



20 September 2010

CELEBRATING
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FORMER LIQUID WASTE FACILITY- RIVERINA HIGHWAY, WIRLINGA

Final Validation Report

Submitted to:
AlburyCity
553 Kiewa Street
Albury, NSW

REPORT



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Report Number. 097613183-006-R-Rev1

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FIGURES

Figure 1: Site Locality Plan

Figure 2: Historical Features and Previous Investigation Location Plan

Figure 3: Former Site Layout Plan

APPENDICES

APPENDIX A

Environment Management Plan



1.0 INTRODUCTION

The former Wirlinga Waste Liquid Facility located on the Riverina Highway, Wirlinga (the "site") was historically used for the disposal of liquid wastes generated from within the Albury area. The site is owned and managed by AlburyCity who have rehabilitated the site to allow use of the site for passive recreational uses. Golder Associates Pty Ltd (Golder Associates) was engaged by AlburyCity to provide environmental consulting services to help facilitate this rehabilitation.

2.0 BACKGROUND

Operations at the site commenced in 1950 and ceased in 2000. During the 50 years of operation, liquid wastes from various sources were disposed at the site. Sludges' accumulated in disposal ponds whilst effluent from the ponds was used to irrigate the surrounding paddocks. Disposal ponds no longer in use were backfilled. At the time of the site closure, six ponds were present in the central area of the site. Bioremediation of the sludge in the active disposal ponds at the time of closure commenced in mid-2008 and finished in 2009. A Phase 1 Contamination Assessment for the site was completed by Golder Associates in October 2008 (Reference 087613074/004 Rev1). This report was submitted to the Department of Environment, Climate Change and Water NSW (DECCW) for review.

A response from DECCW was sent to AlburyCity and indicated that DECCW did not believe that the contamination was significant enough to warrant regulation under the Act. DECCW did however recommend a number of requirements to enable closure of the site and enable redevelopment as a proposed open space area for passive recreation. This report has been prepared to assess the works undertaken against the requirements set by DECCW for closure of the site.

3.0 OBJECTIVES

The objective of the final validation report is document the rehabilitation of the site to satisfy the DECCW closure requirements for the use of the site as passive open space and to provide AlburyCity with a single document summarising the history, closure, decommissioning and rehabilitation of the site.

4.0 SCOPE OF WORKS

The scope of works to achieve the above objective was undertaken as follows:

- Undertaking of an additional groundwater monitoring event;
- Development of a methodology and construction Environmental Management Plan for the rehabilitation;
- On site inspections of the rehabilitation works and provision of environmental advice remotely during the rehabilitation works;
- Development of a long term Environmental Management Plan for the site;
- Review and compilation of information relating to the remediation and rehabilitation phase to support agreement of the closure requirements as set out by DECCW.

5.0 ENVIRONMENTAL SETTING

5.1 Site Description

The site is located 12km east of Albury on the northern side of the Riverina Highway, Wirlinga. The address is 704 Riverina Highway, Wirlinga. A location map is shown in Figure 1. The site is registered as Lot 1



DP372042, in the Parish of Thurgoona, County of Goulburn, Shire of Hume. With the local government boundary adjustment in June 2004, the titles have been amended to reflect that the local government area is now Albury City Council and not Shire of Hume. Australian Grid coordinates 600800 North and 501900 East fall within the site.

Prior to the local government boundary adjustment in June 2004, the site was zoned "Rural Environmental (Inner)" under the Hume 2001 Local Environmental Plan. Prior to this it was zoned "Rural General Farming 1A". With the boundary adjustment and the site coming under the jurisdiction of Albury City Council, the Council was required to review its Local Environmental Plan to incorporate those areas that were formerly in Hume Shire and now in Albury City Council. Council engaged GHD Pty Ltd to undertake a land use strategy ("Albury Land Use Strategy 2007") which identified the area around the site as "potential growth area". Council has now completed its review and a new Local Environmental Plan (ALEP 2010) was gazetted on 13 August 2010 with the site zoned as "E3 – Environmental Management".

The site measures 9.057 hectares in area and is situated across a low lying hill. The elevation ranges from 190 m AHD in the western and central part of the site and falls to 168 m AHD at the lowest point near the south-eastern corner of the site. The site is bounded by privately owned grazing land to the east, north and west. A small water course, Sandy Creek, runs alongside the northern and the eastern boundaries of the site. At the time of assessment, the Creek was relatively dry, with a small amount of ponded water observed at points along the Creek. The Riverina Highway is located along the southern boundary. A site plan is shown in Figure 2.

Open farmland surrounds the site. The farms appear to be predominantly used for stock grazing for animals such as sheep and cows. The area to the south of the site is characterised as the Murray River flood plain. The Murray River is located approximately 1.5 km south of the site. Lake Hume (a man-made reservoir) is located approximately 2.5 km to the south east of the site.

5.2 Geology and Hydrogeology

5.2.1 Regional Geology

The 1:50,000 series "Hume" map sheet, published by the Geological Survey of Victoria, indicates three geological formations are present across the site. The alignment of Sandy Creek and the area across the eastern section of the site comprises the Quaternary Shepparton Formation. This is described as buff to yellow-brown clay, silt, sand and gravel, with grey buff to red-brown soil. The northern section of the site comprises Quaternary colluvium deposits, consisting of hillwash and scree deposits, red to yellow silt, sand and gravel poorly sorted in a red-brown soil. The south western section of the site is underlain by Devonian granite. The granite is generally fine to medium grained and pale red in colour.

5.2.2 Regional Hydrogeology

A review of the NSW *Groundwater Quality Protection Policy* Map of Groundwater Resources illustrates that groundwater in the Albury region has total dissolved solids concentrations of between 1,000-3,000 mg/L and is suitable for all livestock, some domestic and limited industrial uses. On a regional scale, groundwater flows in a southerly direction, from the hills to the north of the site towards the Murray River, located to the south of the site.

A search of the NSW Natural Resource Atlas was undertaken and 9 registered groundwater bores were identified within a 3 kilometre radius of the site. Groundwater was found to be used for a variety of purposes, predominantly domestic and stock use.

Groundwater investigations at the site have found the depth to groundwater to vary from around 10 to 19 m below the ground at elevations varying from 176 m AHD to 164 m AHD with groundwater likely to be flowing in a south easterly direction.



6.0 SITE HISTORY

The site history has been outlined in Golder Associates' Report "*Phase 1 Contamination Assessment, Former Liquid Waste Treatment Facility, Wirlinga, NSW*" reference 087613074 004 R Rev1, 15 September 2008 and is summarised below.

The site was purchased by the Albury City Council in August 1950 and has been owned and operated by the Council since this time.

In 1950 the site was established by the Council as a facility for the disposal of night soil. This practice continued until May 1991 when the remaining night soil services disposed of waste directly to the sewerage system. From 1968, other liquid wastes were disposed at the site. Over the years this included sewerage treatment plant sludge, transport accident spills, spills from industrial accidents and cleanups from pollution incidents detected by the EPA. Wastes collected by the Council's liquid waste contractor were also disposed at the site and included waste from grease traps, silt and grease arrestors, oil interceptors, triple interceptors and dilution pits.

The site closed on 30 August 2000 and has not received waste of any nature since this time. The disposal facility operated unlicensed from its inception until September 1991 and following this operated under EPA licence number 3753. Special Condition E1 on the licence requires the site to be rehabilitated and a post closure management plan was developed in December 2000 to comply with this.

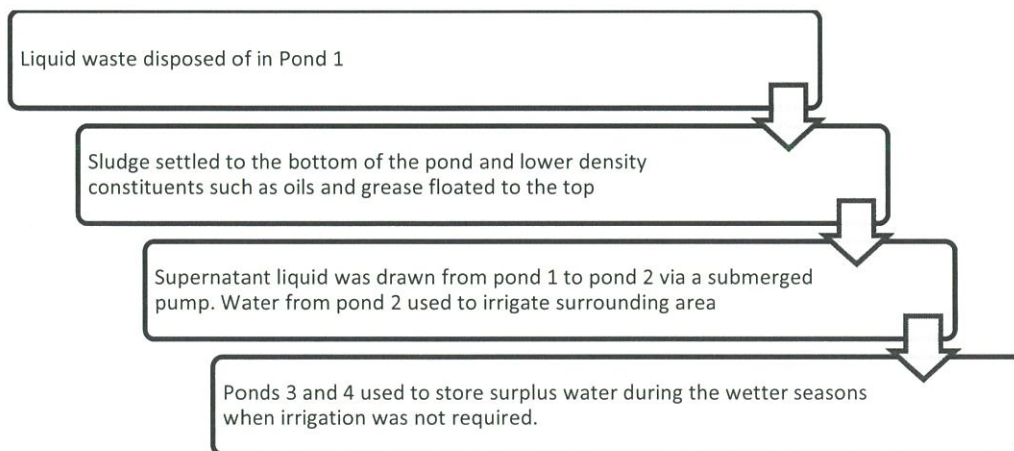
During operation of the site numerous ponds have been used for the disposal of waste liquids. The approximate locations of these ponds as estimated from historical aerial photographs and plans is provided in Figure 2.

At the time of closure in 2000 four main disposal ponds were present as follows and shown in Figure 3:

- Pond 1- Former operating pond
- Pond 2 – Former Overflow pond
- Ponds 3 & 4 Standby overflow ponds

In addition to the above ponds 2 smaller ponds were noted but were referred to as non operational.

The ponds system operated on the principle of gravity separation of oil and grease and the settlement of sludge and operated as follows:





7.0 POND ASSESSMENT AND REMEDIATION

7.1 Post Closure Plan (2000)

Following the closure of the site a post closure plan was implemented by Albury City Council:

- Albury City Council "Wirlinga Liquid Waste Disposal Facility – Post Closure Management Plan", December 2000.

This document provided a brief overview of the site operations followed by a four stage approach to site rehabilitation.

Stage 1: Bioremediation of the 300 mm layer of oils floating on the surface of the pond water (comprising a mixture of petroleum and cooking oils). Removal of the oil fractions would then allow for Stage 2 to commence.

Stage 2: Offered three options for treating the underlying sludge materials as follows:

- Bioremediation of grease and oily sludge in situ
- Excavation, windrowing and mixing of combined sludge and soils allowing the material to be dried out by the sun.
- Dewatering of sludge material and drying where possible for future burial on site.

Stage 3: Rehabilitation phase to include removal of all internal fence lines, backfilling all ponds excavations and re contouring the site to comply with the surrounding topography and maintain the environmental integrity of the site not allowing surface runoff to intercept the adjacent surface water bodies.

Stage 4: Comprises continuous environmental monitoring for 5 years with Albury City Council to retain ownership for at least 10 years and registering the site as "Contaminated"

7.2 Assessment of Wastes and RAP (2006)

Albury City Council engaged Transpacific Technical Services to assess the contamination status of the contents of ponds 1-4.

- Transpacific Technical Services "Draft Report – Contamination Assessment of Waste Wirlinga Waste Disposal Ponds, Albury, New South Wales" Dated 30 October 2006.

Transpacific Technical Services collected samples from each of the four ponds comprising the fat/oil layer on the surface, the supernatant water and the underlying sediments. The results were summarised as follows:

Pond 1:

- Supernatant water contained lead concentrations ranging between 5.6 and 6.8 mg/l, which was greater than the adopted criteria and classified as "controlled aqueous liquid Group A"
- Oil/fat samples reported total petroleum hydrocarbon (TPH) contamination C₁₀-C₃₆ with concentrations ranging between 142,000 and 318,400 mg/kg. This was classified as "Hazardous Waste" and must be disposed of to an appropriately licensed facility. It was identified that the oil and grease layer was also included in this layer at 550,000 and 860,000 mg/kg.



- From the sediment samples collected one sample reported elevated TPH C₁₀-C₃₆ at 109,000 mg/kg. This was classified as "Hazardous Waste" for disposal to licensed facility. The southern half of pond 1 reported much lesser concentrations of TPH C₁₀-C₃₆ (11,100 mg/kg). This section was classified as "Industrial Waste" for disposal to a licensed facility. The oil/grease contamination was 160,000 to 417,000 mg/kg.

Pond 2:

- Supernatant water within pond 2 did not report contaminant concentrations exceeding the adopted criteria; however, the results reported a pH value of 4.8, which is considered to be slightly acidic. This water was classified as Group B (Liquid food wastes) and disposed of to a licensed facility.
- Oil/fat samples reported one sample with concentrations above the adopted criteria with a C₁₀-C₃₆ concentration of 294,600 mg/kg. This correlated to high oil/grease content 355,000 mg/kg. This material was subsequently classified as "Hazardous Waste" to be disposed of to a licensed facility.

Pond 3:

- Supernatant water within pond 2 did not report contaminant concentrations exceeding the adopted criteria; however, the results reported a pH value of 6.3, which is considered to be slightly acidic. This water was classified as Group B (Liquid food wastes) and to be disposed of at a licensed facility. It was recommended that this water be neutralised and used for irrigation water.

Transpacific Technical Services completed the assessment report with a "Remediation Action Plan" (RAP). The RAP is summarised as follows:

- Seek approval to use the water in ponds 3 & 4 for irrigation
- Remove oil/fat layers and dispose to a licensed facility via vacuum fitted tankers
- Remove the supernatant water to a licensed facility via vacuum tanker.
- Remove contaminated soils and sediments from the surrounding bunded walls and base of the ponds. Stockpile material and work periodically to reduce moisture content. Sample appropriately for classification.

7.3 Pond Remediation (2008-2009)

Following on from the assessment works undertaken by Transpacific Services and the RAP submitted within that report, AlburyCity submitted a request for tender for a remediation contractor to undertake remedial works at the site in line with the RAP. The contract was awarded to EnviroPacific Services Pty Ltd (EPS) on 5 March 2008.

The tender documents from AlburyCity requested a summary report be submitted to AlburyCity following completion of the remediation works. This was not provided to AlburyCity and consequently this section is discussed via anecdotal evidence supplied from Albury City representatives.

The remediation works commenced April 2008 and were completed in March 2009. The works comprised removal of liquids from ponds 1 & 2. A total of 1,974,550 litres of liquid were removed from the ponds. This waste was segregated according to the content of the liquid (oil/fats and supernatant etc) and transported to either Transwaste Technologies Pty Ltd in Melbourne (281,820 litres) or Greenchip Recycling in Wodonga (1,692,730 litres).



The remaining sludges were excavated and mixed with green waste, microbe-rich organic material and chemical additives (mainly fertilisers). This material was then windrowed to allow for natural breakdown of the hydrocarbon compounds within the material. The windrows were located to the west of the entry road on to the site (Figure 3). The windrows were periodically watered and turned to maintain a good environment to promote bacteria growth. This process was undertaken between June 2008 and February 2009. EPS monitored the concentrations of TPH and PAH compounds in the material until they were below acceptable concentrations for disposal at Albury Landfill. A total of 7,541.74 tonnes of composted waste was disposed at Albury Landfill between 17 and 25 March 2009.

This completed the remediation process of the pond water and sludges allowing the planning process for the rehabilitation works for the site to commence.

8.0 SITE ASSESSMENT AND REHABILITATION

8.1 Site Assessment (2008)

Golder Associates was engaged by Transpacific Industries Group Ltd (TPI) to undertake a Phase 1 Contamination Assessment. A second phase of works comprising validation sampling of the two main disposal ponds ran concurrently with the Phase 1 contamination assessment. The results of the above investigations were presented in:

- Golder Associates Report "*Phase 1 Contamination Assessment – Former Liquid Waste Treatment Facility, Wirringa, NSW* (reference 087613074/004 R Rev0).

In summary, the Phase 1 investigation comprised a site history review and the excavation of 15 test pits across the site targeted at former ponds and to provide coverage of the site to assess the contamination status of site soils. In addition, 2 additional groundwater wells were installed to supplement the existing two wells on site followed by a round of groundwater sampling. These works also included validation sampling of the ponds following excavation of the sediments and soils of the bunded walls as part of the pond remediation works described in Section 7.3.

The results identified a disturbed fill layer to depths between 0.0 and 1.2 m below ground level (bgl) with natural soils generally encountered below 1.2 m with the exception of TP 5 and TP9 where fill extended to depths of 3.0 and 3.2 m bgl respectively. It is assumed that these test pits intersected past disposal ponds.

The analytical results indicated that contamination was predominantly associated with lead, polycyclic aromatic hydrocarbons (PAH) and TPH.

The initial validation samples collected from within pond 1 identified TPH C₁₀-C₃₆ concentrations of 15,000 and 57,500 mg/kg on the north and south walls. Samples collected from the base reported TPH C₁₀-C₃₆ concentrations ranging between 2,490 to 15,500 mg/kg. Samples collected from pond 2 reported elevated TPH C₁₀-C₃₆ concentration on all four walls ranging between 2,080 to 45,230 mg/kg.

The inferred groundwater flow direction was in a south easterly direction towards Sandy Creek. The results of the groundwater sampling indicated minor TPH C₁₀-C₂₈ contamination but not reported at concentrations that would be considered indicative of significant contamination. Minor metal concentrations were also reported but considered likely to be associated with natural background concentrations. An elevated nitrate result in groundwater from BH10 was reported and was considered likely to be associated with anthropogenic causes. A further round of groundwater sampling was recommended.

8.2 DECCW Review (2009)

The Phase 1 Contamination report was forwarded to the DECCW for review in accordance with s12 of the "*Contaminated Land Management Act 1997*".



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The DECCW review (DECCW Ref. DOC09/46645 LIC06/353 dated 7th October 2009) stated that "From the information provided there are no reasons to believe that the contamination is significant enough to warrant regulation under the Act"

DECCW recommended the following actions for closure of the site for use for passive recreational purposes:

1. Ensure adequate soil and grass cover over the site to prevent direct human exposure to residual contamination.
2. Conduct a groundwater monitoring event to confirm previous investigation/monitoring results.
3. Develop and implement an Environmental Management Plan (EMP) to include:
 - An OH&S plan to protect workers undertaking future excavation works
 - Maintenance of soil/grass cover and repair identified surface soil erosion
 - Groundwater monitoring as necessary pending the findings of the above monitoring event

These actions were adopted by AlburyCity and are reported as part of this validation report.

8.3 Supplementary Groundwater Investigation (2009)

In order to comply with the recommendations issued by the DECCW Golder Associates undertook an additional groundwater assessment in December 2009. The results of this groundwater assessment were documented in:

- Golder Associates Report "*Groundwater Monitoring Report, Former Liquid Waste Facility – Wirlinga, Albury, NSW*" (reference 097613183 002 R Rev1), dated 27 January 2010.

A total of four groundwater wells were sampled on 8th and 9th of December 2009. The results of the 2009 groundwater monitoring round indicated overall there was very little change in the contamination status of the underlying groundwater at the site with very minimal changes reported. Slight increases in metal concentrations were reported in the 2009 monitoring round but these were considered to be indicative of natural back ground levels.

More notably concentrations of contaminants such as chloroform, TPH and nitrate that are likely to represent minor impact from previous activities appeared to have reduced very slightly between the groundwater monitoring round in 2008 and 2009, which may indicate a slight improvement in the underlying groundwater quality. The most notable decrease is the reduction in nitrate in BH10 from 140 mg/L in 2008 to 78 mg/L in 2009.

The reported differences in sodium, chloride and sulphate represented minor changes in the chemistry of the underlying groundwater and were likely to be attributed to seasonal variations.

This groundwater monitoring event was undertaken to satisfied Point 2 of the DECCW's recommendations (Section 8.2) and given the slight improvement in groundwater quality and the potentially low risk on surrounding beneficial uses, no further groundwater monitoring events were recommended.

8.4 Construction Contamination Management Plan (2009)

The required rehabilitation works and the contamination management procedures to be implemented during those works were developed by Golder Associates and documented in a Construction Contamination Management Plan issued by Golder Associates "*Construction Contamination Management Plan, Former Liquid Waste Facility, Wirlinga, Albury, NSW*" (reference 097613183 001 R Rev1).



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The objective of the CCMP was to outline procedures to be followed during the rehabilitation works to manage the existing contamination to:

- Protect the health and safety of all who work on, or use, the site;
- Protect the environment.

The CCMP also provided guidance to AlburyCity to address Point 1 of the DECCW requirements (Section 8,3) and provide the environmental management procedures for the construction phase of the works to address Point 3 of the DECCW requirements for rehabilitation.

The methodology for undertaking the rehabilitation works was to be developed and implemented by AlburyCity. However, the CCMP set out the expected methodology for the rehabilitation works as follows:

- *Rehabilitation of the site will occur by reshaping in the form of cutting and fill of the site using material already on site with the aim of no importation of material and no off-site disposal of excess material.*
- *Current fill platforms and pond bund materials will be cut to fill the lower lying former pond areas. The material is to be placed in layers, moisture conditioned and compacted to reduce future settlement in the filled areas. A minimum of 0.3 m capping of the former ponds area is to be undertaken.*
- *Any excess water within ponds to be backfilled should be pumped to the ponds in the central area of the site which are currently full of water. Water from these ponds should then be used for moisture conditioning the soils for compaction and for dust control. No water is to be disposed from site unless through an appropriate licensed contractor. A licensed contractor will be a registered contractor with the DECCW NSW and licensed to transport such waste to a facility licensed to accept the water.*
- *The ponds containing water in the central area of the site should be backfilled following backfill of the remaining areas to maximise the use of water on the site in compaction.*
- *The material stockpiled along the western boundary of the site should be placed over the former stockpiling area between the stockpile and the access road to form a minimum 0.3 m thickness of cover.*
- *It is recommended that one of the drainage channels to the south east of the site be maintained during and following the rehabilitation to reduce the risk of sediment laden runoff entering the adjacent water course. Following suitable time frame to allow for sufficient vegetation cover, this drainage channel can be removed.*
- *Following completion of the works should there be an excess of material this material should be stockpiled and sampled by for classification for off-site disposal (Refer Section 6.1.4);*
- *The existing groundwater wells (BH7-BH10) are to be maintained throughout the rehabilitation process. The 6 shallow groundwater wells (BH1-BH6) at the site which are reported to be dry wells and shall be appropriately decommissioned by a licensed drilling contractor in accordance with the DECCW regulations. A licensed drilling contractor would be any drilling company that are qualified in the drilling of groundwater bores for any purpose.*

The CCMP also provided management procedures for the works as follows:

- Responsibilities
- Health and Safety
- Environmental Management
- Materials Tracking
- Observations of Contamination



- Disposal of Soil from Site
- Importation of Fill to Site
- Documentation and Review.

8.5 Site Rehabilitation Works (2010)

On 7 April 2010 AlburyCity commenced the rehabilitation works at the site. These works were undertaken by AlburyCity personnel and comprised earthworks to backfill the remaining ponds and re shaping of the site contours to replicate the natural topography of the surround landscape.

Golder Associates was engaged to assist in the initial induction of key AlburyCity personnel with respect to the requirements of the CCMP, to provide contamination advice during the rehabilitation as issues arise, to undertake periodic inspections of the works and to prepare this validation report.

The following photographs provide a visual summary of activities undertaken during the rehabilitation works followed by a graphic displaying the key milestones of the rehabilitation works.



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Date	Rehabilitation of Pond 1
7 April 2010	
20 May 2010	
6 July 2010	



FINAL VALIDATION REPORT - WIRLINGA

Date	Rehabilitation of Pond 3	
7 April 2010		
20 May 2010		
6 July 2010		



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Table 1: Summary of Key Milestones during Rehabilitation

Date	Actions
7 April 2010	■ Initial Site Meeting to discuss the rehabilitation works. Representative from Albury City and Golder Associates in attendance
20 April 2010	■ Commence back filling pond 1. The sides of the ponds were pulled into the centre and compacted into layers
29 April 2010	■ During excavation works, a black sludge encountered. Photographs were collected and discussed with Colin Johnson and Golder Associates. Only a small volume was identified and stockpiled for disposal.
3 May 2010	■ Complete levelling of pond 1. Commence backfilling pond 4 and 5.
7 May 2010	■ Black sludge material removed to the Albury Landfill. This material was placed in a specifically constructed lined cell at Albury Landfill.
11 May 2010	■ Commence filling pond 3 and continuation of shaping and back filling ponds 4 & 5.
17 May 2010	■ Finish backfilling of ponds 3 - 5
20 May 2010	■ A Site progress meeting with Colin Johnson (AC) Neil Chadwick (Golder Associates), David Barton (AC) was undertaken. ■ Work commenced in eastern section of the site levelling out the drainage channels and contouring the eastern section of the site with a grader
25 May 2010	■ Commence pumping water out of pond 2 and commence backfilling of pond 2
4 June 2010	■ Shaping of northern, western and eastern embankments was commenced and continued throughout the remainder of the rehabilitation works
25 June 2010	■ Earthworks completed, site demobilisation.
2 July 2010	■ Grass seed spread across the site to promote vegetation regrowth across the site to prevent surface runoff. The seeding also allowed the site to be rehabilitated to a more natural vegetation cover to support the final end use of the site as passive open space.



As indicated above, only one contamination issue of note was identified during the works when a small quantity of black sludge was uncovered. This was stockpiled and removed to Albury Landfill.

A final site visit was undertaken by Neil Chadwick of Golder Associates and Colin Johnson of AlburyCity on 7 July 2010. The site appeared to be well contoured with the ponds backfilled and the treatment area used by EPA for the treatment of sludges' having been covered with a layer of soil.

In summary, Golder Associates is of the opinion that the rehabilitation works proceeded in accordance with the CCMP and following growth of vegetation on the site, we believe the site status satisfies the DECCW requirement of ensuring adequate soil and grass cover over the site to prevent direct human exposure to residual contamination subject to the continued implementation of a long term management plan for the site as described below.

9.0 LONG TERM MANAGEMENT

Point 3 of the DECCW requirements for closure (Section 8.3) requires development and implementation of a long term Environmental Management Plan (EMP) to support the passive recreational use of the site.

9.1 Summary of Current Site Contamination Status

Following rehabilitation, the site has a nominal surface layer of clean soil and vegetation. Beneath the surface layer, in some locations of the site, buried sludges, waste and contaminated material may exist. These materials potentially contain elevated concentrations of total petroleum hydrocarbons, polycyclic aromatic hydrocarbons and potentially metals and other contaminants above concentrations considered to present an acceptable risk to human health should people be in routine contact with the soils. The areas of highest risk of these materials are generally focussed in the areas of former ponds (refer Figure 2) but may exist in other areas of the site.

Groundwater investigations indicate that the groundwater on the site is unlikely to be significantly impacted by the past use of the site.

9.2 Long Term Management

Given the residual contamination status of the site, the long term environmental management principles for the site are as follows:

- Management and maintenance of the integrity of the surface layer of soil and vegetation
- Prevention of penetration of the surface layer of soil and vegetation by site users
- Management of the penetration of the surface layer of soil and vegetation should this be necessary by maintenance personnel
- Prevention of the abstraction of groundwater

An EMP has been developed for the passive recreational use of the site and is included in Appendix A of this report. The EMP includes general procedures for:

- Surface Inspection and Maintenance
- Groundwater Monitoring Network and Groundwater Abstraction
- Use of the Site by the Public
- Site Maintenance Procedures



- Health and Safety
- Environmental Management
- Standard Maintenance
- Intrusive Excavation Works

The EMP should be implemented by AlburyCity to support the passive recreational use of the site into the future. Should the use of the site change, then further assessment of the site would be required to confirm the suitability of the site for that use. It is noted that the existing groundwater wells on the site have been retained to support such further assessment into the future should this be required.

10.0 CONCLUSION

In line with DECCW's requirements for closure of the Wirlinga site (DECCW Ref. DOC09/46645 LIC06/353 dated 7th October 2009) and subsequent use for passive recreational purposes, Golder Associates is of the opinion that:

- The rehabilitation of the site has provided adequate soil cover over the site to prevent direct human exposure to residual contamination as long as the seeding undertaken at the site results in an adequate grass cover and subject to the implementation of a long term Environmental Management Plan to manage the soil and grass cover.
- A groundwater monitoring event was conducted in December 2009 which confirms the previous groundwater monitoring results from 2008.
- A long term Environmental Management Plan has been developed for the site and included in this report to manage and maintain the grass and soil cover constructed over the site and manage the health and safety of site users and also of construction workers who may need to undertake works beneath the soil and grass cover.

As such, we are of the opinion that AlburyCity has now met DECCW's requirements for closure of the contamination issues related to the Wirlinga site and for the site to be used for passive recreational use subject to implementation of the long term EMP.

11.0 RECOMMENDATIONS

We recommend that:

- This report is submitted to DECCW to confirm that its requirements for the site have been met;
- The Environmental Management Plan for the site be implemented by AlburyCity.



12.0 LIMITATIONS

This Document has been provided by Golder Associates Pty Ltd (Golder Associates) subject to the following limitations:

This Document has been prepared for the particular purpose outlined in Golder Associates' proposal and no responsibility is accepted for the use of this Document, in whole or in part, in other contexts or for any other purpose.

The scope and the period of Golder Associates' Services are as described in Golder Associates' proposal, and are subject to restrictions and limitations. Golder Associates did not perform a complete assessment of all possible conditions or circumstances that may exist at the site referenced in the Document. If a service is not expressly indicated, do not assume it has been provided. If a matter is not addressed, do not assume that any determination has been made by Golder Associates in regards to it.

Conditions may exist which were undetectable given the limited nature of the enquiry Golder Associates was retained to undertake with respect to the site. Variations in conditions may occur between investigatory locations, and there may be special conditions pertaining to the site which have not been revealed by the investigation and which have not therefore been taken into account in the Document. Accordingly, additional studies and actions may be required.

In addition, it is recognised that the passage of time affects the information and assessment provided in this Document. Golder Associates' opinions are based upon information that existed at the time of the production of the Document. It is understood that the Services provided allowed Golder Associates to form no more than an opinion of the actual conditions of the site at the time the site was visited and cannot be used to assess the effect of any subsequent changes in the quality of the site, or its surroundings, or any laws or regulations.

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13.0 REFERENCES

- 1) Golder Associates Report "Groundwater Monitoring Report, Former Liquid Waste Facility – Wirlinga, Albury, NSW" (reference 097613183 002 R Rev1), dated 27 January 2010
- 2) Albury City Council "Wirlinga Liquid Waste Disposal Facility – Post Closure Management Plan", December 2000.
- 3) Transpacific Technical Services "Draft Report – Contamination Assessment of Waste Wirlinga Waste Disposal Ponds, Albury, New South Wales" Dated 30 October 2006.



FINAL VALIDATION REPORT - WIRLINGA

- 4) Golder Associates Report "*Groundwater Monitoring Report, Former Liquid Waste Facility – Wirlinga, Albury, NSW*" (reference 097613183 002 R Rev1), dated 27 January 2010.
- 5) Golder Associates "*Construction Contamination Management Plan, Former Liquid Waste Facility, Wirlinga, Albury, NSW*" (reference 097613183 001 R Rev1)
- 6) Golder Associates "*Phase 1 Contamination Assessment – Former Liquid Waste Treatment Facility, Wirlinga, NSW*" (reference 087613074/004 R Rev0).



Report Signature Page

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FIGURES

Site Locality Plan

Legend

 Approximate Site Location

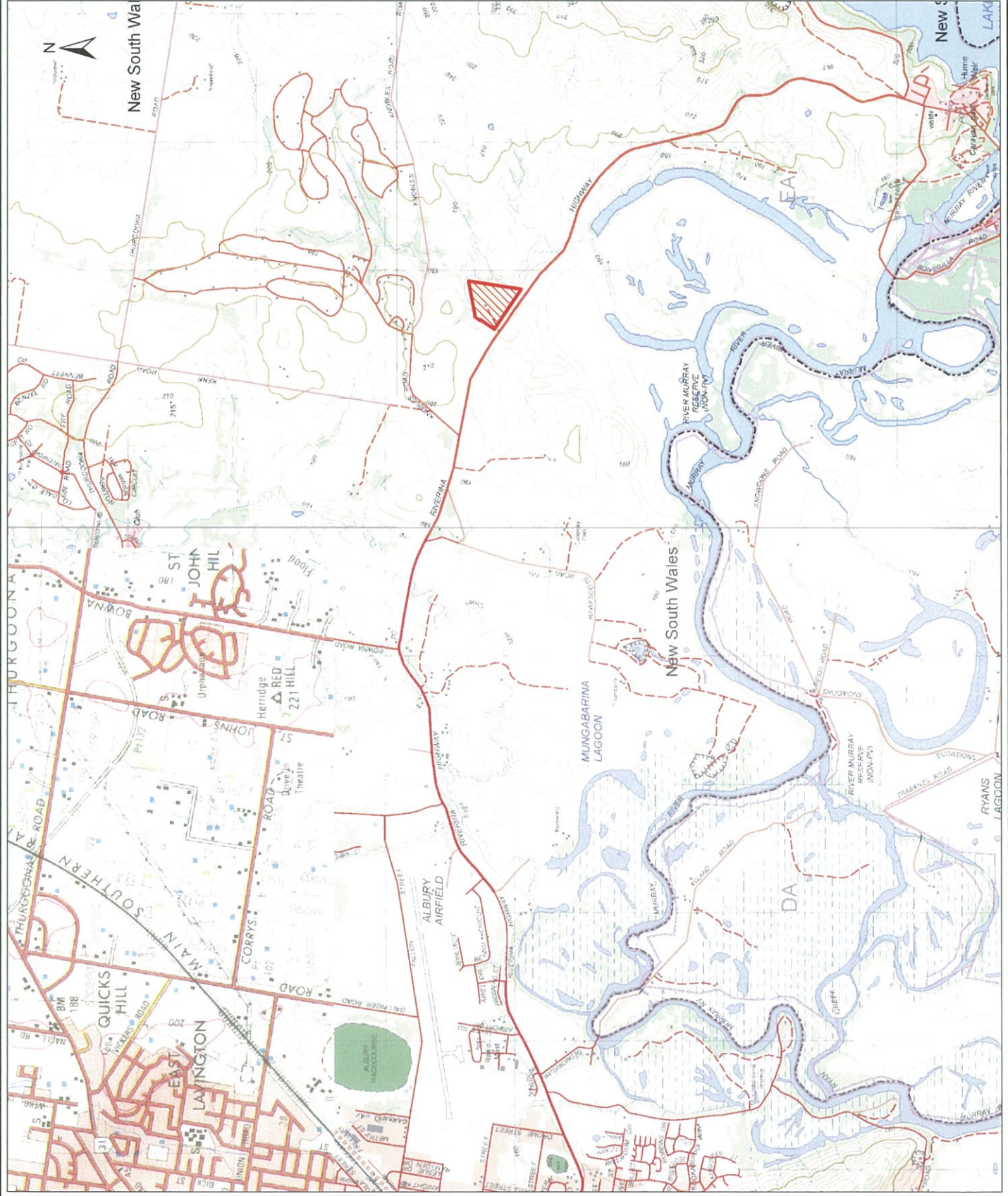
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Historical Features and Investigation Locations

Legend

- Groundwater Well, Installed by Golder Associates
- Groundwater Well, Existing
- Shallow Groundwater Well, Existing (Approx Location)
- Test Pit Locations

Historical Features

- Disturbed surface profile
- Potential disposal ponds
- Feature of Potential Interest
- Approximate Site Boundary

NOTES:

Site Features and Borehole Locations digitized from plans. Borehole Locations installed by Coffey (1999).

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Former Site Layout Plan

Legend

-  Groundwater Well, Installed by Golder Associates
-  Groundwater Well, Existing

Site Features

-  Former Sludge Ponds to be filled
-  Ponds currently containing water
-  Approximate location of stockpiles for bioremediation process
-  Surface water catch drains
-  Gravel Track
-  Approximate Site Boundary

NOTES:

Site Boundary and Site Features sourced from
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APPENDIX A

Environment Management Plan



8 September 2010

CELEBRATING
50
YEARS
in 2010

FORMER LIQUID WASTE FACILITY - WIRLINGA

Environment Management Plan for Passive Recreation Use

Submitted to:
AlburyCity
553 Kiewa Street
Albury NSW

REPORT



A world of
capabilities
delivered locally

Report Number. 097613183-007-R-Rev0

Distribution:

1 x AlburyCity
1 x Golder Associates





ENVIRONMENT MANAGEMENT PLAN - WIRLINGA

RECORD OF REVISION

The following table outlines the minor revisions made to this document:

Company	Version	Date Issued
Golder Associates Pty Ltd	Initial Issue Included in Final Validation Report (097613183-006-R-Rev0)	8 September 2010

Any complete revision of the document will be accompanied by a new revision number, i.e. Rev1, and date, in the lower left hand corner of all pages. All minor changes will be incorporated into this revision and the above table will be updated.



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ENVIRONMENT MANAGEMENT PLAN - WIRLINGA

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APPENDIX A

OH&S Management Plan for ongoing use of the site



1.0 INTRODUCTION

1.1 General

This Environment Management Plan (EMP) has been prepared to address the long term contamination management of the rehabilitated former liquid waste facility at Wirlinga, NSW (the "site"). A site plan is presented Figure 1.

During 2008 to 2010, AlburyCity undertook rehabilitation works at the site to allow for the use of the site as passive recreational open space. These rehabilitation works included the emptying of the former waste liquid ponds and the reshaping of the site including backfilling of the ponds to correspond with the natural topography of the surrounding area.

This EMP has been prepared to assist in the ongoing environmental management of the site and outlines the protocols and procedures that should be followed during the ongoing use, management and maintenance of the site as a passive recreational open space.

1.2 Objectives

The objective of this EMP is to outline procedures to manage the existing contamination during the future use of the site as passive recreational open space in order to:

- Protect the health and safety of all who work on, or use, the site;
- Protect the environment.

2.0 BACKGROUND INFORMATION

2.1 Site Rehabilitation

The site history, rehabilitation and validation process for the site is described in detail in Golder Associates Report "*Final Validation Report, Former Liquid Waste Facility, Wirlinga*" (reference 097613183-006-R-Rev0)

In summary, operations at the site commenced in 1950 and ceased in 2000. During the 50 years of operation, liquid wastes from various sources were disposed at the site. Sludges accumulated in disposal ponds and effluent from the ponds was used to irrigate the surrounding paddocks. Disposal ponds no longer in use were backfilled. During operation of the site numerous ponds were used for the disposal of waste liquids. The approximate locations of these ponds as estimated from historical aerial photographs and plans is provided in Figure 2. At the time of the site closure, six ponds were present in the central area of the site. Bioremediation of the sludge in the active disposal ponds at the time of closure commenced in mid 2008 and finished in early 2009. Site assessment of soil and groundwater was undertaken during 2008 and 2009 and presented in:

- Golder Associates Report "*Phase 1 Contamination Assessment – Former Liquid Waste Treatment Facility, Wirlinga, NSW*" (reference 087613074/004 R Rev0).

In summary, the Phase 1 investigation comprised a site history review and the excavation of 15 test pits across the site targeted at former ponds and to provide coverage of the site to assess the contamination status of site soils. In addition, 2 additional groundwater wells were installed to supplement the existing two wells on site followed by a round of groundwater sampling. These works also included validation sampling of the ponds following excavation of the sediments and soils of the bunded walls as part of the pond remediation works.

- The results identified a disturbed fill layer to depths between 0.0 and 1.2 m below ground level (bgl) with natural soils generally encountered below 1.2 m with the exception of TP 5 and TP9 where fill extended to depths of 3.0 and 3.2 m bgl respectively. It is assumed that these test pits intersected past disposal ponds.



- The analytical results indicated that contamination was predominantly associated with lead, polycyclic aromatic hydrocarbons (PAH) and TPH.
- The initial validation samples collected from within pond 1 identified TPH C₁₀-C₃₆ concentrations of 15,000 and 57,500 mg/kg on the north and south walls. Samples collected from the base reported TPH C₁₀-C₃₆ concentrations ranging between 2,490 to 15,500 mg/kg. Samples collected from pond 2 reported elevated TPH C₁₀-C₃₆ concentration on all four walls ranging between 2,080 to 45,230 mg/kg.
- The inferred groundwater flow direction was in a south easterly direction towards Sandy Creek. The results of the groundwater sampling indicated minor TPH C₁₀-C₂₈ contamination but not reported at concentrations that would be considered indicative of significant contamination. Minor metal concentrations were also reported but considered likely to be associated with natural background concentrations. An elevated nitrate result in groundwater from BH10 was reported and was considered likely to be associated with anthropogenic causes.

The contamination assessment was sent to Department of Environment and Climate Change and Water (DECCW) NSW for review. The DECCW responded with a list of requirements for closure of the site. These requirements were then addressed through further assessment and rehabilitation of the site during 2009 and 2010. Rehabilitation comprised the filling of existing ponds and the reshaping and vegetation of the site of the site to cover potentially contaminated soils and allow the site to be free-draining.

The rehabilitation and validation works were documented in Golder Associates Report "*Final Validation Report, Former Liquid Waste Facility, Wirlinga*" (reference 097613183-006-R-Rev0) and concluded that the AlburyCity has met DECCW's requirements for closure of the contamination issues related to the Wirlinga site and for the site to be used for passive recreational use, subject to implementation of a long term EMP.

2.2 Summary of Current Site Contamination Status

Following rehabilitation, the site has a nominal surface layer of clean soil and vegetation. Beneath the surface layer, in some locations of the site, buried sludges, waste and contaminated material may exist. These materials potentially contain elevated concentrations of total petroleum hydrocarbons, polycyclic aromatic hydrocarbons and potentially metals and other contaminants above concentrations considered to present an acceptable risk to human health should people be in routine contact with the soils. The areas of highest risk of these materials are generally focussed in the areas of former ponds (refer Figure 2) but may exist in other areas of the site.

Groundwater investigations indicate that the groundwater on the site is unlikely to be significantly impacted by the past use of the site.

2.3 Long Term Management Principles

Given the residual contamination status of the site, the long term environmental management principles for the site are as follows:

- Management and maintenance of the integrity of the surface layer of soil and vegetation
- Prevention of penetration of the surface layer of soil and vegetation by site users
- Management of the penetration of the surface layer of soil and vegetation should this be necessary by maintenance personnel
- Prevention of the abstraction of groundwater



3.0 RESPONSIBILITIES

3.1 Overall Responsibility

Given that the site is owned and managed by AlburyCity it will be the responsibility of AlburyCity to ensure that the EMP is implemented and adhered to. It is recommended that a person is appointed by AlburyCity with the responsibility of implementing the EMP and ensuring its compliance by all site users. It is recommended that such a person would assume the role of Site Manager.

3.2 Site Manager

For the purposes of this document, the Site Manager shall be considered to be the party responsible for the day-to-day implementation of the EMP. It is the Site Manager's responsibility to:

- Ensure that all site works are undertaken in accordance with this EMP.
- Maintain all site records related to implementation of this EMP.
- Manage the implementation of any recommendations made by those parties in relation to work undertaken in accordance with this EMP.
- Undertake site inspections as required in accordance with this EMP.
- Provide all site maintenance workers/contractors with a copy of this EMP to alert them to the condition of the site.

Table 1: Contact Details of Site Manager

Name and Title*	Contact Details	Date Effective

*This table should be amended if a new person is appointed to this role

3.3 Site Contractors

All Contractors used on the site for any ongoing maintenance/operation activities must implement the EMP fully and be aware of the risks and obligations indicated in the document.

The EMP must be referenced as part of the Contractor Induction to the site so all operators and workers on the site are aware of their requirements, the risks involved and the reporting of any breaches of the EMP.

3.4 Environmental Consultant

From time to time, action may be required under this EMP by an Environmental Consultant. The Environmental Consultant must be a suitably trained and qualified environmental professional. It is preferable that an Environmental Consultant be used from a company that is a member of the Australian Contaminated Land Consultants Association (ACLCA).



4.0 SPECIFIC MANAGEMENT REQUIREMENTS

4.1 Surface Inspection and Maintenance

The Site Manager shall inspect the surface of the site every 6 months to confirm that the vegetation and soil cover placed a part of the rehabilitation is maintained. The inspection shall comprise a specific walkover of the high use areas of the site and a more general walkover of the remainder of the site. The Site Manager shall look in particular for the following and undertake the associated rectification actions:

- Areas where vermin or humans have excavated into the site. The vermin should be eradicated and the holes backfilled and reseeded.
- Areas of distressed or dead vegetation where soil has been exposed. These areas should be temporarily taped off and reseeded to promote new vegetation.
- Areas of erosion. These areas should be filled with compacted soil and reseeded or more significant works undertaken to reduce ongoing areas of high erosion potential such as placement of crushed rock.
- Areas of exposed odourous or discoloured soil. These areas shall be taped off from access, capped with a minimum of 200 mm of clean soil and reseeded to promote vegetation.

All actions undertaken with respect to this EMP shall be recorded in accordance with Section 6 of this EMP.

4.2 Groundwater Monitoring Network and Groundwater Abstraction

Although DECCW has indicated no further groundwater sampling is required at the site, the existing groundwater network of four wells (Figure 1) shall be protected and maintained should additional groundwater monitoring be required at a later date. The locations of the wells should be made clear to maintenance personnel maintaining the site vegetation to reduce the risk of them being destroyed. The coordinates of the four groundwater wells are as follows:

Table 2: Groundwater Well Details

Well	Easting	Northing	Elevation Top to Casting (m AHD)
BH7	501761.372	6008096.12	182.544
BH8	501748.184	6008073.23	183.129
BH9	501888.742	6008243.36	177.903
BH10	501654.547	6008264.77	187.993

The Site Manager shall periodically inspect to ensure the groundwater wells are in serviceable condition. The Site Manager shall also ensure groundwater is not abstracted from the site for any other purpose than investigation. If groundwater abstraction is required, a groundwater assessment shall be undertaken to confirm that groundwater is suitable for that purpose.

4.3 Use of the Site by the Public

The general low intensity open space use is not considered to pose a significant human health risk due to the infrequent exposure to the soil. However, through the management of the site the Site Manager should try to:

1. Ensure as far as practical that people do not dig into the soil.



2. Encourage site users to remain on designated tracks or areas prepared for higher use. This may include the use of crushed rock around picnic tables or car parks where more highly trafficked zones are expected.
3. Record all actions undertaken with respect to this EMP in accordance with Section 6 of this EMP.

4.4 Site Maintenance Procedures

4.4.1 Health and Safety

Health and safety is paramount when undertaking any works at the site for all personnel involved. Appendix A “*Health and Safety Plan for Soil Works at the Former Liquid Waste Disposal Facility, Wirlinga, NSW*” provides the minimum procedures **to be followed by all workers** when working at the site and dealing with potentially contaminated soil. Contractors who work on this site remain responsible for all health and safety issues associated with their activities.

4.4.2 Environmental Management

During any works at the site good environmental management procedures should be followed by all contractors working on the site. It is the responsibility of the site contractors to manage their works to minimise potential impacts on the site and the surrounding environment. Such procedures shall include but are not limited to:

- Appropriate chemical and fuel storage;
- Refuelling of equipment to reduce the risk of spillage;
- Appropriate waste control and disposal methods;
- Minimising dust generation;
- Minimising offsite tracking of soil;
- Control, management and discharge of site stormwater.

It is expected that such controls would be part of standard AlburyCity works practices.

4.4.3 Standard Maintenance

Standard maintenance activities include landscaping, surface path and road maintenance lawn mowing, fencing and all other activities where soil disturbance is to a depth of less than 200 mm.

Prior to undertaking these standard maintenance activities, maintenance personnel and contractors should be briefed by the Site Manager (or designated representative) regarding the potential site contamination and the procedures contained within this EMP and in particular:

- Keeping digging duties to a minimum (eg. Weeding and maintaining landscape cover);
- Minimising the amount of dust generated during lawn mowing;
- Should coloured or odourous soil be encountered, then the maintenance personnel should stop work in the area and report the issue to the Site Manager (or designated representative) for advice and action;
- All maintenance personnel should observe normal hygiene practices and ensure:
 - Gloves and coveralls are worn for all works where soils are contacted;
 - Hands are washed thoroughly before eating, smoking or after working at the site.



- All actions undertaken with respect to this EMP shall be recorded in accordance with Section 6 of this EMP.

4.4.4 Intrusive Excavation Works

Intrusive Excavation Works are considered to be maintenance requiring excavation of greater than 200 mm into the surface of the site. The following procedures should be followed as a minimum when undertaking Intrusive Excavation Works at the site:

- The minimum OH&S procedures provided in Appendix A shall be implemented by the Contractor. Protective personal equipment (PPE) to be used by site workers during excavation will be specified dependant on the type and purpose of excavation.
- All works which involve excavation into the soil shall be documented as to their compliance with the requirements of this EMP.
- Excavations should be kept as shallow as practicable.
- Soil excavated should be placed onto a sheet of builder's plastic laid down beside the excavation.
- The materials comprising the upper 200 mm below ground level should be excavated first and placed in a separate stockpile to the other excavated material.
- Any excess soil or waste generated from below 200 mm at the site should be reused below 200 mm depth.
- Any excess soil generated from less than 200 mm below ground level can be reused at any depth.
- Excavations should be left open for the minimum possible length of time.

Given that the site has been rehabilitated and this incorporated significant reshaping of the previous features it is unlikely that significant contamination will be encountered during any excavation works. There is however, a low risk that areas of excavation may contain contamination producing odour or discoloured soil. If mild odourous soils are detected, work should continue in accordance with the OH&S Plan (Appendix A) and the location documented. The odour should be monitored and if considered to be getting stronger works should cease, the Site Manager notified and advice sought from a suitably qualified environmental consultant.

There is also a potential that discoloured or stained soils maybe encountered. Should an area of greater than 5 m x 5 m of discoloured or stained soil be identified, works should cease, the Site Manager notified and advice sought from a suitable qualified environmental consultant.

The aim of any intrusive works is to minimise material requiring off-site disposal. Should excess soil be created as a result of works at the site, it must first be stored and managed on-site in a stockpile covered with plastic prior to it being disposed. Disposal of any excess soil produced as a result of the any earthworks is to be undertaken following classification. Testing of the soil shall be undertaken by a suitably qualified environmental consultant with classification by comparison of the results to the relevant Waste Guidelines "Classifying Classification Guidelines Part 1: Classifying Wastes" NSW DECC.

All maintenance works which involve excavation into the soil shall be documented as to their compliance with the requirements of this EMP. This will include testing results for the excess soil and proof of the appropriate disposal of the soil offsite.



5.0 DOCUMENTATION AND REVIEW

5.1 Records of Monitoring and Inspection

Monitoring or action in accordance with this plan shall be recorded by date and action on a simple proforma developed by the Site Manager and kept on file by the Site Manager.

5.2 Review

The information collected as part of this EMP and the EMP itself should be reviewed by an Environmental Consultant at a frequency determined by the Site Manager commensurate with the degree of actions required under the plan or at least every five years. The review should assess whether the management has been implemented appropriately and whether the site uses, the regulatory environment, the site conditions or the additional data collected warrant that changes are made to the EMP. The review should be documented.

5.3 Closure of EMP

The procedures outlined in this EMP should be followed until one of the following conditions are satisfied:

- All site areas are assessed or remediated such that they present soil contamination that poses an acceptable risk to human health and environment for the proposed site use;
- A site specific risk assessment is performed by a qualified environmental consultant to demonstrate that the risks are acceptable for the site use without an EMP to the satisfaction of AlburyCity.



Report Signature Page

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FIGURES

Former Site Plan Pre Rehabilitation



Legend

- Groundwater Well,
Installed by Golder Associates
- Groundwater Well,
Existing
- Gravel Track
- Approximate Site Boundary

NOTES:
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APPENDIX A

OH&S Management Plan for ongoing use of the site



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**Environmental and OH&S Management Plan for Soil Works
at the Former Liquid Waste Disposal Facility
at Wirlinga, NSW**

Prepared for: Golder Associates
Contact: Neil Chadwick
Telephone: 8862 3752
Job Number: 3328

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1. Introduction

Soil contamination investigations at the former Liquid Waste Disposal Facility site in Wirringa NSW undertaken by Golder Associates on behalf of the Transpacific Industries Group Ltd, indicated the presence of Polycyclic Aromatic Hydrocarbons (PAH's) and C₁₀ – C₃₆ Petroleum Hydrocarbons. In the context of the proposed use of the site as open public space, the presence of these substances during the site construction phase and subsequent soil excavation works may pose a potential risk to human health through exposure by dust inhalation or ingestion.

This report assesses the risk posed to personnel working on the site and details procedures to minimise these potential exposures.

The NSW Occupational Health and Safety Act 2000 (Section 10) requires that a person who has control of premises used by people as a place of work must ensure that the premises are safe and without risks to health.

The duties of the person who has control of the workplace under the NSW OHS Regulations 2001 are to:

- ensure that any premises controlled by the employer where the employees work (and the means of access to or exit from the premises) are safe and without risks to health,
- any plant or substance provided for use by the employees at work is safe and without risks to health when properly used,
- systems of work and the working environment of the employees are safe and without risks to health,
- providing such information, instruction, training and supervision as may be necessary to ensure the employees' health and safety at work,

The duties of the employee (Part 2 Division 3) are to take reasonable care for the health and safety of people at their place of work and who may be affected by their acts or omissions at work and to cooperate with their employer and other people to enable compliance with the Act and Regulations.

2. Site Induction/Briefing/Training

All personnel carrying out works at the former Liquid Waste Disposal Facility at the Wirlinga site must be provided with a copy of this plan, the Golder Associates "Construction Contamination Management Plan" and any relevant Safe Work Method Statements (SWMs) developed for this project at the completion of the site induction/briefing/training session.

Nominated Albury City Council Officers will provide a briefing to all personnel undertaking works on the former Wirlinga liquid waste facility. A register of personnel who received the induction/briefing/training shall be established and maintained on-site by the appointed Council Foreman/Ganger together with a copy of all of the documentation provided at the session

At the completion of the site induction/briefing/training, personnel must sign the form in the appendix of this plan to acknowledge that they have received the induction, briefing and training and also sign the relevant SWMs.

Relevant Workcover NSW codes of practices and guidance documents should be available at a supervisory level by the responsible employee. Relevant Workcover documents include:

- Guidelines for Writing Work Method Statements in Plain English
- Hazard Identification and Risk Assessment for Builders

3. Nature of Contaminants

The following contaminants have been identified as being present in the near surface soils at the Wirlinga site.

- Polycyclic Aromatic Hydrocarbons (PAHs)
- Total C10-C36 Petroleum Hydrocarbons

4. Routes of Exposure

The three major routes of potential chemical exposure to personnel during site work are:

- Inhalation of airborne contaminated soil during excavation.
- Ingestion of contaminated soil.
- Skin absorption from contact with contaminated soil.

5. Risk Assessment

(i) Inhalation of airborne contaminated soil during excavation.

Inhalation of contaminants at the site may occur through inhalation of non-volatile contaminants (TPH C10-C36, PAHs) attached to airborne soil dust particles during soil excavation.

The Safe Work Australia exposure standard for Dust Not Otherwise Classified (DNOC) is 10mg/m³ average over an eight hour period. Safe Work Australia has also set exposure standards for individual airborne contaminants including those present in the soil at the Wirlinga site.

The generation of airborne dust levels in the region of 10mg/m³ generally requires large amounts of energy ie dry crushing, drilling excavation. At this dust level and using the highest contaminant levels for TPH C10-C36 of 30,000 mg/kg and PAH's 510 mg/kg, found on the site; none of the more stringent individual exposure standards for the contaminants are exceeded. **Therefore, it is unlikely that soil works on the site will create a significant contaminant inhalation exposure hazard.**

It should be noted that the exposure standards are average breathing zone concentrations over an 8-hour day/40-hour week for an entire working life time which are not thought to cause harm. Any soil works at the site are likely to be of relatively short duration and frequency, thus further reducing the exposure risk.

Control of airborne dust levels as outlined in section 7.2 should effectively control potential exposure through inhalation of airborne soil dust.

(ii) Ingestion of contaminated soils

Contaminated soil may potentially be ingested through transfer from contaminated hands and food to mouth.

Significant ingestion of contaminated soils will only result if personal hygiene requirements (outlined in 7.1) and the wearing of personal protective equipment (outlined in 7.3) are not effectively carried out. These include:

- *Washing hands prior to eating or smoking and avoiding hand-to-mouth activities such as nail biting*
- *Protecting food, drink and cigarettes from contamination*
- *Wearing suitable gloves where contact with soil is possible*

(iii) Skin absorption from contact with contaminated soil

Prolonged skin contact with PAHs can make the skin more sensitive to UV radiation and sunburn.

The effective use of personal protective equipment (PPE) as outlined in section 7.3 should effectively minimize any risk. The key PPE requirements are:

- Use of disposable overalls where there is a high potential for contamination of clothing and skin
- Use of gloves where prolonged skin contact of the hands with contaminated soil is likely

6. Health Effects of Exposure

Although a number of soil contaminants have been identified at the former Wirlinga liquid waste disposal site, the two contaminants which have been found in concentrations above the National Environment Protection Measure (NEPM) Health-based Investigation Levels (HIL) and therefore the one of greatest significance with respect to intrusive works on soil are polycyclic aromatic hydrocarbons (PAHs) (including benzo(a)pyrene). PAHs are a family of similar chemicals and are by-products of incomplete combustion or from petroleum products such as coal tar and bitumen. Prolonged skin contact with PAHs can make the skin more sensitive to sunlight and therefore more prone to sunburn. Long term inhalation of PAHs has been associated with lung cancer. PAHs are present in cigarette smoke and are thought to be one of the main causes of lung cancer in smokers.

No significant potential short-term health effects from exposure to PAHs are likely at the concentrations present in the soil at the Wirlinga site.

7. General Safety Aspects and Procedures

The following general safety aspects and procedures are designed to minimize all routes of exposure to chemical contaminants that may be present in the site soil.

7.1 Personal Hygiene

Contaminated soil can be transferred from hand-to-mouth during activities such as smoking and eating. It is therefore important to maintain a high level of personal hygiene to reduce this route of exposure.

The following rules must be adhered to during work carried out at the Wirlinga site:

- *No smoking or eating while hands are contaminated with soil*
- *Wash hands with soap and water before eating or smoking.*
- *Following work which involves contact with potentially contaminated soil, soiled clothing and footwear should be removed before entering a clean area such as buildings, private vehicles etc.*
- *Avoid activities such as nail biting.*

In order to facilitate good personal hygiene, adequate washing facilities near the area to be impacted should be provided on site.

7.2 Control of Exposure

- A Work Method Statement (WMS) must be prepared prior to any work involving contact with contaminated soil. The WMS must outline the work processes, potential exposures and controls to be implemented. The WMS must be prepared by a contractor in consultation with any other relevant affected staff. A proforma Work Method Statement is provided in the Appendix to this OHS Plan.
- Maintaining the soil in a damp condition during excavation should control airborne dust/soil generation. The excavated contaminated soil that is stockpiled on-site should also be maintained in a damp condition or covered with a suitable material such as plastic or canvas to stop wind erosion. Access to excavated soil should be restricted through the use of barriers.
- Activities which may cause contaminated soil to become airborne should be avoided.
- Skin contact with soil should be avoided as far as is practicable.
- Personnel must not enter a clean area unless they have removed contaminated clothing and footwear
- Food, cigarettes and beverages should not be stored in an area close to soil works where they may become contaminated.
- Contaminated clothing should be removed before leaving the site.
- Hand tools and excavation equipment contaminated with soil should be washed down prior to leaving the site to remove soil and prevent inadvertent exposure of unprotected personnel at off-site locations.
- Respiratory protection in the form of P1 or P2 particulate respirators and other forms of personal protective equipment such as gloves, impervious disposable overalls and boots may be required at the discretion of the responsible employer representative.

7.3 Personal Protective Equipment (PPE)

7.3.1 Standard Work Outfit

- Cotton overalls fully buttoned to the neck and at the sleeves or work trousers and long sleeve shirt. Overalls and shirts should have flap-type pockets so as to avoid accumulation of soil. Overalls should be replaced when they become heavily soiled.
- Safety boots.
- Safety glasses may be required at the discretion of the designated site supervisor.

7.3.2 Respiratory Protection

It is not anticipated that activities on site will result in significant levels of airborne contaminated soil. However, in circumstances where the production of airborne contaminated soil in the breathing zone is considered likely (such as during major mechanical excavation works which involves contaminated soil or accessing crawl spaces underneath buildings where wetting of soil is impractical), half-face piece respiratory protection (either disposable or cartridge type) with P1 filter or better complying with Australian Standard AS1716 (2003) - Respiratory Protective Devices is to be worn. The need for respiratory protection must be based on an assessment of exposure risk carried out as part of developing a work method statement for the works. If there is uncertainty as to whether particular activities represent an inhalation exposure risk, an occupational hygienist should be consulted for advice.

Respirators should be maintained in a clean condition and in good repair. These should be stored in an area well away from the area of contamination when not in use. Filtration type respirators should not be used when entering poorly ventilated pits or trenches if there is a possibility of very high levels of vapour or low oxygen levels.

7.3.3 Gloves

Impervious industrial gloves compatible for use with PAHs and TPHs are to be worn if prolonged skin contact with contaminated soil is likely. Gloves should be checked regularly for wear and tear and replaced when deemed necessary.

7.3.4 Provision of PPE

PPE is to be provided to all personnel who are likely to come into contact with contaminated soil. Contractors must provide their own PPE which must meet the minimum standards as determined by the Council or as designated by the site supervisor in consultation with authorized Council staff and documented in the SWMs.

7.3.5 Storage of PPE

PPE should be stored in an area and in a manner such that it is unlikely to be contaminated. Respirators should be stored inside an appropriate container, such as a plastic bag, when not in use.

8. Monitoring

8.1 Dust monitoring

Dust monitoring for contaminants is not considered practical as the results of such monitoring are usually not available for a number of days after exposure and, in any event, no immediate danger to life and health is likely to be present. As the creation of dust may be a potential issue during rehabilitation works but should be adequately controlled by the measures outlined under Section 7.2.

8.2 Biological Monitoring

Biological monitoring for exposure to chemical contaminants is considered unnecessary and of limited use.

9. First Aid

The provision of first aid equipment and first aiders should be based on a specific site risk assessment for the activities being undertaken and should form part of the Work Method Statement.

No specific provisions for first aid for chemical exposure are considered necessary. The most likely injury associated with chemical exposure which may require first aid is irritation due to contaminated soil entering the eyes.

**CERTIFICATE OF RECEIPT OF OCCUPATIONAL HEALTH
AND SAFETY BRIEFING AND GUIDELINES.**

I.....
NAME IN BLOCK LETTERS

OF.....
COMPANY IN BLOCK LETTERS

**HAVE RECEIVED AN OCCUPATIONAL HEALTH AND
SAFETY BRIEFING AND A COPY OF THE
OCCUPATIONAL HEALTH AND SAFETY GUIDELINES
PERTAINING TO WORK BEING CARRIED OUT AT**

**Former Liquid Waste Disposal Facility,
Wirlinga, NSW**

DATE:.....SIGNATURE:.....

TO BE RETURNED TO THE DELEGATED DESIGNATED PERSON PRIOR TO THE
COMMENCEMENT OF WORK ON SITE.

Appendix

Proforma Work Method Statement

Work Method Statement (Part 1)		Signed Off: _____ Date: _____ No: _____	
Contractor: Put the name of your organisation here.			
Project: Put the name of the building you are working on here.			
Job: Write in the task or job that you are doing.			
Procedure (in steps):	Possible Hazards:	Safety Controls:	
1. Write out the job step by step	Include all possible hazards such as:	List all safety controls such as:	
2. Start each step with an action word. For example	• Hazardous substances, explosives, dust, etc	• MSDS	
3. • Fix hand rail to stair well walls	• Manual handling, lifting heavy weights (15kg?)	• Warning Signs	
4.	• Twisting, pushing and pulling, lifting and carrying	• Personal protective equipment	
5.	• Hazards to others in area	• Fellow workers/public safety provisions	
6.	• Rubbish, electrical, fells	• Storage of materials and equipment	
7.		• Housekeeping	
8.			
9.			
10.			
11.			
12.			
13.			
14.			
15.			

Work Method Statement (Part 2)		
Personal Qualifications and Experience:	Personnel, Duties and Responsibilities:	Training Required to Complete Work:
You will need to list all the details of qualifications and experience you and your workers will need for the job. Include: trade certificates, WorkCover tickets, demolition licences for contractor. Experience may cover previous work done in the area that may not require certificates or licences.	Give details of the duties and specific responsibilities of supervisors and other personnel. For example, describe such things as daily safety check of the work area by leading hand. You might like to include on a separate sheet, a flow chart showing the structure of your organisation and include the responsibilities of each person in that structure	Make sure that all workers and their supervisors are trained in the procedures needed to complete the job safely, especially where you are using new or changed work methods.
Engineering Details/Certificates/WorkCover Approvals:		
Give details that might be required for demolition, precast panel erection, structural steel erection. Certificates may be needed for formwork – falsework, machinery on suspended slabs, point loading on suspended slabs and WorkCover approval of machine-felling for demolition work.	Codes of Practice, Legislation: Are relevant codes of practice available on site? Is the work method equal to or better than any applicable codes of practice for the job to be done? Do procedures agree with relevant legislation?	
Plant/Equipment:		
List plant and equipment that you use on the job, e.g. ladders, scaffold trestles, grinders, electrical leads and equipment, formwork materials shoring materials, oxy set, welding machines, fire extinguishers, etc.	Maintenance Checks: Include: maintenance on cranes, forklift, monthly check on all electrical equipment and necessary tags, etc	
Read and Signed by All Employees on Site:		

At Golder Associates we strive to be the most respected global group of companies specialising in ground engineering and environmental services. Employee owned since our formation in 1960, we have created a unique culture with pride in ownership, resulting in long-term organisational stability. Golder professionals take the time to build an understanding of client needs and of the specific environments in which they operate. We continue to expand our technical capabilities and have experienced steady growth with employees now operating from offices located throughout Africa, Asia, Australasia, Europe, North America and South America.

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