kg	104	----	53	131	----	----
		EP071: >C34 - C40 Fraction	----	2400 mg/kg	87.5	----	52	132	----	----
EG005T: Total Metals by ICP-AES (QCLot: 2626628)										
ES1227890-001	Anonymous	EG005T: Arsenic	7440-38-2	50 mg/kg	117	----	70	130	----	----
		EG005T: Cadmium	7440-43-9	50 mg/kg	98.9	----	70	130	----	----
		EG005T: Chromium	7440-47-3	50 mg/kg	105	----	70	130	----	----
		EG005T: Copper	7440-50-8	250 mg/kg	108	----	70	130	----	----
		EG005T: Lead	7439-92-1	250 mg/kg	100	----	70	130	----	----
		EG005T: Nickel	7440-02-0	50 mg/kg	103	----	70	130	----	----
		EG005T: Zinc	7440-66-6	250 mg/kg	106	----	70	130	----	----
EP068A: Organochlorine Pesticides (OC) (QCLot: 2627419)										
EP1209945-002	Anonymous	EP068: gamma-BHC	58-89-9	0.5 mg/kg	97.9	----	70	130	----	----
		EP068: Heptachlor	76-44-8	0.5 mg/kg	100	----	70	130	----	----
		EP068: Aldrin	309-00-2	0.5 mg/kg	88.5	----	70	130	----	----
		EP068: Dieldrin	60-57-1	0.5 mg/kg	96.2	----	70	130	----	----
		EP068: Endrin	72-20-8	2 mg/kg	92.2	----	70	130	----	----
		EP068: 4.4`-DDT	50-29-3	2 mg/kg	80.6	----	70	130	----	----

Environmental Division

INTERPRETIVE QUALITY CONTROL REPORT

Work Order	: **ES1228084**	Page	: 1 of 5
Client	: ENVIROWEST CONSULTING	Laboratory	: Environmental Division Sydney
Contact	: MR ANDREW RUMING	Contact	: Client Services
Address	: PO BOX 9158 ORANGE NSW, AUSTRALIA 2800	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
E-mail	: andrew@envirowest.net.au	E-mail	: sydney@alsglobal.com
Telephone	: +61 63614954	Telephone	: +61-2-8784 8555
Facsimile	: +61 02 63603960	Facsimile	: +61-2-8784 8500
Project	: 12147-1	QC Level	: NEPM 1999 Schedule B(3) and ALS QCS3 requirement
Site	: 12147-1		
C-O-C number	: 12147-1	Date Samples Received	: 28-NOV-2012
Sampler	: AR	Issue Date	: 06-DEC-2012
Order number	: 12147-1		
		No. of samples received	: 10
Quote number	: SY/400/11	No. of samples analysed	: 10

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. All pages of this report have been checked and approved for release.

This Interpretive Quality Control Report contains the following information:

- Analysis Holding Time Compliance
- Quality Control Parameter Frequency Compliance
- Brief Method Summaries
- Summary of Outliers

Analysis Holding Time Compliance

The following report summarises extraction / preparation and analysis times and compares with recommended holding times. Dates reported represent first date of extraction or analysis and precludes subsequent dilutions and reruns. Information is also provided re the sample container (preservative) from which the analysis aliquot was taken. Elapsed period to analysis represents number of days from sampling where no extraction / digestion is involved or period from extraction / digestion where this is present. For composite samples, sampling date is assumed to be that of the oldest sample contributing to the composite. Sample date for laboratory produced leachates is assumed as the completion date of the leaching process. Outliers for holding time are based on USEPA SW 846, APHA, AS and NEPM (1999). A listing of breaches is provided in the Summary of Outliers.

Holding times for leachate methods (excluding elutriates) vary according to the analytes being determined on the resulting solution. For non-volatile analytes, the holding time compliance assessment compares the leach date with the shortest analyte holding time for the equivalent soil method. These soil holding times are: Organics (14 days); Mercury (28 days) & other metals (180 days). A recorded breach therefore does not guarantee a breach for all non-volatile parameters.

Matrix: **SOIL**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EA055: Moisture Content							
Soil Glass Jar - Unpreserved (EA055-103)							
MH1, MH2, MH3, MH4, MH5, MH6, MH7, MH8, MH9, MHH	**23-NOV-2012**	**----**	----	----	**29-NOV-2012**	07-DEC-2012	✓
EG005T: Total Metals by ICP-AES							
Soil Glass Jar - Unpreserved (EG005T)							
MH2, MH3	**23-NOV-2012**	**03-DEC-2012**	22-MAY-2013	✓	**03-DEC-2012**	22-MAY-2013	✓
EP068A: Organochlorine Pesticides (OC)							
Soil Glass Jar - Unpreserved (EP068)							
MH2, MH3	**23-NOV-2012**	**03-DEC-2012**	07-DEC-2012	✓	**04-DEC-2012**	12-JAN-2013	✓
EP080/071: Total Recoverable Hydrocarbons - NEPM 2010 Draft							
Soil Glass Jar - Unpreserved (EP071)							
MH1, MH2, MH3, MH4, MH5, MH6, MH7, MH8, MH9, MHH	**23-NOV-2012**	**30-NOV-2012**	07-DEC-2012	✓	**03-DEC-2012**	09-JAN-2013	✓

General Comments

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
^ = This result is computed from individual analyte detections at or above the level of reporting

Analytical Results

Sub-Matrix: **SOIL** (Matrix: **SOIL**)

Compound	CAS Number	LOR	Unit	Client sample ID	MH1	MH2	MH3	MH4	MH5
				Client sampling date / time	23-NOV-2012 15:00	23-NOV-2012 15:00	23-NOV-2012 15:00	23-NOV-2012 15:00	23-NOV-2012 15:00
					ES1228084-001	ES1228084-002	ES1228084-003	ES1228084-004	ES1228084-005
EA055: Moisture Content									
Moisture Content (dried @ 103°C)	----	1.0	%		**11.2**	**6.6**	**6.5**	**3.9**	**3.0**
EG005T: Total Metals by ICP-AES									
Arsenic	7440-38-2	5	mg/kg		----	<5	<5	----	----
Cadmium	7440-43-9	1	mg/kg		----	<1	<1	----	----
Chromium	7440-47-3	2	mg/kg		----	**14**	**9**	----	----
Copper	7440-50-8	5	mg/kg		----	**7**	<5	----	----
Lead	7439-92-1	5	mg/kg		----	**7**	<5	----	----
Nickel	7440-02-0	2	mg/kg		----	**3**	<2	----	----
Zinc	7440-66-6	5	mg/kg		----	**5**	<5	----	----
EP068A: Organochlorine Pesticides (OC)									
alpha-BHC	319-84-6	0.05	mg/kg		----	<0.05	<0.05	----	----
Hexachlorobenzene (HCB)	118-74-1	0.05	mg/kg		----	<0.05	<0.05	----	----
beta-BHC	319-85-7	0.05	mg/kg		----	<0.05	<0.05	----	----
gamma-BHC	58-89-9	0.05	mg/kg		----	<0.05	<0.05	----	----
delta-BHC	319-86-8	0.05	mg/kg		----	<0.05	<0.05	----	----
Heptachlor	76-44-8	0.05	mg/kg		----	<0.05	<0.05	----	----
Aldrin	309-00-2	0.05	mg/kg		----	<0.05	<0.05	----	----
Heptachlor epoxide	1024-57-3	0.05	mg/kg		----	<0.05	<0.05	----	----
^ **Total Chlordane (sum)**	----	0.05	mg/kg		----	<0.05	<0.05	----	----
trans-Chlordane	5103-74-2	0.05	mg/kg		----	<0.05	<0.05	----	----
alpha-Endosulfan	959-98-8	0.05	mg/kg		----	<0.05	<0.05	----	----
cis-Chlordane	5103-71-9	0.05	mg/kg		----	<0.05	<0.05	----	----
Dieldrin	60-57-1	0.05	mg/kg		----	<0.05	<0.05	----	----
4.4`-DDE	72-55-9	0.05	mg/kg		----	<0.05	<0.05	----	----
Endrin	72-20-8	0.05	mg/kg		----	<0.05	<0.05	----	----
beta-Endosulfan	33213-65-9	0.05	mg/kg		----	<0.05	<0.05	----	----
^ **Endosulfan (sum)**	115-29-7	0.05	mg/kg		----	<0.05	<0.05	----	----
4.4`-DDD	72-54-8	0.05	mg/kg		----	<0.05	<0.05	----	----
Endrin aldehyde	7421-93-4	0.05	mg/kg		----	<0.05	<0.05	----	----
Endosulfan sulfate	1031-07-8	0.05	mg/kg		----	<0.05	<0.05	----	----
4.4`-DDT	50-29-3	0.2	mg/kg		----	<0.2	<0.2	----	----
Endrin ketone	53494-70-5	0.05	mg/kg		----	<0.05	<0.05	----	----
Methoxychlor	72-43-5	0.2	mg/kg		----	<0.2	<0.2	----	----

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	MH1	MH2	MH3	MH4	MH5
				Client sampling date / time	23-NOV-2012 15:00	23-NOV-2012 15:00	23-NOV-2012 15:00	23-NOV-2012 15:00	23-NOV-2012 15:00
Compound	CAS Number	LOR	Unit		ES1228084-001	ES1228084-002	ES1228084-003	ES1228084-004	ES1228084-005
EP068A: Organochlorine Pesticides (OC) - Continued									
^ Sum of Aldrin + Dieldrin	309-00-2/60-57-1	0.05	mg/kg		----	<0.05	<0.05	----	----
^ Sum of DDD + DDE + DDT	----	0.05	mg/kg		----	<0.05	<0.05	----	----
EP080/071: Total Petroleum Hydrocarbons									
C10 - C14 Fraction	----	50	mg/kg		<50	<50	<50	<50	<50
C15 - C28 Fraction	----	100	mg/kg		<100	<100	<100	<100	<100
C29 - C36 Fraction	----	100	mg/kg		<100	<100	<100	<100	<100
^ C10 - C36 Fraction (sum)	----	50	mg/kg		<50	<50	<50	<50	<50
EP080/071: Total Recoverable Hydrocarbons - NEPM 2010 Draft									
>C10 - C16 Fraction	----	50	mg/kg		<50	<50	<50	<50	<50
>C16 - C34 Fraction	----	100	mg/kg		<100	<100	<100	<100	<100
>C34 - C40 Fraction	----	100	mg/kg		<100	<100	<100	<100	<100
^ >C10 - C40 Fraction (sum)	----	50	mg/kg		<50	<50	<50	<50	<50
EP068S: Organochlorine Pesticide Surrogate									
Dibromo-DDE	21655-73-2	0.1	%		----	107	94.2	----	----
EP068T: Organophosphorus Pesticide Surrogate									
DEF	78-48-8	0.1	%		----	123	102	----	----

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Client sample ID	MH6	MH7	MH8	MH9	MHH
			Client sampling date / time	23-NOV-2012 15:00	23-NOV-2012 15:00	23-NOV-2012 15:00	23-NOV-2012 15:00	23-NOV-2012 15:00
Compound	CAS Number	LOR	Unit	ES1228084-006	ES1228084-007	ES1228084-008	ES1228084-009	ES1228084-010
EA055: Moisture Content								
Moisture Content (dried @ 103°C)	----	1.0	%	6.5	1.4	7.1	7.0	7.4
EP080/071: Total Petroleum Hydrocarbons								
C10 - C14 Fraction	----	50	mg/kg	<50	<50	<50	<50	<50
C15 - C28 Fraction	----	100	mg/kg	<100	<100	<100	<100	<100
C29 - C36 Fraction	----	100	mg/kg	<100	<100	<100	<100	<100
^ C10 - C36 Fraction (sum)	----	50	mg/kg	<50	<50	<50	<50	<50
EP080/071: Total Recoverable Hydrocarbons - NEPM 2010 Draft								
>C10 - C16 Fraction	----	50	mg/kg	<50	<50	<50	<50	<50
>C16 - C34 Fraction	----	100	mg/kg	<100	<100	<100	<100	<100
>C34 - C40 Fraction	----	100	mg/kg	<100	<100	<100	<100	<100
^ >C10 - C40 Fraction (sum)	----	50	mg/kg	<50	<50	<50	<50	<50

Surrogate Control Limits

Sub-Matrix: **SOIL**		Recovery Limits (%)	
Compound	*CAS Number*	*Low*	*High*
EP068S: Organochlorine Pesticide Surrogate			
Dibromo-DDE	21655-73-2	49	145
EP068T: Organophosphorus Pesticide Surrogate			
DEF	78-48-8	32	142

Chain of Custody Form – Ref 12147-1

Sheet 1 of 1

Environmental Division Sydney
Work Order
ES1228084
Telephone : +61-2-8784 8555

Ref:	**12147-1**		**Sample matrix**			**Sample preservation**			**Analysis**			
Investigator:	Envirowest Consulting 24 William Street PO Box 8158 ORANGE NSW 2800											
Telephone:	(02) 6361 4954											
Facsimile:	(02) 6360 3960											
Email:	**ec@envirowest.net.au**											
Contact Person:	Andrew Ruming											
									ALS Method Code			
									S-1	**EP068A**	**EP071**	
Laboratory:	Australian Laboratory Services 277 Woodpark Road SMITHFIELD NSW 2164		Water	Soil	Sludge	Cool	HNO3/ HCl	Unpre-served	As, Cd, Cr, Cu, Ni, Pb, Zn	OCP	TPH (C10-C36)	
Quotation #:	**SY-448-12**											
Courier/CN:												
	Sample ID	**Container***	**Sampling Date/Time**									
1	MH1	A	23/11/2012		X		X		X			X
2	MH2	A	23/11/2012		X		X		X	X	X	X
3	MH3	A	23/11/2012		X		X		X	X	X	X
4	MH4	A	23/11/2012		X		X		X			X
5	MH5	A	23/11/2012		X		X		X			X
6	MH6	A	23/11/2012		X		X		X			X
7	MH7	A	23/11/2012		X		X		X			X
8	MH8	A	23/11/2012		X		X		X			X
9	MH9	A	23/11/2012		X		X		X			X
10	MHH	A	23/11/2012		X		X		X			X

Investigator: I attest that the proper field sampling procedures were used during the collection of these samples.

Sampler name: Andrew Ruming
Date : 27/11/2012 Time: 11am

Relinquished by: (print and signature)	Andrew Ruming	Date 27/11/12	Time 17:00
Received by: (print and signature)	Reanne	Date 28-11-12	Time 0800

Please return completed form to Envirowest Consulting, *A = 200mL solvent rinsed glass jar with Teflon lined lid, B = 2x40mL vials solvent rinsed Teflon lined septum caps, C 1x500mL glass bottles , solvent rinsed, Teflon lined cap, D= 200mL plastic bottle with nitric acid.

Appendix 4. Sampling log

Client	Mellross Homes
Contact	-
Job number	R12147val
Location	327 Boorowa Street, Orange NSW
Date	23 November 2012
Investigator(s)	Andrew Ruming
Weather conditions	Fine

Sample id	Matrix	Date	Location	Analysis required
MH1	Soil	23/11/12	Vehicle service ramp base	TPH(C10-C36)
MH2	Soil	23/11/12	Fibro shed base	TPH(C10-C36), metals, OCP
MH3	Soil	23/11/12	Fibro shed wall	TPH(C10-C36), metals, OCP
MH4	Soil	23/11/12	Diesel AST base	TPH(C10-C36)
MH5	Soil	23/11/12	Diesel AST wall	TPH(C10-C36)
MH6	Soil	23/11/12	South east of diesel AST base	TPH(C10-C36)
MH7	Soil	23/11/12	South east of diesel AST wall	TPH(C10-C36)
MH8	Soil	23/11/12	South of diesel AST base	TPH(C10-C36)
MH9	Soil	23/11/12	South of diesel AST wall	TPH(C10-C36)
MHH	Soil	23/11/12	Duplicate of MH8	TPH(C10-C36)