

Monday, 29 March 2010

Our Ref: EA0026

Land Remediation Projects Manager
Incitec Fertilisers Limited
Main Road,
Boolaroo NSW 2294

Attn: Mark Shelley

Dear Mark,

**Re: Interim Audit Advice No. 20
Phase 2 Detailed Remediation Action Plan
Incitec Fertilisers Limited Site, Cockle Creek, NSW**

Since the completion of the Site Audit Report for the Conceptual Remediation Action Plan (C-RAP) for the Site (i.e. PWH_NSW_30, 17 November 2008), the following documents have been prepared by Soil and Groundwater Consulting (S&G), Golder Associates (GA), Manidis Roberts (MR) or Heritage Computing and submitted to the Auditor for review:

- Heritage Computing (10 November 2008) *Groundwater Modelling of the Incitec Pivot Cockle Creek Site* (ref: HC2008/10);
- Golder Associates Pty Ltd (December 2008) *Geotechnical investigation, Incitec Cockle Creek Facility, Boolaroo, NSW* (ref: 077623082_022_R_Rev1);
- Soil & Groundwater Consulting (10 August 2009) *Groundwater Hotspot Treatment Trial, Boolaroo, New South Wales* (ref: SG061313 RP04);
- Soil & Groundwater Consulting Pty Ltd (16 September 2009), *Soil data gaps assessment, Boolaroo, New South Wales*, (ref: SG061313 RP06);
- Golder Associates Pty Ltd (13 November 2009) *Geotechnical Investigation For Temporary Batter Slopes, Southern Gully Area, Incitec Cockle Creek Plant, Boolaroo, NSW, 13 November 2009* (ref: 076623082_040);
- Memorandum from Jacinta McMahon and Gary Shmertmann of Golder Associates Pty Ltd to Mark Shelley titled '*Incitec Cockle Creek Containment Cell – Design Amendments*', dated 26 February 2010;
- Soil & Groundwater Consulting (March 2010) *Addendum Report, Response to Audit C-RAP Conditions, IFL Cockle Creek Assessments*;
- Manidis Roberts Pty Ltd (March 2010) *Cockle Creek Construction Environmental Management Plan (CEMP)*;

- Soil and Groundwater Consulting (1 March 2010) *Detailed Remediation Action Plan, Phase 2, Cockle Creek Site Redevelopment, Boolaroo, New South Wales* (ref: SG061313 RP06);
- Golder Associates (10 March 2010) *Re: Site Audit Advice No. 11 Incitec Fertiliser Limited, Cockle Creek Site, Boolaroo, Review of Draft Cell Design* (ref: 077623082-050);
- Soil and Groundwater Consulting (19 March 2010) *Detailed Remediation Action Plan, Phase 2, Cockle Creek Site Redevelopment, Boolaroo, New South Wales* (ref: SG061313 RP06 REVISION 1);
- Soil and Groundwater Consulting (25 March 2010) *Detailed Remediation Action Plan, Phase 2, Cockle Creek Site Redevelopment, Boolaroo, New South Wales* (ref: SG061313 RP06 REVISION 2);
- Golder Associates (25 March 2010) *Re: Containment Cell Design, Cockle Creek, NSW* (ref: 077623082-031, Rev 5);
- Golder Associates Pty Ltd (26th March 2010) *Materials Compatibility Assessment*, (ref: 077623082-023-R-Rev2).

The documents referenced above have been prepared in order to:

- i) Address 19 conditions stipulated in the Conceptual Remediation Action Plan Site Audit Report (C-RAP SAR); and
- ii) Aid in providing a framework for the Phase 2 remediation works which in brief comprise excavation of contaminated soils in the north eastern portion of the Site and commencement of containment cell construction activities in this area.

This interim advice letter serves to assess the status of the responses to the 19 conditions and also provide the Auditor's review of the Phase 2 Detailed Remediation Action Plan (D-RAP) which in particular presents the detailed containment cell design.

It is understood that this interim advice letter is to be used as part of the Part 3A planning submission for the project.

1. CONCEPTUAL RAP CONDITIONS

The following table presents the C-RAP SAR conditions and a summary of how these conditions have been met.

Table 1: Summary of Compliance With C-RAP SAR Conditions		
No.	C-RAP SAR Condition	Summary of How Condition Has Been Met
1	Clarification of some elements of the site history (e.g. NPK production).	<p>S&G undertook an interview with a former manager of the Site who indicated that NPK production was not completed at the Site (see 30 November 2009 document).</p> <p>The Auditor considers that the condition has been adequately met.</p>
2	Additional hydraulic conductivity testing is to be conducted to provide a more defensible basis for estimating the groundwater flow velocities across the Site.	<p>S&G provided some interim data in the 30 November 2009 report, with more detailed reporting to follow after additional testing. Raw data from the additional testing was provided by email during December 2009.</p> <p>In March 2010 S&G provided a revised addendum report which provided the required data.</p> <p>The Auditor considers that the condition has been adequately met.</p>
3	A numerical groundwater flow and solute transport model is to be constructed and calibrated. This model is to be used to assess the post-remediation groundwater impact on the nearest receptors.	<p>A numerical groundwater flow model has been completed (see 10 November 2008 Heritage Computing report).</p> <p>The solute transport model is to be prepared by S&G in the near future and is to be reviewed by the Auditor as part of the Phase 3 D-RAP review.</p> <p>The absence of this model at this stage is not considered critical as there are contingencies in place to further treat groundwater if required (i.e. downgradient extraction trenches) and based upon preliminary model results it is unlikely that remnant groundwater contamination will significantly impact on the nearest receptor.</p>

Table 1: Summary of Compliance With C-RAP SAR Conditions

No.	C-RAP SAR Condition	Summary of How Condition Has Been Met
4	<p>Appropriate soil assessment criteria should be defined for:</p> <ul style="list-style-type: none"> – Antimony, Barium, Molybdenum, Sulphate, Silver, Tin, Vanadium, Total Phosphorous, Reactive Phosphate, Total Soluble Salts, Calcium, Fluoride, Nitrate, Ammonia and Total Nitrogen with respect to the protection of human health under a low density residential exposure scenario (i.e. HIL A); – Antimony, Barium, Beryllium, Cobalt, Molybdenum, Silver, Tin, Reactive Phosphate, Total Soluble Salts, Calcium, Fluoride, Nitrate, Ammonia and Total Nitrogen with respect to risks to the environment. 	<p>Where available, criteria have been defined for these chemicals in the Phase 2 D-RAP. The Auditor notes that assessment criteria have been defined for the chemicals which are likely to drive risks at the Site.</p> <p>The Auditor considers that the condition has been adequately met.</p>
5	<p>Groundwater assessment criteria must be defined for each chemical of concern for protection of primary contact recreation receptors, protection of aquaculture and protection of marine water ecosystems. Where no guidance is provided under NSW EPA or other NSW EPA endorsed Australian sources, other repudiable sources must be utilised (e.g. US EPA). Subsequently, groundwater data must be assessed and discussed with respect to these criteria.</p>	<p>Where available, criteria have been defined for these chemicals in the Phase 2 D-RAP. The Auditor notes that assessment criteria have been defined for the chemicals which are likely to drive risks at the Site.</p> <p>The Auditor considers that the condition has been adequately met.</p>
6	<p>The rationale for disregarding the URS (2004) data must be clearly defined through a review of the URS (2004) quality assurance and quality control data.</p>	<p>S&G provided a discussion in the 30 November 2008 report which in brief suggested that the data was disregarded on the basis of missing quality assurance and quality control data. S&G did not consider this to be significant based upon the scope of the S&G investigations.</p> <p>The Auditor considers that the condition has been adequately met.</p>

Table 1: Summary of Compliance With C-RAP SAR Conditions

No.	C-RAP SAR Condition	Summary of How Condition Has Been Met
7	The issue of whether the primary laboratory used is reporting Sulphate with appropriate accuracy needs to be further assessed.	<p>S&G provided a discussion in the 30 November 2008 which suggested that the issue relates to the primary laboratory reporting Sulphate as Sulphide and the secondary laboratory reporting Sulphate as Sulphate. This issue is to be further investigated during validation sampling (i.e. through additional sampling and analysis).</p> <p>The Auditor considers that the condition has been adequately met.</p>
8	Additional soil investigations will be required to defensibly assess the contamination status of the fill and natural soils across the Site with respect to Beryllium, Cobalt, Vanadium, Asbestos, Fluoride, TPH, BTEX, PAH, OCP, Phenols, PCB and VHCs.	<p>Additional investigations were completed and reported in the 16 September 2009 report.</p> <p>The Auditor considers that the condition has been adequately met.</p>
9	Soils to be placed in the containment cell must be assessed by an appropriately experienced and qualified expert with respect to potential reactions which may compromise the integrity of the proposed containment cell. This process should include the identification of any data gaps and completion of appropriate additional investigations (as necessary) and must assess the compatibility of the GCL liner with leachate (potentially Calcium rich).	<p>GA completed a 'materials compatibility assessment (MCA) report' dated 20 November 2009. The document was commented upon by the Auditor and a number of issues were subsequently addressed through written correspondence (see 30 November 2009 letter, 10 March 2010 letter). Subsequently, the MCA report was revised and reissued on 26th March 2010.</p> <p>The Auditor considers that the condition has been adequately met.</p>
10	Assessment criteria for air quality during the remediation phase must be appropriately defined.	<p>This has been provided in the CEMP.</p> <p>The Auditor considers that the condition has been adequately met.</p>
11	Design details for the proposed precipitation based water treatment system must be adequately defined.	<p>Design details were provided to the Auditor (see 30 November 2009 letter) and also to the Department of Water and Energy as part of the dewatering / injection licensing process.</p> <p>The Auditor considers that the condition has been adequately met.</p>

Table 1: Summary of Compliance With C-RAP SAR Conditions

No.	C-RAP SAR Condition	Summary of How Condition Has Been Met
12	Evidence of a dewatering / reinjection license issued by the appropriate regulatory body for the proposed extraction of groundwater and reinjection of treated water must be provided.	<p>A Department of Water and Energy license for 'groundwater remediation' which included a number of conditions was forwarded to the Auditor.</p> <p>The Auditor considers that the condition has been adequately met.</p>
13	Evidence of a trade waste agreement for discharge to sewer (if treated groundwater is to be disposed of in this manner) must be provided.	Not applicable as discharge to sewer is no longer being proposed.
14	<p>Further engineering details of the containment cell are provided including (but not limited to) the following:</p> <ul style="list-style-type: none"> – Seal bearing layer material characteristics (e.g. soil type, cation exchange capacity, permeability, dry density, moisture content etc.) and placement procedures; – Drainage layer material characteristics (e.g. diameter, fines content etc.); – Leachate collection pipe types and spacings; – Leachate sump construction details and materials; – Revegetation layer characteristics; – Fill and asbestos placement procedures. – Appropriate modelling of the advective and diffusive contaminant flux through the cell liner is undertaken to demonstrate that the design is protective of groundwater. 	<p>GA has provided appropriate engineering details in the D-RAP. The Auditor and GA have exchanged a series of correspondence regarding the detailed design.</p> <p>The Auditor considers that the condition has been adequately met.</p>
15	Contact details for the key stakeholders (i.e. phone) must be defined.	Contact details for key stakeholders have been defined in the Phase 2 D-RAP.
16	A remediation schedule and hours of operation must be defined.	<p>The remediation schedule and hours of operation were defined in the Phase 2 RAP.</p> <p>The Auditor considers that the condition has been adequately met.</p>

Table 1: Summary of Compliance With C-RAP SAR Conditions

No.	C-RAP SAR Condition	Summary of How Condition Has Been Met
17	Relevant Asbestos removal related legislation, regulation, guidance and licensing requirements etc. must be defined.	An appropriate discussion of asbestos management requirements has been provided in the Phase 2 D-RAP, noting that a third party is to be engaged in order to ensure that asbestos management requirements are appropriately met.
18	Contingency approaches must be defined for soil and groundwater remediation in the event that the selected preferred remedial options prove to be inadequate to achieve the remedial objectives (both in the short term and long term).	<p>A discussion of contingency approaches was provided in the Phase 2 D-RAP.</p> <p>The Auditor considers that the condition has been adequately met.</p>
19	<p>The commitments made under the C-RAP section titled 'Construction & Demolition Management Plan' must be fulfilled, namely:</p> <ul style="list-style-type: none"> – The 'site specific safety management system' must be developed; – An appropriate Surface Water Management Plan must be prepared; – An appropriate Groundwater Management Plan must be prepared; – An appropriate Traffic Management Plan must be prepared; – An appropriate Air Quality Management Plan must be prepared; – An appropriate Asbestos Management Plan must be prepared; – An appropriate Noise & Vibration Management Plan must be prepared; – An appropriate Odour Management Plan must be prepared. 	<p>A Construction Environmental Management Plan (CEMP) has been prepared by MR and provided as an appendix to the Phase 2 D-RAP. The CEMP addresses each of the relevant C-RAP SAR conditions.</p> <p>The Auditor considers that the condition has been adequately met.</p>

Based on the above review, only one of the 19 conditions from the C-RAP has not been met (lack of a solute transport model). The absence of this model at this stage is not considered critical as there are contingencies in place to further treat groundwater if required (i.e. downgradient extraction trenches) and based on preliminary model results it is unlikely that remnant groundwater contamination will significantly impact on the nearest receptor. Nonetheless, this document will be prepared in the future and reviewed along with the Phase 3 D-RAP.

2. ADEQUACY OF THE PHASE 2 D-RAP

The following table presents an assessment of the Phase 2 D-RAP in accordance with NSW EPA (1997) *Contaminated Sites: Guidelines for Consultants Reporting on Contaminated Sites*:

Table 2: Assessment of Detailed Remedial Action Plan	
Remedial Action Plan Aspect	Auditor Assessment / Comments
EXECUTIVE SUMMARY	An executive summary has been provided and is considered to be adequate.
SCOPE OF WORK	The scope of work has been clearly defined and is considered to be adequate.
SITE IDENTIFICATION	The site identification has been clearly defined.
SITE HISTORY	An adequate summary of the Site history has been provided.
SITE CONDITION AND SURROUNDING ENVIRONMENT	The Site condition and surrounding environment have been adequately summarised.
GEOLOGY & HYDROGEOLOGY	The Auditor considers that the regional and Site specific geology / hydrogeology have been appropriately summarised.
BASIS FOR ASSESSMENT CRITERIA	Assessment criteria were adequately defined for soil, groundwater and surface water. The Auditor notes that assessment criteria were not available for all chemicals which have been detected, however, it is considered that criteria have been identified for the chemicals which drive risks at the Site.
RESULTS & SITE CHARACTERISATION	An adequately detailed discussion of previous results and site characterisation data was provided. The statistical summary previously provided in the C-RAP was updated with limited additional data collected by S&G.
REMEDIAL ACTION PLAN	
Remedial Goal;	<p>The RAP states that the goal of the Phase 2 remediation activities are to (paraphrased) i) establish a fully lined containment cell in the northern portion of the Site and ii) remediate accessible soils.</p> <p>The Auditor considers the remedial goals to be appropriate considering the staged remediation approach which is being proposed.</p>
Discussion of the extent of remediation required;	The D-RAP notes that the majority of the Site requires remediation, however, for the purposes of the Phase 2 remediation activities, the extent of remediation is limited to the area to the north of the current buildings. The areas where buildings are currently present is referred to as the Phase 3 area. The area to the south west of the current buildings (i.e. vicinity of depression and infilled gully) is referred to as the Phase 4 area.

Table 2: Assessment of Detailed Remedial Action Plan	
Remedial Action Plan Aspect	Auditor Assessment / Comments
Evaluation of Remedial Options;	The evaluation of relevant remedial options was previously presented in the C-RAP and considered to have been adequate. The Auditor considers that reiteration of the C-RAP discussion was not necessary.
Selected Preferred Option;	<p>The C-RAP previously identified the preferred remediation approach to be excavated of contaminated soils and construction of an onsite containment cell, with localised groundwater extraction and treatment to be conducted in the north western portion of the Site. This represents Phase 2 of the remediation activities.</p> <p>Phase 2 remediation activities are to comprise excavation of contaminated soils, temporary stockpiling of soil in available areas or within Shed 4, screening of excavated soils for geotechnically unsuitable materials and partial construction of the containment cell.</p> <p>The Phase 2 D-RAP includes a containment cell detailed design prepared by GA as an appendix. The Auditor has completed a review of the detailed design considering NSW EPA (1996) <i>Environmental Guidelines: Solid Waste Landfills</i> (see Attachment 1 to this letter).</p> <p>GA produced a MCA to assess any deleterious impacts which may result from the type of materials to be placed in the cell with regard to:</p> <ul style="list-style-type: none"> • Acid Generating Potential; • Aggressivity; • Fouling; • Reactivity; • Flammability. <p>The Auditor has reviewed the MCA and agrees that no significant impacts are likely to result.</p>
Rationale;	The C-RAP included a rationale for the selection of the preferred remedial option which the Auditor considers to have been appropriate. The Auditor considers that reiteration of the C-RAP discussion was not necessary.

Table 2: Assessment of Detailed Remedial Action Plan	
Remedial Action Plan Aspect	Auditor Assessment / Comments
Proposed Validation Testing;	<p>The proposed validation testing includes the following:</p> <ul style="list-style-type: none"> • Visual inspection to confirm the absence of fill and odorous / discoloured soils in excavated areas; • Use of X-ray Fluorescence (XRF) screening for excavation surfaces on a 30m grid (15 per hectare). The XRF data will be validated through laboratory analysis on a basis of one laboratory check sample per 10 XRF samples; • Sampling for a broad range of organic and inorganic analytes on a larger grid (5 per hectare); • TCLP testing to show that commercial / industrial landuse based validation criteria will be adequately protective of groundwater. <p>The Auditor considers the proposed validation testing to be adequate.</p>
Interim Site Management Plan (before remediation);	<p>The Site is currently operational and access is restricted through a chain mesh fence along each boundary and a security controlled vehicle access gate. As such, the Auditor considers that interim site management is not necessary.</p>

Table 2: Assessment of Detailed Remedial Action Plan	
Remedial Action Plan Aspect	Auditor Assessment / Comments
Site Management Plan (operation phase) including stormwater, soil, noise, dust, odour and OH&S;	<p>The Phase 2 D-RAP includes a Construction Environmental Management Plan (CEMP) prepared by MR as an appendix. The CEMP addresses the following issues:</p> <ul style="list-style-type: none"> • Soil management (e.g. minimise erosion); • Surface water management (e.g. collection, dams, stormwater treatment, diversions); • Groundwater management (e.g. groundwater treatment system discussed in C-RAP SAR); • Flora and fauna management (e.g. unexpected finds, prevention of weed propagation); • Visual landscape and rehabilitation management; • Noise and vibration management (e.g. minimisation, monitoring and community liaison); • Air quality management (e.g. dust / odour minimisation and monitoring); • Traffic / access management (e.g. signage, speed limitation, parking restrictions); • Archaeology and heritage management (e.g. cease work if potential heritage items are discovered); • Hazard and risk management (e.g. induction); • Utilities and service management (e.g. minimise interruptions); • Asbestos management (e.g. licensing of contractors, register, permits, monitoring, record keeping); • Demolition management (e.g. licensing of contractors, permits, monitoring, waste management). <p>The CEMP is considered to be adequate for the purposes of the Audit.</p>

Table 2: Assessment of Detailed Remedial Action Plan	
Remedial Action Plan Aspect	Auditor Assessment / Comments
Contingency Plan if Selected Remedial Strategy Fails;	<p>The Phase 2 D-RAP provides the following contingency plans:</p> <ol style="list-style-type: none">1. The only potentially viable option to remediate soil contamination was identified to be offsite disposal to a landfill, which S&G has assessed to be cost prohibitive;2. Maintenance of a buffer zone on the hydraulically downgradient side of the containment cell to allow for future groundwater activities (if necessary).
Contingency Plans to Respond to site Incidents. Site Management Plan for the Operation Phase;	
Remediation Schedule and Hours of Operation;	<p>A remediation schedule was provided by Golder as an attachment to the Phase 2 D-RAP.</p> <p>The D-RAP notes hours of operation to be 6am to 6pm Monday to Friday and 9am to 1pm on Saturdays.</p>

Table 2: Assessment of Detailed Remedial Action Plan	
Remedial Action Plan Aspect	Auditor Assessment / Comments
License and Approvals;	<p>The D-RAP provides a discussion of relevant licenses and approvals, including the following:</p> <ul style="list-style-type: none"> Contaminated Land Management Act 1997: Site has been declared as a Remediation Site under Part 3, Division 3. IFL has entered into a Voluntary Management Plan with DECCW; State Environmental Planning Policy 'Major Projects' 2005: Due to the Remediation Site declaration, Minister for Planning & The Environment approval is required for the remediation under Part 3A of the Environmental Planning and Assessment Act 1979; State Environmental Planning Policy 55 'Remediation of Land': The proposed remediation works are Category 1 and require consent (noting that the requirement for consent was triggered under the Major Projects SEPP); Protection of the Environment (Operations) Act 1997 and Regulations: Some waste management and waste tracking requirements apply. <p>It is noted that S&G has been obtaining appropriate licensing for dewatering / reinjection from the Department of Water and Energy.</p> <p>The Golders Cell Design report noted that the removal of 1,600m³ (or 56,000m²) of Asbestos containing materials will be required to be undertaken by appropriately licenses contractors in accordance with specific regulatory requirements and work practices. The Phase 2 D-RAP includes additional discussion regarding Asbestos management requirements and noted that a third party will be appointed to ensure Asbestos management requirements are met.</p> <p>Preliminary heritage investigations have indicated a low potential for significant heritage sites.</p>
Contacts / Community Relations;	Key stakeholder details have been defined.
Staged Progress Reporting;	<p>The D-RAP proposes monthly progress reporting, reporting when certain milestones are reached, annual reporting and a final validation report.</p> <p>The Auditor considers the proposed reporting to be adequate.</p>

Table 2: Assessment of Detailed Remedial Action Plan	
Remedial Action Plan Aspect	Auditor Assessment / Comments
Long term site management plan.	<p>An Environmental Management Plan (EMP) will be prepared following completion of the remediation works to provide a framework for the ongoing management of the containment cell. The D-RAP highlights leachate management, capping inspection / maintenance and surface water / groundwater monitoring as the primary long term management related requirements. A Groundwater Quality Management Plan will be developed and implemented as part of the EMP.</p> <p>The D-RAP states that the EMP must be a legally enforceable document and as such:</p> <ul style="list-style-type: none"> • The existence of the EMP will be noted on the Section 149 Certificate for the containment cell portion of the Site (which will have a separate title identifier by completion of the containment cell) and under Section 88b of the Conveyancing Act 1919 where its presence will be noted on the land title; • The EMP will be implemented by a single entity. At this stage, IFL will retain ownership of the containment cell and as such carry legal responsibility for the implementation of the EMP; • The EMP will be reviewed and approved by the Site Auditor. <p>The details regarding the proposed long term management of the containment cell are considered to be adequate for this stage (i.e. commencement of part of remediation activities).</p>
CONCLUSIONS & RECOMMENDATIONS	A 'Conclusions & Recommendations' section was provided which the Auditor considers to be adequate.

Based on the above review the Auditor considers that the Phase 2 D-RAP provides a suitable framework for remediation of the Phase 2 area.

3. OUTSTANDING ACTIONS

Based on the review the cell design (Attachment 1), there are a few minor issues that require resolution before the final site sign off. These are summarised in the table below.

Table 3: Summary of Outstanding Items from the Review of the Cell Design			
Item No. (see Attachment 1)	Issue	Aspect	Resolution
4	Groundwater monitoring network	Long Term Groundwater monitoring program required.	To be provided in Groundwater Quality Monitoring Plan prior to completion of final Site Audit Report and Site Audit Statement.
5	Groundwater monitoring program		
6	Groundwater assessment program		
7	Surface water monitoring program	Surface Water monitoring program required	To be provided in Surface Water Quality Monitoring Plan prior to completion of final Site Audit Report and Site Audit Statement.
2	Leachate collection system	Leachate disposal details	To be provided in Cell Operation and Maintenance Plan.
8	Leachate monitoring program	Leachate assessment.	
31	Litter control	Daily and Intermediate cover details	

4. FUTURE STAGES OF AUDIT

In accordance with the requirements for the Voluntary Management Proposal agreed between IFL and NSW DECCW the following audit outcomes are to be provided in the future.

Table 4 – Future Audit Outcomes			
Remediation Phase	Documents to Audit	Audit Outcome	Comment
Phase 4	Phase 4 D-RAP	Interim Audit Advice	Pending and to be submitted along with this Interim Audit Advice as part of the Part 3A planning submission.
Phase 3	Phase 3 D-RAP	Interim Audit Advice	Phase 3 D-RAP not prepared yet.
Completion	Validation Reports	Part A Site Suitability Audits	To be prepared for both Containment Cell and Residential Area.

5. CONCLUSIONS

Based on the Auditors review of the Phase 2 D-RAP and accompanying cell design the following is concluded:

- 18 of the 19 conditions of the C-RAP have been adequately addressed. The outstanding condition (i.e. groundwater solute transport model) is not of critical importance at this stage and is to be addressed in the near future;
- The Phase 2 D-RAP provides a suitable framework for remediation of the Phase 2 area;
- The cell design is in general accordance with the relevant sections of the NSW EPA (1996) *Environmental Guidelines: Solid Waste Landfills* and is considered suitable to adequately protect human health and the environment in the future.

Should you have any questions regarding the content of this letter, please do not hesitate to contact me via phone (02 4040 8150) or email (phitchcock@environmental-auditors.com.au).

Yours faithfully,



Phillip Hitchcock

NSW EPA Accredited Site Auditor (Contaminated Land)

ATTACHMENT 1

REVIEW OF DETAILED DESIGN FOR CONTAINMENT CELL

Item	Benchmark EPA Solid waste guidelines (1996)	Primary environmental goal	Aspect	Golders cell design	Advice No 11 Auditor Comment	Golder Response10th March 2010	Outstanding Issue
1	Leachate barrier system	Preventing pollution of water by leachate	Barrier system to be designed and installed in accordance with the quality requirements specified in an approved Construction Quality Assurance Program (CQAP).	CQAP to come.	CQAP required for detailed review.	Nil	No. CQAP provided in final cell design report.
			A recompacted clay or modified soil liner at least 90cm thick with an in-situ coefficient of permeability of less than 10^{-9} m/s.	Sealing layer is only 50cm thick.	Although the sealing layer is only 50cm there is also a composite liner comprising a GCL and 2mm HDPE. Design is appropriate.	NR	No
			Layers of a compatible material and each underlying layer should be scoured to prevent excessive permeability due to laminations.	Clay is to be placed in lifts. HDPE to be roughened on both sides to prevent slipping.	Design is appropriate.	Nil	No
			Sides should not exceed gradient of one vertical to three horizontal	Not appropriate for cell configuration.	NA	Nil	No
			If located in an area of poor	Base liner is a single	Considered	Nil	No

Item	Benchmark EPA Solid waste guidelines (1996)	Primary environmental goal	Aspect	Golders cell design	Advice No 11 Auditor Comment	Golder Response10th March 2010	Outstanding Issue
			hydrological conditions or threatens groundwaters or surface waters, the liner should be overlaid with a flexible membrane liner (FML) of permeability 10^{-14} m/s.	composite liner comprising a HDPE membrane with an overlying geotextile cushion layer and an underlying GCL and soil bearing layer. Cell design also incorporates an underdrain to collect groundwater that migrates to the underside of the cell.	appropriate.		
			The FML should have properties that maintain the permeability for a period at least equal to the reactive life of the waste contained by the FML.	Cell design life noted as being in the order of 100 years.	The reactive life refers to a utrescibles landfill and is not applicable as the landfill is essentially a monofil containing minimal organic matter.	Nil	No
			FML should have a minimum thickness of 1.5mm, and be laid with appropriate construction quality assurance program.	2mm HDPE proposed. A summary of proposed QA/QC is provided noting that testing will be undertaken.	CQAP required for detailed review.	Nil	No

Item	Benchmark EPA Solid waste guidelines (1996)	Primary environmental goal	Aspect	Golders cell design	Advice No 11 Auditor Comment	Golder Response 10th March 2010	Outstanding Issue
				CQAP to come.			
			All joins and repairs to be fully tested to ensure liner integrity is not breached.	A summary of proposed QA/QC is provided noting that testing will be undertaken. CQAP to come.	CQAP required for detailed review.	Nil	No
			FML should be protected by an overlay of soil with low abrasive properties or synthetic non-woven geotextile of sufficient depth to protect the FML.	Cushion geotextile overlying 2mm HDPE.	Considered appropriate.	Nil	No
			Where the natural geology of the site is proposed to be used as the leachate barrier system.	NA, natural geology not being relied upon.	NA	Nil	No
			Once settling has finished, the upper surface of the liner or barrier must exhibit a transverse gradient of >3% and longitudinal gradient of greater than 1%.	The transverse gradient is to be between 4 and 12 % with a longitudinal gradient of 10%.	Considered appropriate	Nil	No
2	Leachate	Preventing pollution	The leachate collection	CQAP to come.	CQAP required for	Nil	No.

Item	Benchmark EPA Solid waste guidelines (1996)	Primary environmental goal	Aspect	Golders cell design	Advice No 11 Auditor Comment	Golder Response 10th March 2010	Outstanding Issue
	collection system	of water by leachate	system to be designed and installed in accordance with the quality requirements specified in an approved Construction Quality Assurance Program.		detailed review.		CQAP provided in final cell design report.
			Over the liner, drainage layer should be installed >30cm, with $K > 10^{-3}$ m/s.	Drainage layer = 30cm, $K > 1 \times 10^{-3}$ m/s.	Considered appropriate	NR	No
			Drainage media should have sufficiently large pore space to prevent encrustation. Gravel should be rounded, >20mm, smooth-surfaced, non-reactive in mildly acidic conditions, relatively uniform in grain size, and free of carbonates.	Gravel maximum particle size 26.5mm, however 19mm sieve <20% and 13.2mm sieve <10%, fines <2%. Free of organic matter; carbonates; clay balls.	Generally considered appropriate however the angularity of the gravel is not specified and please justify the 32% less than 26.5mm.	Design now changed to geocomposite drain, so comment redundant	No
			Geotextiles should not be used where low porosity and consequent encrustation could result in blockage.	A geotextile overlays the gravel but encrustation is not expected to be a major issue	NA	NR	No
			Perforated collector pipes should be placed within the	Pipes are generally at 75m centres placed	Considered generally	Details provided	No

Item	Benchmark EPA Solid waste guidelines (1996)	Primary environmental goal	Aspect	Golders cell design	Advice No 11 Auditor Comment	Golder Response 10th March 2010	Outstanding Issue
			drainage layer at intervals of not more than 50m. Should be minimum 150mm diameter, strong, minimum longitudinal gradient of 1%, capable of being rinsed/monitored.	within a drainage blanket over the majority of the cell floor. Pipes are 160mm diameter, Strength not specified Longitudinal Gradient = 4 – 12% There are three flushing points	appropriate. Noting that strength has not be specified. Please comment on the spacing of the pipes exceeding the benchmark.		
			Daily or intermediate cover to be removed prior to further filling.	Only applicable for a putrescible landfill	NA	NR	No
			Leachate stored in a dam or in above-ground tanks surrounded by a bund with a capacity of 100%.	Minimal leachate expected due to 3 sealing layers in capping. Therefore no leachate dam proposed.	HELP modelling required to support low infiltration rate.	To be provided in revision of design report	No Closed out in revised cell design report.
			Dam or tanks to have alarms, capable of accepting 1/25	See above	NA	NR	No

Item	Benchmark EPA Solid waste guidelines (1996)	Primary environmental goal	Aspect	Golders cell design	Advice No 11 Auditor Comment	Golder Response10th March 2010	Outstanding Issue
			year storm event.				
			Leachate to be tested prior to disposal.	Not included	Details to be included in CEMP/Cell O&M Plan.	NR	No
			Leachate to be disposed of by 1) sewer, 2) spraying or land application or injection back into the landfill under licence 3) treatment and discharge under licence.	Not included	To be included in CEMP or Cell Operation & Management Plan.	NR	Yes, to be closed out in Cell O and M plan which will be assessed as Part of final audit on site suitability following completion of remediation.
3	Surface water controls	Preventing pollution of water by leachate	All water that has entered waste-filled areas and water that has been contaminated by leachate should be handled and treated in the same manner as leachate.	Not included	Details to be included in CEMP/Cell O&M Plan.	NR	No
			All surface water to be handled in accordance with stormwater manual.	Not included	Details to be included in CEMP/Cell O&M Plan.	NR	No. Included in CEMP.
			Exposed or cleared areas to be minimised at all times,	Only applicable for a	NA	NR	No

Item	Benchmark EPA Solid waste guidelines (1996)	Primary environmental goal	Aspect	Golders cell design	Advice No 11 Auditor Comment	Golder Response10th March 2010	Outstanding Issue
			topsoil set aside for revegetation purposes. Any areas exposed for greater than 30 days to be stabilised to prevent soil erosion.	putrescible landfill			
4	Groundwater monitoring network	Detecting water pollution	If multiple aquifers identified, should have either a nest of bores, slotted over different intervals, a multi-port bore or an appropriate combination of both. Monitoring bores minimum 50mm diameter. Bores to be adequately constructed.	Not included	To be included in D-RAP	NR	Yes To be provided in Groundwater Quality Monitoring Plan at a later date.
5	Groundwater monitoring program	Detecting water pollution	Groundwater monitoring program in LEMP. Plan of the proposed location and depth of wells required. Analysis as per Table 2, and sampled by appropriately qualified persons.	Not included. Table 2 analytes are based on a putrescibles landfill and are not appropriate.	To be included in D-RAP	NR	Yes To be provided in Groundwater Monitoring Plan at a later date.

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			Procedures as per p22, including QA/QC.				
6	Groundwater assessment program	Detecting water pollution	If the groundwater monitoring program detects a possible failure of the leachate containment system, groundwater assessment program to be established.	Not included	To be included in D- RAP	NR	Yes. To be provided in Groundwater Monitoring Plan at a later date.
7	Surface water monitoring program	Detecting water pollution	Surveyed monitoring points in receiving waters at all site discharge locations upstream and downstream of the landfill. Quarterly sampling recommended. Analysis as per Table 2.	Not included	To be included in D- RAP/CEMP	NR	Yes. To be provided in Surface water Monitoring Plan at a later date
8	Leachate monitoring program	Preventing pollution of water by leachate	Recommended to assess leachate, any disposal method to be approved by EPA and outlined in LEMP	Not included	To be included in cell operation and maintenance plan (Cell O&M).	NR	Yes. To be included in Cell O and M plan at a later date.
9	Water contamination	Remediation water	Groundwater Contamination Remediation Plan should be	Not included	To be included in D-	NR	No.

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	remediation plan	pollution	developed if groundwater or subsoil contamination is confirmed via the Groundwater Assessment Plan.		RAP as contingency.		Included in Phase 2 D-RAP.
10	Landfill gas containment system	Preventing landfill gas emissions	LFG to be contained by other benchmark techniques 1) Leachate barrier system, 28) Site capping and re vegetation, 33) Covering of waste.	Not included	NA as due to the low organic matter, no significant landfill gas will be generated.	NR	No
11	Extraction and disposal of landfill gas	Preventing landfill gas emissions	A gas extraction system to be used to extract, and where possible, combust landfill gases.	Not included	NA, as above.	NR	No
12	Fire prevention	Preventing landfill gas emissions	Occupier to have clear signs advising that flammable liquids are not permitted. Stockpiles of approved amounts of combustibles for recycling and composting should be divided into small piles or windrows so that any burning material can be kept away from or readily	Not included.	NA, as above.	NR	No

Item	Benchmark EPA Solid waste guidelines (1996)	Primary environmental goal	Aspect	Golders cell design	Advice No 11 Auditor Comment	Golder Response10th March 2010	Outstanding Issue
			<p>separated from additional fuel.</p> <p>Cell construction, compaction and use of cover to be undertaken in a manner conducive to the prevention of a landfill fire.</p> <p>All sealed or contaminated drums should be banned from landfill unless delivered as a special waste.</p> <p>All fuels/flammable solvents for operational use to be stored in an appropriately ventilated and secure store.</p>				
13	Controlled burning	Preventing landfill gas emissions	Release of leachate and/or pollutants as a result of burning waste should be prevented.	Not included.	NA, as above	NR	No
14	Site closure	Preventing landfill gas emissions	Landfill site to be closed in a manner that reduces to a minimum the emission of landfill gases.	Not included.	NA, as above	NR	No
15	Subsurface gas	Detecting landfill	Landfill gas monitoring	Not included.	NA, as above	NR	No

Item	Benchmark EPA Solid waste guidelines (1996)	Primary environmental goal	Aspect	Golders cell design	Advice No 11 Auditor Comment	Golder Response 10th March 2010	Outstanding Issue
	monitoring devices	gas emissions	devices should be capable of detecting landfill gas in sufficiently low concentrations to ensure that landfill gas is not migrating off-site, and toxic air emissions are not a threat to the community.				
16	Subsurface gas monitoring program	Detecting landfill gas emissions	A subsurface gas monitoring program should be implemented to demonstrate that gas is not migrating off-site.	Not included.	NA, as above	NR	No
17	Surface gas emission monitoring	Detecting landfill gas emissions	Surface gas migration monitoring should demonstrate that the cover material and extraction system is controlling the emission of landfill gas.	Not included.	NA, as above	NR	No
18	Gas accumulation monitoring	Detecting landfill gas emissions	Landfill gas must not accumulate in buildings and pose a danger of explosion.	Not included.	NA, as above	NR	No
19	Remediation of uncontrolled landfill gas	Remediating landfill gas emissions	EPA must be notified and a written assessment of the emissions and management	Not included.	NA, as above	NR	No

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	emissions		controls implemented/proposed to be forwarded within 14 days.				
20	Assurance of quality	Assuring quality of design, construction and operation.	A fully documented Construction Quality Assurance System to be developed in accordance with AS 3905.2. A fully documented Environmental Management Quality System to be developed and implemented.	CQAP to come.	CQAP required for detailed review.	Nil	No CQAP provided in the final cell design report.
21	Screening of wastes received	Assessing quality of incoming waste.	The landfill occupier should have in place waste acceptance and screening procedures to ensure that the site does not accept wastes that are prohibited from entry.	Not included	NA, not a receiver of waste all coming from site. Only VENM to be imported	NR	No
22	Measurement of quantities of wastes received	Recording of wastes received	All landfill operations should include a record of waste received.	No external waste to be received	NA	NR	No
23	Recording of the quantities of	Recording of wastes	Landfill to provide information to EPA on a	NA as not a licensed	Not required. Final audit report will	NR	No

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	wastes received	received	monthly and annual basis.	landfill	include summary of volumes emplaced.		
24	Compaction of waste	Minimising landfill space used.	Landfill occupiers are expected to ensure that maximum compaction is achieved for the capacity of the machines used. For landfills receiving >50 000t, waste compaction goal is 850kg/m3.	Emplacement material to be well compacted to 95% Standard Maximum Dry Density. Aspect relates to putrescible waste so not applicable	Considered appropriate	NR	No
25	Recycling	Maximisation of recycling	LEMP should include a plan to recover and recycle, re-use of reprocess wastes that can be viably recycled.	Not included.	NA, related to a solid waste landfill	NR	No
26	Financial assurance	Remediation landfill after closure	Financial assurance required to ensure that landfill occupiers adequately plan for emergency closure, site remediation and post-closure care by providing a specific mechanism to accumulate requisite funding during the life of the landfill.	Not included	NA as not a licensed landfill	NR	No
27	Filling	Minimising landfill	Landfill contours should be managed in a systematic	Not included	Contours and volumes to be	Nil	No

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	plan/contours	space used	<p>manner as outlined in the LEMP.</p> <p>Landfill occupier to update the filling plan when each cell is started/completed.</p> <p>The filling plan to identify the type of waste in each cell and the location of any special burials such as asbestos.</p> <p>Survey to be conducted by a registered surveyor.</p>	The location of asbestos has not been discussed.	<p>provided at completion of each stage.</p> <p>Staging plan produced.</p> <p>Location of asbestos to be placed in the cell should be specified.</p>		Provided in final cell design report.
28	Site capping and revegetation	Remediating landfill after closure	Site capping and revegetation to ensure that the final surface provides a barrier to the migration of water into the waste, controls emissions to water and atmosphere, promotes sound land management and conservation, and prevents hazards and protects amenity.	Included	Considered appropriate	NR	No
			Occupier to commence capping of the completed	Timing included in	Considered	NR	No

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			filled areas within 30 days of completion of capping in the area, weather permitting.	staging plan	appropriate		
			<p>Landfill capping layer to have 5 parts</p> <ul style="list-style-type: none"> Seal-bearing surface Gas drainage layer (30cm . <10% CaCO₃) Sealing layer (50cm x 10 -8) Infiltration drainage layer (30cm 1 x 10 -5) Revegetation layer (1m). 	<p>Landfill capping comprises:</p> <ul style="list-style-type: none"> Seal bearing layer (300mm) compacted clay Geomembrane liner LLDPE 1mm Subsoil drainage layer (geocomposite) Subsoil layer (550mm) Revegetation layer (150mm) 	<p>Generally in accordance with guidelines with the exception of a gas collection system below the liner. As noted, this is not considered necessary based on the evaluation of gas generation potential. Further comment provided below.</p>	NR	No
			Seal-bearing surface to consist of a properly designed and engineered layer of material.	Seal-bearing surface to comprise 300mm clayey soil, compacted to >98% std. max dry density and within +/- 2% of std. optimum	Although less than the 0.5m required it is noted that the cap also includes a HDPE layer so is less permeable than the	NR	No

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				water content.	benchmark		
			Gas drainage layer minimum thickness=30cm. CaCO ₃ must not exceed 10% by weight.	Not included.	NA - No gas drainage layer required as significant quantities of gas should not be generated.	NR	No
			Drainage layer of at least $K=10^{-5}$ m/s, greater than 30cm deep.	Drainage layer c	Although layer is thinner the permeability is higher and overall would be suitably transmissive.	NR	No
			Revegetation layer greater than 100cm. Plants to have root systems which will not penetrate beyond revegetation layer or block the drainage layer.	Revegetation layer, including top two layers = 500mm.	Please justify	Increased to 700mm and appropriate for the type of vegetation (grasses)	No
			Final settlement of the seal-bearing surface should leave a gradient of greater than 5%.	5% slope on the top of the cell.	Appropriate.	NR	No
			Within 3 months of completion of landfill's waste receipt operations, a	NA. Only for licensed landfills	Not required. Ongoing monitoring requirements to be	NR	No

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			written Closure Plan must be submitted to EPA for approval.		outlined in CEMP. Staging plan includes final cell dates.		
			Lockable security gates are installed and maintained. 1.8m high wire mesh fence around the perimeter of the site.	Not included.	Security requirements to be included in D-RAP.	NR	No In Phase 2 D-RAP.
29	Landfill closure and post-closure monitoring and maintenance	Remediating landfill after closure.	Local amenity should not be degraded by litter.	Not included	No litter identified on the site, no controls required.	NR	No
30	Security of site	Preventing unauthorised entry.	All mud and waste materials on vehicles that leave the site should generally be removed. Landfill occupier to provide a wheel-washing and wheel-cleaning facility.	Not included.	Soil management provisions to be included in D-RAP or CEMP.	NR	No In Phase 2 D-RAP.
31	Litter control	Preventing degradation of local amenity	Daily soil cover – to a minimum depth of 15cm, all waste to be covered prior to ceasing operations at the	Not included.	Waste covering details to be included in CEMP or Cell O and M plan.	NR	Yes To be included in Cell O and M plan.

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			<p>end of each day.</p> <p>Intermediate cover – suitably selected intermediate cover to be applied to a depth of 30cm over surfaces which will be exposed for more than 90 days.</p> <p>Cover material stockpile – two week supply to be maintained.</p>				
32	Cleaning of vehicles	Preventing degradation of local amenity	<p>Max. level of 4g/m² per month for dust deposition rate, not to leave site boundary.</p> <p>Water spraying for dust suppression ok, may need additional controls in areas of fine soils or windy conditions.</p> <p>Dust gauges to be installed in accordance with AS2724.1-1984. No. and locations to be approved by</p>	Not included.	Dust management provisions to be included in CEMP.	NR	No Included in CEMP.

Item	Benchmark EPA Solid waste guidelines (1996)	Primary environmental goal	Aspect	Golders cell design	Advice No 11 Auditor Comment	Golder Response 10th March 2010	Outstanding Issue
			EPA. Monitoring of dust off-site within 1km of site boundary, to be carried out by a suitably qualified person and a NATA registered lab.				
33	Covering of waste	Preventing degradation of local amenity	Pests, vermin and noxious weeds should not be present at the site in sufficient numbers to pose an environmental hazard or loss of amenity.	Not included. Inspection for weed control noted on a monthly basis for first year and then annually.	To be included in CEMP	NR	No Included in CEMP.
34	Dust controls	Preventing degradation of local amenity	Occupier needs to take appropriate good housekeeping steps, use of daily cover and immediate attention to odourous wastes will assist this. If potential odour impact identified (under DUAP1996), a meteorological station is required. Landfill occupier to maintain a record of complaints	Not included.	To be included in CEMP	NR	No Included in CEMP

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			regarding odours.				
35	Pest, vermin and noxious weed controls	Preventing degradation of local amenity	Specific criteria in EPA's Environmental Noise Control Manual.	Not included.	To be included in Cell O and M plan	NR	No Included in CEMP.
36	Odour controls	Preventing degradation of local amenity.	Site specific fire management plan required to minimise the incidence and impact of fire.	Not included.	To be included in D-RAP/CEMP	NR	No Included in CEMP.
37	Noise control	Preventing noise pollution.	Level and nature of staffing and training should be adequate for environmentally responsible and safe management of the landfill.	Not included.	To be included in D-RAP/CEMP	NR	No. Included in CEMP.

Based on the above review the Auditor considers that cell design is in general accordance with relevant sections of the NSW EPA (1996) *Environmental Guidelines: Solid Waste Landfills*.