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Coffs Harbour City Council

Major Project 07-0085 - Coramba Groundwater Remediation Project

Submissions Report

May 2009

INFRASTRUCTURE | MINING & INDUSTRY | DEFENCE | PROPERTY & BUILDINGS | ENVIRONMENT

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1. Introduction

1.1 Overview

The environmental assessment was placed on public exhibition by the Department of Planning (DoP) between 26 February 2009 and 30 March 2009. Following exhibition, the DoP provided Coffs Harbour City Council (CHCC) with a copy of submissions received.

The letter stated that in accordance with clause 75H(6) of the Act, the Director General of DoP requires CHCC to respond to issues raised in the submissions.

This report provides CHCC's responses to this requirement.

No modifications to the proposal described in the Environmental Assessment are proposed by this report.

1.2 Background

In 2002 a seepage of hydrocarbon contaminated groundwater was identified entering a backwater adjacent to the Orara River, upstream of the off-take for the Coramba township's reticulated water supply (this off-take has since been removed). The source of the hydrocarbon contamination is understood to be from an unleaded petrol leak from a former underground storage tank at the existing service station at 33 Gale Street.

The Department of Environment and Climate Change (DECC) made a declaration under Section 21 of the Contaminated Land Management (CLM) Act 1997 over 5 Martin Street, Coramba, as a "Remediation Site" in July 2003. This declaration was subsequently revised to include part of this property only. Following this determination, the DECC assisted the landowners of 5 Martin Street to apply to the NSW Environmental Trust for grant funding under the "innocent owners scheme" to fund remedial works.

Following on from earlier work by other consultants, a Pre-Remediation Environmental Assessment was conducted in 2006 by WSP Environmental Pty Ltd (WSP), "in order to determine the source of contamination, assess the local hydrogeology and contamination migration pathways and to identify the plume of contaminated groundwater" (WSP October 2006). The findings of that assessment provided sufficient information for the preparation of a draft Remedial Action Plan (RAP) (also prepared by WSP) (WSP September 2006). These reports were the subject of a "Site Audit Report" (November 2006) by an accredited site auditor with HLA-Envirosciences Pty Ltd (HLA). It should be noted that these reports were not commissioned by Coffs Harbour City Council (CHCC), rather they were funded via the NSW Environmental Trust under the "Contaminated Land Management Program" grant to the owners of 5 Martin Street, under regulation by the DECC.

Several soil and groundwater remedial technologies were proposed in the RAP, however, a staged approach to remediation has been recommended by the

Interagency Community Working Party (ICWP) and adopted by CHCC following consultation with the DECC and community representatives. In essence Stage 1 includes the installation of an “air sparge system with soil vapour extraction (SVE) and treatment of the collected contaminated soil vapour” as envisioned in the WSP RAP.

1.3 Outline of the Proposal

General

The Air Sparge and SVE and Treatment System will be installed in the upper and lower alluvial terraces, adjacent to the Orara River. The system will include 13 vertical sparge points (injection wells) for air injection into the saturated zone of the alluvium, a horizontal vapour extraction system in the vadose/unsaturated zone above the sparge points to capture and extract contaminated soil vapour, air injection and extraction infrastructure (blowers/compressors), and an activated carbon treatment system for extracted air.

The proposed alignment has been positioned to capture the zone of greatest groundwater impact as noted in historical groundwater monitoring events. Other key features include:

- All sparging and SVE infrastructure is proposed to be placed below the surface of the ground to minimise issues relating to tampering and/or vandalism.
- An equipment shed or control compound will be placed above the 1 in 100 year flood event. This is the most amenable location and was selected giving consideration to access to power, proximity to the sparge system, distance from the river (to minimise flood damage risk) and proximity to adjacent properties.
- Road box style access to each of the sparge points is proposed to allow for maintenance of the points but also to prevent tampering and reduce the visual impact at the remedial location.
- Power will be supplied via a temporary power supply from over head lines located in Martin Street.

Timeframe

The proposed timeframe for remediation works will be developed in consultation with relevant authorities and the landowners. WSP are confident that remedial solutions could be in place within 18-25 weeks, with operations and maintenance to occur for at least the next 2 to 3 years, based on the known level of contamination.

Costs

The expected project capital value of the Stage 1 works is approximately $175,000.

1.4 Contents of the report

The report provides a summary of submissions and presents CHCC's responses to these submissions. Finally, it presents mitigation measures that CHCC agrees to undertake should the proposal be granted approval (the statement of commitments).

2. Consultation

2.1 Statutory consultation

Consultation undertaken with relevant government authorities in preparing the EAR included:

- Request from the Director-General of the NSW Department of Planning (DoP) to obtain the Director-General's Requirements (DGRs) for the EAR as required under the *Environmental Planning and Assessment Regulation 2000 (EP& A Regulation)*. A written response was received on the 17 July 2007 identifying the key issues that must be included in the EAR.
- Follow–up letters were sent to all relevant government authorities regarding the proposed remediation works.

2.2 Community consultation

Following a public meeting in December 2006, the DECC, the NSW Department of Health, CHCC and the Premier's Office formed the Coramba Fuel Contamination Interagency Community Working Party (ICWP) with members of the Coramba community to progress remediation of the groundwater contamination. Council has since engaged a specialist consultant and prepared a community consultation strategy for the Project.

2.2.1 Coramba Fuel Contamination Interagency Community Working Party Meetings

The first meeting of the ICWP was held on 26 February 2007.

At that first meeting, the ICWP asked CHCC to consider becoming the applicant to the NSW Environmental Trust so that it could apply - on behalf of the Coramba community - for funding to enable remediation work to begin and to project manage the work, subject to receiving the necessary grants.

Following approval of that request at a subsequent CHCC meeting in April 2007, CHCC agreed to apply to the Trust for funding to cover the costs of the first stage of the remediation works.

Consultation with the community and stakeholders to date has been through the ICWP with meetings being held on 29 March 2007, 1 May 2007, 14 June 2007, 27 September 2007, 29 May 2008, and 31 July 2008. Media releases have also been sent out on 27 February 2007, 4 April 2007, 13 June 2007, 18 December 2007 and 11 January 2008.

The ICWP proposes to undertake further public meeting consultation with the community at various stages in the process. This will ensure timely community input into the EAR process and approval of the Stage 1 remediation works.

2.2.2 Public Community Meetings

In addition to the ICWP meetings, public community meetings have been held at Coramba Hall on 19 December 2006, 14 June 2007 and 17 January 2008.

2.2.3 Community-based VOC Monitoring

DECC arranged community-based VOC monitoring in Coramba. Six air sampling devices (summa canisters) were provided by DECC's laboratory. The aim was to have local residents living in close proximity to the river to take a grab sample of air during periods of perceived odour/ poor air quality.

On 17 July 2008, DECC representatives met with Coramba residents to discuss/ advise them of the required sampling procedures, and confirm appropriate sampling locations.

Three of the canisters were used to obtain a "background" samples from the north side of the river, a "control" sample from the service station forecourt and the third sample immediately adjacent to the seepage location/backwater.

Other canisters were issued to residents at 3, 5, and 10 Martin Street.

The results of this "acute" (short-term) monitoring will be presented to the community by DECC in due course. This monitoring will assist in designing further monitoring. CHCC will engage a consultant for this monitoring, with grant funding provided by the NSW Environmental Trust, towards the end of 2008/ early 2009 with regular on-going monitoring.

DECC have advised that they may also repeat the community-based VOC monitoring.

2.3 Public exhibition of the environmental assessment

The environmental assessment was exhibited from 26 February 2009 to 30 March 2009 at the following locations:

- Coffs Harbour City Council's Administration Building and website – www.coffsharbour.nsw.gov.au
- Department of Planning
  Information Centre, 22-33 Bridge Street
  Sydney
- Department of Planning website - www.planning.nsw.gov.au/asp/major_projects.asp
- Coramba Post Office

2.4 Submissions received

In total, 11 submissions were received, which comprised:

- 5 written submissions from government bodies; and

- 6 written submissions from the public.

CHCC considered all submissions received by 30 March 2009.

2.5 Processing of submissions

The comments raised have been summarised. GHD has analysed the issues raised and assisted CHCC to prepare a response.

For privacy reasons, personal details of the public submissions have been withheld.

3. Government Agency Submissions

Table 1 Government Agency Submissions

Government Agency	Issue Raised	Comment
Department of Environment and Climate Change	**Air Quality** ◗ DECC calculations show that a maximum of allowable emission rate could be 0.0015 mg/m3 compared with 0.00015 mg/m3 stated in the air quality report. ◗ Calculations for the maximum allowable benzene emission rate should be checked and the correct value stated in the report. ◗ Further discussion on the assumption of 95% removal efficiency from the activated carbon beds should be included in the assessment. This should include a reference for the source of the assumption. ◗ Parameters for the proposed activated carbon beds should be supplied, including bed size, exposure time, bed life and allowable input concentration. ◗ The design and operation of the proposed activated carbon system should be shown to be consistent with the best-practice requirements of the Approved Methods. Suggested Condition: Emissions from operation of the air sparge and SVE system should achieve ambient ground level air quality concentration criteria.	GHD has reviewed the calculations in the air quality assessment and can't find an error. The parameters for the proposed activated carbon beds including bed size, exposure time, bed life and allowable input concentration were not available at the time of printing of this report. CHCC is in negotiation with WSP Environmental to carry out the proposed remediation works and will provide design parameters in due course. The design and operation of the proposed activated carbon system will be consistent with the best-practice requirements of the Approved Methods. A condition of approval requiring emissions from operation of the air sparge and SVE system to achieve ambient ground level air quality concentration criteria is considered appropriate.
	Dust Assessment ◗ A qualitative dust assessment was included in the air quality assessment. Dust is not considered a significant issue for this project. As such the qualitative assessment is considered adequate. Suggested Condition: Standard dust	Noted

Government Agency	Issue Raised	Comment
	controls, as outlined in the air quality assessment should be implemented.	
	Noise and Vibration ◗ DECC has reviewed the Noise and Vibration Impact Assessment within the Environmental Assessment and supports the proposal subject to conditions.	Noted. Additional noise monitoring would only be undertaken following commissioning and in response to valid complaint/s.
	Water Quality ◗ DECC agrees with the water quality mitigation measures and soil erosion and sedimentation mitigation as outlined in 6.2.3 of the Environmental Assessment.	Noted, Agree with suggested conditions.
RTA	◗ The RTA have no objection and no comments to offer for the proposed activity.	Noted
North Coast Area Health Service	**Noise** ◗ Due to the low background noise levels, the use of neutral wind conditions in modelling, reliance upon enclosure design to reduce noise levels and the extended time period of the potential noise source, I hold some concern that noise from the SVE/sparging system may become an issue for nearby residents. Recommendation: A condition of approval be included to require that sound level monitoring be conducted at residential noise receivers 1, 2, 3 4.	Mechanical plant in the proposed compound area has the potential to exceed the adopted noise criterion during all time periods. Predicted noise levels with an appropriate enclosure indicated that the adopted noise goals should be met in all time periods and at all residences. However, with consideration to the NSW INP, the adopted night time noise goal was exceeded in a portion of the residential property of 10 Martin Street. For further effective attenuation at the source, the enclosure will be internally lined with additional appropriately rated acoustic material, minimising build-up of reverberant acoustic energy and the extent of transmitted acoustic energy through the building element material. Additional noise monitoring would be undertaken following commissioning and in response to valid complaint/s.
	Community Liaison ◗ A Communication Strategy should be developed so that there are established roles and activities for Council/contractors/ Working Party. The Communication	A condition of approval requiring the proponent to develop and implement a communication strategy in relation to the Stage 1 remediation works is considered appropriate.

Government Agency	Issue Raised	Comment
	Strategy should include details of who will communicate with whom about what, with what frequency and how. Recommendation: That a condition of approval be included to require the proponent to develop and implement a communication strategy in relation to the Stage 1 remediation works.	
	Exposure Risks ◗ It is not clear whether signage is currently present near the footbridge. Recommendation: That a condition of approval be included to require the proponent to ensure that warning signage at the Orara River near the footbridge is maintained throughout the period.	A condition of approval requiring the proponent to ensure that warning signage at the Orara River near the footbridge is maintained throughout the period is considered appropriate.
	Air Emission Monitoring ◗ Section 6.1.3 recommends monitoring of emission rates of atmospheric pollutants but it does not describe the method, frequency of monitoring, or actions to be taken if emission limits are exceeded. Recommendation: That unless Section 6.1.3 is enhanced with further clarity and detail of air emission monitoring, a condition of approval be included to require the proponent to develop an air emission monitoring plan that described method, frequency and actions to be taken if limited are exceeded.	A condition of approval requiring the proponent to develop an air emission monitoring plan that describes method, frequency and actions to be taken if limits are exceeded is considered appropriate.
	End Point Assessment ◗ It is not clear from the documentation that there are established triggers to end the SVE/sparging process. The EA should clearly state the set of environmental factors that will indicate that the SVE/sparging process has achieved all it can, so that the project works can cease. Recommendation: That unless the	WSP Environmental Pty Ltd (2006) are confident that remedial solutions could be in place within 3 to 6 months with operations and maintenance to occur for at least the next 2 to 3 years, based on their understanding of the current level of contamination. The proposed remediation works will be undertaken in accordance with the provisions of the *Contaminated Land Management Act 1997*.

Government Agency	Issue Raised	Comment
	EA is enhanced to provide the set of conditions that will trigger the completion of the Stage 1 works, a condition of approval be included to require the proponent to clearly state and provide to DECC, Department of Planning, NSW Health and the Working Party the set of conditions that will indicate the completion of the Stage 1 SVE/sparging process.	A condition of approval requiring the proponent to clearly state and provide to DECC, Department of Planning, NSW Health and the Working Party the set of conditions that will indicate the completion of the Stage 1 SVE/sparging process is considered appropriate.
	Monitored Natural Attenuation Parameters ◗ There is no specific direction given in the document, about where, how or when the monitoring should occur, nor who is to conduct the review of the monitoring data nor how often the data are to be reviewed. Recommendation: That unless the EA is enhanced to provide clear direction on the content of a monitoring program for MNA parameters, a condition of approval be included to require the proponent to develop and implement an effective MNA parameters monitoring program.	The issue of MNA monitoring is not directly relevant to this proposal and is a matter of separate consideration by CHCC with the DECC and Working Party. It is considered that a condition should not be enforced in the Application.
	Statement of Commitments ◗ Statement of Commitments needs rewording to address environmental management or mitigation measures.	See Section 5 of this report.
Department of Water and Energy	**Water Licensing** ◗ A licence under Part 5 of the *Water Act 1912* is required to authorise any works, prior to installation which intercept the watertable. This includes the air sparge system and any additional monitoring bores required as part of the project. This will require approval from the legal owner/occupier of the land.	A licence under Part 5 of the *Water Act 1912* will be obtained to authorise the works in conjunction with approval from the legal owner/occupier of the land.
	Riparian Issues ◗ The Department supports	Noted. The works will be undertaken following the standards and principles

Government Agency	Issue Raised	Comment
	restoring the connectivity in the riparian zone with endemic native species and recommends at least a 20 metre vegetated riparian zone, where possible. ◗ The Department has concerns with bank stability. Any disturbed areas associated with the site will need to be rehabilitated and revegetated immediately. ◗ Whilst a separate Controlled Activity Approval under the *Water Management Act 2000* is not required for Major Projects, the works are required to be undertaken following the standards and principles of relevant legislations and State policies.	of relevant legislation and State policies.
	Monitoring ◗ A groundwater monitoring plan should be developed and implemented for the site in conjunction with DWE hydrogeologists. Monitoring results should also be forwarded to DWE for our information and review.	This is considered to be beyond the scope of the proposal. An "Operation and Maintenance Report" or similar could be forwarded to the DWE, based on the operational outcomes of the air sparge system. As per the MNA suggestion above, the ongoing monitoring is the subject of regulation by DECC, and should not be conditioned in this Application. As part of the remedial works, ongoing monitoring will be conducted at several wells, at locations close to the source, throughout the remediation area, and close to the river. The results of these analyses will be reviewed and a determination made as to the effectiveness of ongoing degradation throughout the remedial works. This will, in part, determine modifications to the remediation system. Responses could include the addition of ameliorants, e.g. oxygen, nutrients, specialised microbes."
Coffs Harbour City Council	**Access and manoeuvring** ◗ The proponent is required to prepare a traffic and pedestrian management plan for the establishment phase to ensure	A condition requiring that a traffic and pedestrian management plan be prepared prior to commencement of works is considered appropriate.

Government Agency	Issue Raised	Comment
	that there is no obstruction to pedestrian and vehicle movements in Martin Street, including service vehicles (eg. Waste collection). ◗ The air sparge system, where installed within the public road/vehicle turning and manoeuvring area shall be designed to withstand normal vehicle loads.	
	Services ◗ Council's records disclose a water reticulation main in the vicinity of the proposed works. The proponent is required to liaise with Council's Water Supply Works Coordinator to resolve the location and the depth of this water main relative to the proposed works (see attached plan).	A condition requiring that the proponent ensure that prior to construction it will liaise with Council's Water Supply Works Coordinator to resolve the location and the depth of this water main relative to the proposed works is considered appropriate.
	Biodiversity ◗ Generally there are very few ecological issues associated with the site or the proposed works. ◗ The VMP is probably unworkable in its current form due to a lack of information regarding locally occurring flora species suitable for the site. ◗ The flora species list provided in the VMP needs to be amended to reflect the species composition of the STCFF EEC rather than the REFCF EEC. The VMP should provide a more specific list of locally occurring flora species that comprise the STCFF EEC rather than just the broad list, which contains some species that are unlikely to occur in the locality.	Locally occurring flora species that comprise the STCFF EEC which will be suitable for rehabilitation of the site include: Dominant canopy species *Eucalyptus tereticornis* (forest red gum), *Corymbia intermedia* (pink bloodwood), *Lophostemon suaveolens* (swamp turpentine) and *L. confertus*(brush box). Recommend primary plantings of these ones with interspersed plantings of secondary canopy, understorey trees and shrubs and then dense plantings groundcovers to fill in the gaps. Secondary canopy species *E. propinqua* (grey gum), *Angophora subvelutina* (broad-leaved apple), *E. robusta* (swamp mahogany), *Eucalyptus resinifera* subsp. *hemilampra* (red mahogany), *A. paludosa* (narrow-leaved apple). Understorey trees: *Casuarina* cunninghamiana (river oak), *Alphitonia excelsa* (red ash), *Glochidion ferdinandi* (cheese tree), and *Ficus*coronata (creek sandpaper

Government Agency	Issue Raised	Comment
		fig) Understorey shrubs: *Breynia oblongifolia* (breynia), *Commersonia bartramia*(brown kurrajong), and *Hibiscus tiliaceus* (cottonwood hibiscus). Groundcovers: *Imperata cylindrica* (blady grass), *Themeda australis* (kangaroo grass), *Dianella caerulea* (blue flax-lily), *Pratia purpurascens* (white root), and *Dichondra repens* (kidney weed) A condition requiring the VMP to be amended to incorporate the above species is considered appropriate.
	Acoustic ◗ The Noise and Vibration Impact Assessment report is endorsed and the recommendation of this report should be implemented as part of the project.	Noted
	Flood Impact ◗ The flood assessment is endorsed. It is agreed that the blower/compressor enclosure be positioned above the 1:100 year flood level and that this installation incorporate a cut off system so that during flood events the system will turn off.	Noted

4. Public Submissions

Table 2 Public Submissions

Name	Issue Raised	Comment
PS1	Does not support the proposal for the following reasons: ◗ Was aware of the fuel contamination in Coramba. ◗ In the report it shows that the pipe that will carry the contaminated air will sit approximately 3 metres above the housing for the pump – that height would be almost directly level with my property.	Air received from the vapour recovery system will be captured and treated via two activated carbon beds, operated in series. Modelling has shown that the predicted benzene concentration at the most exposed receptor would comply with the DECC criterion for benzene. A condition of approval requiring the proponent to develop an air emission monitoring plan that describes method, frequency and actions to be taken if limits are exceeded is considered appropriate.
	◗ Noise from the pump and the fact that it will run 24/7. Noises at night time, when it is extremely quiet would be of major concern.	Predicted noise levels indicated that with the enclosure, the adopted noise goals were met in all time periods and at all receivers, except Receiver 1. The NSW INP requires that noise levels be assessed at the most affected point within 30 m from the residence, within the residential property boundary. Therefore, with consideration to the NSW INP, Receiver 1 was modelled at a distance of 20 m from the residence at 10 Martin Street, on the property boundary. At this location, the predicted noise level of 32 dB(A) exceeds the adopted nighttime criteria of 30 dB(A). However, the predicted noise level at the residence was 25 dB(A), which is under the 30 dB(A) criterion. Therefore, the nighttime noise goal is exceeded in only a small portion of the property, which will most likely be unoccupied during nighttime hours. For further effective attenuation at the source, the enclosure will be internally lined with additional appropriately rated acoustic material, minimising build-up of reverberant acoustic energy and the extent of transmitted acoustic energy through the building element material.

Name	Issue Raised	Comment
	◗ Possibility of placing the pump and housing across the river and all the pipe work being carried under the footbridge. Martin Street can be a very busy place in the summer as many locals and people from Coffs Harbour use this as a swimming hole. I feel there would be more suitable places for this to be placed.	The proposed location of the equipment compound was chosen as it is the most amenable location and was selected giving consideration to access to power, proximity to the sparge system (in order to maximise air pressure) and distance from the river (to minimise flood damage risk).
	◗ Construction process will take between 18 to 26 weeks, involve machinery and possible road and bridge closures. This would be a huge impact on all residents.	The proposed construction period has been estimated at between 18 – 26 weeks. This time includes preparing equipment for delivery and set up on site. Short term noise and access impacts are expected but will be minimised where possible. Access will be maintained along Martin Street through to the footbridge during the construction phase.
	◗ During construction traffic is a huge concern. What effect would it have upon the river system if flooding was to occur during the construction phase?	Only limited number of vehicles will visit the site during construction. Vehicles likely to be used will be in the range of small commercial 4 wheel drive utilities such as a Toyota Hilux through to large rigid truck and semi-trailer. It is likely that 3 to 5 vehicles will be brought to the site for setting up and initial operations. Construction is to take place outside of summer months to avoid the possibility of flooding during construction.
	◗ How does this effect the running of the pump etc and would it mean extended periods of the inability to use the sparge and prolong the experiment.	The proponent will design a cut off for the SVE system during elevated moisture conditions. Once the SVE system detects high moisture levels, it will turn off the system. This means that during high rainfall conditions the sparge system may be inactive. Based on meteorological data collected by WSP it is likely that such an event will only occur twice a year.
	◗ There is no signage to warn people of the upcoming proposed works or the dangers of contamination of the site.	A condition of approval requiring the proponent to ensure that warning signage at the Orara River near the footbridge is maintained throughout the period is considered appropriate.
	◗ I am unaware of any testing	The approval sought from the

Name	Issue Raised	Comment
	having been carried out in relation to the properties behind the Petrol station situated in Gale Street. How can this air sparge be the solution to all of our problems and at what point would the decision be made as to whether the air sparge is in fact the solution to the problem.	Department of Planning is that relating to the proposed air sparge and SVE system upon and adjacent to No. 5 Martin Street only. Any proposed additional remedial options would be the subject of separate consideration under the Environmental Planning & Assessment Act, and are outside the scope of the approval sought currently.
PS2	◗ The primary impact on near residents to the old seep site is odours. The removal of the source of these odours is not being addressed. The proposal in its current form is seen by many in the community to be a waste of money.	A source of hydrocarbon odour has been identified as the bunded sump area. The proposed air sparge system has been designed to intercept the petroleum hydrocarbons which have been entering this sump and will therefore reduce odour from this location. Volatile vapours will be drawn out via the air sparge and SVE system and directed through activated carbon drums which will be in series to prevent breakthrough of volatiles to the atmosphere.
	◗ The second ground for objection at this time is the lack of address of any risk to endangered and threatened fish species in the Orara River. The river is the habitat of one endangered species, the Eastern (Freshwater) Cod (Maccullochella ikei). Environmental Assessment is silent on this.	The proposed remediation works will create a barrier to the lateral migration of petroleum hydrocarbons to the Orara River thereby reducing any further risk to endangered and threatened fish species in the Orara River.
	◗ My third ground is one of basic equity of the owners of No. 5 Martin Street. The Environmental Assessment, to my view, has failed to take in the needs of this family.	The proposed remediation works will reduce the environmental and human health risks associated with the contaminated groundwater.
PS3	◗ It was suggested that the Air Sparge Pump Unit be located on the northern side of the river with air lines etc to follow across the footbridge to the Sparge Points Wells on the Southern side of the river.	The proposed location of the equipment compound was chosen as it is the most amenable location and was selected giving consideration to access to power, proximity to the sparge system (in order to maximise air pressure) and distance from the river (to minimise flood damage risk).
	◗ Location of the Air Sparge Wells	The approval sought from the

Name	Issue Raised	Comment
	do not address the western seep sight and therefore will not be effective.	Department of Planning is that relating to the proposed air sparge and SVE system upon and adjacent to No. 5 Martin Street only. The location and configuration of the proposed air sparge and SVE system has been designed to intercept the contaminated groundwater plume as delineated by WSP Environmental P/L (2006). Any proposed additional remedial options would be the subject of separate consideration under the Environmental Planning & Assessment Act, and are outside the scope of the approval sought currently.
	◗ Optimistic that 2-3 years of air sparging will be sufficient.	WSP Environmental P/L (2006) are confident that remedial solutions could be in place within 3 to 6 months with operations and maintenance to occur for at least the next 2 to 3 years, based on their understanding of the current level of contamination. The life of the proposal will be monitored during this time.
	◗ The sparge pump unit on the suggested site will obstruct the footpath for access to the river.	The size and configuration of the proposed pump shed will be designed to minimise pedestrian impact. Sufficient space is considered available for the proposed unit. As the compound will only be 3m x 3m and located within the road reserve, it will not restrict access to the river. It will be designed to be aesthetically pleasing and complement surrounding buildings.
	◗ Concerned about the noise levels of the air sparge system.	Mechanical plant in the proposed compound area has the potential to exceed the adopted noise criterion during all time periods. Predicted noise levels with an appropriate enclosure indicated that the adopted noise goals should be met in all time periods and at all residences. However, with consideration to the NSW INP, the adopted night time noise goal was exceeded in a portion of the residential property of 10 Martin Street. A condition of approval requiring that monitoring be conducted at residential noise

Name	Issue Raised	Comment
		receivers 1, 2, 3 4 is considered appropriate.
	◗ Is there any guarantee that the proposed remediation will alleviate the odour that has been present for the last 7 years.	A source of hydrocarbon odour has been identified as the bunded sump area. The proposed air sparge system has been designed to intercept the petroleum hydrocarbons which have been entering this sump and will therefore reduce odour from this location. Volatile vapours will be drawn out via the air sparge and SVE system and directed through activated carbon drums which will be in series to prevent breakthrough of volatiles to the atmosphere.
PS4	There is no proposal to: ◗ Remediate 5 Marin Street, Coramba; ◗ Prevent contamination from entering and passing through 5 Martin Street, Coramba; ◗ Address the full extent of seep sites known to Council; ◗ Establish the suitability of 5 Martin Street Coramba for the Works proposed; ◗ Establish that the proposed works will not have any adverse physical impacts upon the land at 5 Martin Street Coramba, for example by way of geotechnical impacts upon or below the land; or to the river bordering our property; ◗ Determine whether the works proposed actually achieve their desired outcome; or ◗ Accommodate the needs of the family who must continue to live at 5 Martin Street Coramba during construction and operation of this system.	Any proposed additional remedial options would be the subject of separate consideration under the Environmental Planning & Assessment Act, and are outside the scope of the approval sought currently. WSP Environmental P/ L (2006) are confident that remedial solutions could be in place within 3 to 6 months with operations and maintenance to occur for at least the next 2 to 3 years, based on their understanding of the current level of contamination.The effectiveness and life of the proposal will be monitored during this time.
	◗ Because this proposal does not prevent contaminated groundwater form leaving Council owned lands and entering upon 5 Martin Street, our land, and does not propose any remediation of	The proposed remediation works have been selected from a number of options to best address the known extent of contamination and reduce the lateral migration of petroleum hydrocarbons to the Orara River.

Name	Issue Raised	Comment
	our land, we oppose this proposal.	
	◗ We strongly support an application that does prevent contaminated groundwater from leaving Council owned lands and entering upon our land and remediates the existing contamination on our land.	The proposed remediation works have been selected to best address the known extent of contamination and capture the lateral migration of petroleum hydrocarbons.
	◗ We are concerned about the additional liability we might have should some accident occur as a result of the proposal.	Any public liability issues will rest with CHCC during the construction period.
	◗ The location of the proposed compressor/ pump compound will restrict access to the river and guests and children's friends will be greeted by this box	The proposed location of the equipment compound was chosen as it is the most amenable location and was selected giving consideration to access to power, proximity to the sparge system (in order to maximise air pressure) and distance from the river (to minimise flood damage risk). As the compound will only be 3m x 3m and located within the road reserve, it will not restrict access to the river. It will be designed to be aesthetically pleasing and complement surrounding buildings.
	◗ Although the current proposal suggests the work will be undertaken as a Voluntary Remediation Agreement as outlined in the Contaminated Land Management Act…we have not seen any details of the Agreement	Any proposed draft Voluntary Remediation Agreement will be provided to the relevant landowners for approval in conjunction with the regulatory process undertaken by the DECC.
	◗ Works were undertaken without our consent or consultation on our land, including removal of a quantity of material from the bank of the Orara River, the placement in situ of a cage of gabion rocks surrounded by "geofabric".	Whilst this is not relevant to the EA, CHCC understands that Robert Carr & Associates P/L acting on behalf service station owners, installed some remediation infrastructure within the backwater/seepage area.
	◗ The current proposal does not refer to the previous failed remediation attempt, although Council was involved in the placement of the "bund". No assessment has been made of the effects of that installed barrier, in terms of its retention of contaminated substances.	The proposed remediation works will: ◗ create a barrier to the lateral migration of petroleum hydrocarbons to the Orara River; ◗ protect air quality in the area; and ◗ reduce environmental and human health risks associated with the

Name	Issue Raised	Comment
		contaminated groundwater. Consideration of the previously installed work is a separate process to this Part 3A Application, which will be made in consultation with the DECC and landowner.
	◗ Of equal concern to the Department of Planning should be the failure of the proposal to consider further seep sites along the Orara River.	The location and configuration of the proposed air sparge and SVE system has been designed to intercept the contaminated groundwater plume as delineated by WSP Environmental P/L (2006).
	◗ We note that the Declaration originally covered the whole of our property. Although the area covered by the Declaration has since been reduced (in September 2007), no assessment of land use suitability was ever undertaken for the rest of the property or that part which remains "declared".	The catalyst for the remediation is a determination by the Environment Protection Authority (EPA) (now part of the DECC), that the site is a "remediation site" under Section 21 of the *CLM Act* 1997. This declaration applies only to the property identified as 5 Martin Street. Determination by the DECC that the site poses a Significant Risk of Harm permits the NSW DECC to then subject the site to a remediation order, or establish voluntary remediation. The Environmental Assessment (EA) provided an assessment of the potential environmental, social and economic impacts associated with the construction and operational phases of the proposed remediation works and recommends measures to mitigate potential impacts on the environment. The EA has determined the site is suitable for the proposed remediation works. The issue of a Declaration relates to a separate process regarding regulation by the DECC.
	◗ A determination of current land use suitability of 5 Martin Street is yet to be undertaken, despite repeated requests by the landholder for this determination to be made.	See above comment.
	◗ There has been no determination of how much contaminated material will be removed through the placement of this system, nor	The plume is wide spread with a tongue of the highest concentrations reaching down towards the Orara River.

Name	Issue Raised	Comment
	any estimate provided of the anticipated reduction of pollution present in the Orara River.	The proposed remediation works have been selected from a number of options to best address the known extent of contamination and reduce the lateral migration of petroleum hydrocarbons to the Orara River. WSP Environmental Pty Ltd (2006) are confident that remedial solutions could be in place within 3 to 6 months with operations and maintenance to occur for at least the next 2 to 3 years, based on their understanding of the current level of contamination.
PS5	◗ We have thoroughly assessed the proposal and urge the Department to proceed with the outlined remediation without delay. ◗ The overall welfare and safety within the local community, in addition to quality of the river, must be the primary concern.	Noted
PS6	Remediation proposal has been a long time coming. My only concerns are possible noise and any fumes that may leak should the system breakdown. I'm pretty sure these concerns were in the proposal & could be dealt with should they arise. Since the recent flooding of the Orara River, the pool of water & petrol that has formed directly in front of my home has been giving of foul odours. I did report this to the Council & they acted swiftly to rectify the matter (to the best of their ability). It is criminal that this matter has not been put at a high priority. If something is not done to at least try & stop any remaining petrol from entering the river I will pity the future of this planet we call home.	Noted A condition of approval requiring emissions from operation of the air sparge and SVE system to achieve ambient ground level air quality concentration criteria is considered appropriate. Additional noise monitoring would only be undertaken following commissioning and in response to valid complaint/s.

5. Statement of Commitments

CHCC is committed to undertaking its activities in an environmentally responsible manner and effectively managing any risks that may lead to an impact on the environment.

5.1 Construction Environmental Management Plan

CHCC will prepare a Construction Environmental Management Plan (CEMP) prior to the commencement of construction. The CEMP will address the potential impacts referred in this EAR and will outline the environmental management practices and procedures to be followed during the site preparation and construction of the Project. The Draft CEMP will include:

- A summary of all the potential environmental aspects and impacts outlined in this Environmental Assessment;
- A description of all activities to be undertaken on the site during site preparation and construction;
- Statutory approvals and other obligations that will be fulfilled during site preparation and construction, including all approvals, consultations and agreements required from authorities and other stakeholders, and key legislation and policies;
- Details of how the environmental performance of the site preparation and construction works will be monitored, and what actions will be taken to address identified adverse environmental impacts;
- A description of the roles and responsibilities for all relevant employees; and
- Complaints handling procedures.

The mitigation measures to be incorporated into the CEMP include:

5.1.1 Air Quality Mitigation Measures

Construction Mitigation Measures

- Site managers should be provided with daily weather updates that will contain warnings of the onset of strong winds and, in particular, winds in the direction of sensitive receptors. The site manager could then take steps to pre-water construction areas and stockpiles before they are disturbed and cover disturbed soil where fugitive dust/odour may be generated;
- Physical barriers should be constructed to act as windbreaks for the construction site or for stockpile areas in times of high wind;
- Dust screens (e.g. shade cloth) should be installed on construction site boundaries that are adjacent to sensitive receptors;
- Storage piles should be a suitable height, width and slope and placed in areas protected from the wind and away from public places where possible. Spoil

stockpiles should be water sprayed regularly and dry material stockpiles should be covered;

- All trucks hauling dirt, sand, soil or other loose materials to and from the construction site should be covered;
- Earthmoving activities should be suspended during times of high winds, particularly when emission plumes are directed towards sensitive receptors;
- All construction vehicles, mobile plant and machinery should be maintained and operated in accordance with the manufacturers' specifications to minimise exhaust emissions; and
- Disturbance of contaminated soil surfaces should be minimised to reduce any potential odour impact during construction.

5.1.2 Soil, Erosion and Sedimentation Mitigation Measures

Water quality mitigation measures for the Proposal have been identified, with specific measures designed to protect the Orara River.

Measures to be implemented during the construction phase of the Proposal are:

- The design and installation of erosion controls will be undertaken in accordance with Managing Urban Stormwater, Soils and Construction Volume 1, the "Blue Book" (Landcom, 2004).
- At the vegetation clearing stage, the vegetation will be stockpiled and then mulched and spread over disturbed areas to provide a natural erosion barrier.
- Prior to commencement of earthworks there will be a range of measures put in place which include but will not be restricted to:
  - Construction of cut-off drains to prevent clean water from upstream and particularly flow from Martin Street flowing onto disturbed areas and hence become dirty water.
  - The diversion of those discharge points to the nearest watercourse so that clean water can be kept isolated from dirty water.
  - The stabilisation of exposed surfaces as soon as they can be practically stabilised following construction of that aspect of the works.
- A number of controls outside the specific work area will be put in place and these will include but will not be restricted to:
  - Refuelling of all mobile plant and machinery off-site.
  - Minimisation of disturbed areas so that the potential export of sediment is minimised.
  - The establishment and maintenance of a stabilised construction compound to reduce the area of overall disturbance for the project.
- Temporary sediment control measures will be constructed to capture water and sediment before it can leave the site or enter the Orara River. Conceptual design of the temporary sediment control measures will be undertaken using

the procedures outlined in Managing Urban Stormwater, Soils and Construction Volume 1 (Landcom, 2004) and with the following design features:

  - Installation of sediment fences or similar erosion control devices downslope of stockpile and excavation areas;
  - Limiting areas of vegetation and soil disturbance through delineating excavation areas to minimise the potential for erosion;
  - Progressively rehabilitating and revegetating areas of disturbance including, where necessary undertaking short-term stabilisation of temporary stockpiles and disturbed areas.

- To minimise the potential impacts of flooding on trenching or excavation construction works, particularly any works below the 100 year flood level, the following measures should be implemented:
  - Monitoring of weather patterns during construction should provide some indication of the threat of flooding due to rainfall events;
  - Construction equipment and machinery should not be stored overnight within flood prone areas;
  - Water ponding in an excavation is to be managed on site (e.g. soak pit) in preference to offsite discharge; and
  - Any excavated trenches should be re-filled to minimise sediment loss from stockpiled material and the potential for this material to contribute to localised flooding, with any trench below the 100 year flood height to be covered with geotextile fabric until stabilised.
- A surface water quality monitoring programme for the construction period will be developed to monitor water quality upstream and downstream of the construction areas. Construction period monitoring will be carried out periodically and after rainfall events, along with assessment of the operation of soils, erosion and sedimentation mitigation measures. Monitoring during the construction and operational phases of the Proposal will examine the following indicators:
  - pH;
  - Electrical conductivity;
  - Turbidity; and
  - Dissolved oxygen.

5.1.3 Water Quality Mitigation Measures

Signage warning potential users of the river of the contamination in the vicinity of the bunded area and advice to community members to refrain from swimming or other recreational activities in the river from the footbridge and extending 150 metres downstream of the bunded area will be installed by CHCC to minimise risks to users of the river.

A soil and water quality monitoring program will be continued throughout the construction period, during operation and decommissioning of the extraction and

treatment system and continue for a period of six months. The program will be in accordance with Managing Urban Stormwater: Soils and Conservation (Landcom, 2004).

5.1.4 Hydrology and Flooding Mitigation Measures

During flooding events the underground soil vapour extraction component of the air sparging system will be inundated. WSP will design a cut off for the SVE system that will operate during elevated moisture conditions. Once the SVE system detects high moisture levels, it will turn off the system. This means that during high flow conditions in the Orara River the sparge system may be inactive.

5.1.5 Flora and Fauna Impact Mitigation Measures

- All plant and equipment should be sterilised using appropriate methods prior to entering the subject site to ensure no foreign disease, soil or organic matter including seeds are transported into the subject site.
- A comprehensive Erosion and Sediment Control Plan (ESCP) should be developed and implemented before, during and after the works to protect soils and prevent erosion after rainfall events and wind erosion within the subject site. The ESCP should be developed in accordance with the requirements of the NSW Department of Housing publication, *Managing Urban Stormwater: Soils and Construction* (1998).
- Several listed noxious weeds were present on the subject site including Camphor laurel, Chinese privet and *Senna pendula*. It is noted that Camphor laurels in some areas have become important stepping stone habitat with food resources for birds including some threatened species, in particular rainforest pigeons. Therefore, a program will be implemented of gradual removal and replacement with alternative habitat, to include native laurels and other fruiting rainforest trees, preferably those which fruit in Winter & Spring.
- A Vegetation Management Plan (VMP) has been developed for the site and will be amended to incorporate those species listed in Table 1 above.
- A weed management plan will be prepared for the subject site for implementation before, during and after the works are completed to prevent the spread of introduced species and declared noxious plants recorded within the subject site and wider study area as outlined in the VMP.
- A revegetation program will be implemented in conjunction with any weed control activities. Species to be used for revegetation will only consist of local native species as identified in the VMP.
- Corridor linkages will be strengthened where necessary by enhancement plantings as outlined in the VMP.

5.1.6 Cultural Mitigation Measures

Should any previously unrecorded Aboriginal sites or objects be detected during the course of development, work in the immediate vicinity of those objects will cease and the finds be reported to the DECC (National Parks and Wildlife Service - NPWS) and advice sought as to the appropriate course of action.

5.1.7 Noise Mitigation Measures

Construction Noise Recommendations

As far as practicable, the following general noise control measures will be incorporated in the construction EMP:

- Aim to minimise movements of equipment and personnel during noise sensitive periods, such as night time; and
- Staff arriving or leaving the site before 7 am or after 6 pm should be aware of the potential for noise impact at nearby receivers.

Due to the potential for construction noise goals to be exceeded GHD recommends that the following measures be taken into consideration during construction of all infrastructures associated with the project in order to reduce risk of noise impact:

- All work should be kept within the working hours prescribed by the DECC CNG. This includes trucks not arriving on site before 7:00 am. Should works out of these hours be needed, the work methods and noise goals of the DECC's CNG should be considered;
- Review available fixed and mobile equipment fleet and prefer more recent and silenced equipment whenever possible. In any case, all equipment used on site should be in good condition and good working order;
- Plan to use equipment, which is fit for the required tasks in terms of power requirements;
- All engine covers should be kept closed while equipment is operating;
- All combustion engine plant, such as generators, compressors and welders should be checked to ensure they produce minimal noise with particular attention to residential grade exhaust silencers;
- Vehicles should be kept properly serviced and fitted with appropriate mufflers. The use of exhaust brakes should be eliminated, where practicable;
- Where practical, machines should be operated at low speed or power and should be switched off when not being used rather than left idling for prolonged periods; and
- Machines found to produce excessive noise should be removed from the site or stood down until repairs or modifications can be made.

Work Ethics / Community Relations

- All site workers should be sensitised to the potential for noise impacts onto local residents and encouraged to take all practical and reasonable measures to minimise noise during the course of their activities; and
- The site manager (as appropriate) should establish contact with the local residents and communicate the remediation program and progress on a regular basis, particularly for when noisy activities are planned.

General Recommendations

As far as practicable, the following general noise control measures should be incorporated in the design:

- All external noise sources should be located so as to avoid direct line of sight with noise receivers;
- If possible, ventilation or exhaust openings should not face noise receivers;
- Aim to minimise movements of equipment and personnel during noise sensitive periods, such as night time; and
- Staff arriving or leaving the site before 7 am or after 6 pm should be aware of the potential for noise impact at nearby receivers.
- Hours of operation during construction will be limited to:
  - Monday to Friday: 7 am to 6 pm
  - Saturdays: 8am to 1pm
  - Sundays and Public Holidays: No construction work

Mechanical Plant – General Advice

- CHCC will investigate the operational requirements for the compressor and blower systems and where practical, optimise the required operational time with consideration to potentially noise sensitive time periods, such as night;
- CHCC will ensure equipment is kept properly serviced; and
- Where practical, machines should be operated at low speed or power and should be switched off when not being used rather than left idling for prolonged periods.

In-Principle Enclosure Design

- A four sided and covered enclosure should be constructed around the compressor and blower. Typically, an enclosure will provide a sound reduction in the range of 10 – 25 dB(A). The enclosure should extend to ground level, to preclude the potential noise flanking path through any air gaps between the walls and floor in the direction of the nearest receivers;
- There are a number of practical limitations to consider with the type of building materials used for enclosures, including ventilation, aesthetics and ease of removal once the project if complete. It is recommended that the acoustic influence of these be assessed at detailed design stage;

- For further effective attenuation at the source, enclosures should be internally lined with an appropriately rated acoustic material, minimising build-up of reverberant acoustic energy and the extent of transmitted acoustic energy through the building element material; and
- All equipment is to be vibration isolated, with consideration to manufacturers requirements.

5.1.8 Land Use and Infrastructure Mitigation Measures

- CHCC will continue to consult with the local community and affected residents during the construction and operational phases of the Project.
- CHCC will ensure that pedestrian access is maintained along Martin Street and across the foot bridge which crosses the river.
- CHCC will complete a dial-before-you dig search prior to any earthworks.

5.1.9 Visual Amenity Mitigation Measures

It will be necessary to reinstate vegetation cover over disturbed areas to minimise the visual impacts of construction and set up activities. In line with the VMP, appropriate planting of endemic species within the area disturbed will add biodiversity value to the area and provide an important riparian resource for the Orara River.

Given that the enclosure for the blower and compressor will need to be in place for at least 2 – 3 years it is recommended that it is constructed of quality materials and painted in appropriate colours to complement its location adjacent to the existing dwellings in Martin Street.

5.1.10 Health and Safety Mitigation Measures

Warnings to river users about contamination within the immediate vicinity of the bunded area at the bottom of Martin Street should, if heeded, minimise risks from this potential exposure pathway. Ongoing monitoring of river water quality provides ongoing information to assess health risks from recreational use of the river should the level of contamination change over time.

5.1.11 Waste Management Mitigation Measures

The following mitigation measures will be implemented to minimise waste generation and to manage those wastes that are generated:

- Excavated material would, wherever possible, be re-used on site, although some material will require offsite disposal;
- Contaminated material will be managed and disposed of;
- Topsoil will be reused in revegetation and rehabilitation of cleared areas;

- Where practical, vegetative matter, not including weeds, will be chipped and reused on-site. Logs and tree limbs suitable for habitat and or fauna refuge will be collected during clearing and placed in a location identified as suitable;
- Demolition waste materials will be recycled and/or reused on site, or transported to an approved recycling or waste management facility, as appropriate;
- Construction materials will be sourced and ordered in appropriate quantities to avoid the creation of excess waste, recycled and/or reused on site or on other projects where possible, or transported to an approved recycling facility;
- Suitable waste bins/receptacles will be provided throughout the work site to capture all waste streams;
- Separate containers will be provided for recyclable and non-recyclable materials. These materials will be transported to an approved recycling or waste management facility, as appropriate;
- Waste will be transported from the site when storage facilities are filled. The waste storage area will be kept tidy and well maintained;
- Liquid waste such as chemicals, fuel and lubricants, and their containers, will be disposed of in accordance with the requirements of the *Waste Classification Guidelines Part 1: Classifying Waste* (Department of Environment and Climate Change 2008); and
- Portable toilet facilities will be installed on site and emptied periodically by an approved contractor.
- Activated carbon waste will be disposed of appropriately.

5.2 Operational Management

Management issues to be addressed during the operation of the Project are as follows:

5.2.1 Hazard identification and exposure pathways

Based on the site assessments, the hazards which require management are:

- volatile contaminants in air (BTEX, TPH $C_6 – C_9$);
- contaminants in soil, wastes and waters; and
- standard construction site hazards.

Based on the proposed remedial strategy, potential environmental impacts are considered to relate to movement of soils through erosion or disturbance, movement of dust and generation of water and vapours.

Based on the proposed remedial strategy, potential human health exposure relates to:

- dermal (skin) contact with water, soil, dust, or vapours; and/or

- inhalation of volatiles, gases, fibres, soil or dust; and/or
- ingestion of water, soil or dust.

Controlling the above exposure pathways will effectively minimise the risks to workers in relation to the contaminated soil or water, and prevent offsite impacts.

5.2.2 Site management (operation phase)

Specific environmental requirements relating to the remediation works should include:

1. Establishment of contaminant control zones (CCZ) via temporary fencing, to prevent unauthorised access to impacted soils. Only personnel required for the works should enter the CCZ. All personnel and equipment should be appropriately decontaminated prior to exiting the CCZ.
2. Maintain erosion and sediment controls to prevent offsite migration of impacted soils or further contamination of surface water (e.g. by sediments).
3. Use appropriate methods to control the generation of dust and vapours, e.g. limit extent of works at any one time, use water sprays to keep soils moist (but not enough to generate surface water) and use hydrocarbon surfactants to control odours, cover work areas if required, or stop work if wind is sufficient to generate dust.
4. Conduct onsite monitoring for volatiles using a photoionisation detector (PID). The level of personal protective equipment (PPE) required should be based, in part, on the results of air monitoring.

An occupation health and safety plan should include the following:

- Additional personal protective equipment for workers within the contaminated control zone. Workers who may potentially come into contact with soils and/or vapours should be provided with a half face mask respirator fitted with organic filters, disposable cover-alls, disposable gloves and suitable amenities for decontamination. Decontamination should be conducted prior to exiting the site and before any hand to face activities or similar (e.g. eating, drinking, smoking, toilet breaks, etc.).
- Training of workers in the hazards posed by the contaminants. Training should include methods of work which minimise disturbance, dust creation and contact with the soil; and suitable hygiene procedures (e.g. washing hands before eating, removing soil from clothes and skin as soon as possible etc).

5.2.3 Hours of Operation

The hours of operation will be developed in consultation with the relevant authorities and landowners. It is envisioned that the air sparge will operate intermittently 24 hours per day.

Proposed hours of maintenance activity during operation phase will be limited to:

- Monday to Friday: 7 am to 6 pm

– Saturday: 8 am to 1 pm
– No work on Sundays or Public Holidays

The above may be varied due to emergency response requirements etc

5.2.4 Air Quality Monitoring

CHCC will monitor, in accordance with an approved monitoring plan, the emission rates of pollutants during operation of the SVE process to demonstrate compliance with the emission rate limits specified below. The plan will describe the method, frequency and actions to be taken if limits are exceeded.

Table 3 details the predicted results, DECC air quality criteria and the associated mass emission rate limits during the SVE process. The required mass emission rates and concentration calculations have been based on a 1-hour average criterion. It should be noted that benzene, ethyl benzene and PAH are classified under toxicity-based criteria, whereas toluene, xylene and phenol are classified under odour-based criteria.

Table 3 Derived Emission Limits

Constituent	DECC Criteria (1-hour avg., mg/m^3)	Reason for Classification	Mass Emission Rate Limit (g/sec) (1), (2)
Benzene	0.029	Toxicity	0.00015
Toluene	0.36	Odour	0.0019
Ethyl benzene	8.0	Toxicity	0.043
Xylene	0.19	Odour	0.0010
PAH (as Benzo[a]pyrene)	0.0004	Toxicity	0.0000021
Phenol	0.02	Odour	0.00011

(1) Based on unity run (1 g/sec) with a maximum predicted concentration of 93.54 mg/m^3 at Receptor 3.

(2) GHD assumed that 95% of each pollutant is removed from in-stack air treatment via two activated carbon drums connected in series.

5.2.5 Noise Monitoring

Due to the low background noise levels, the use of neutral wind conditions in modelling, reliance upon enclosure design to reduce noise levels and the extended time period of the potential noise source, additional noise monitoring would only be undertaken following commissioning and in response to valid complaint/s.

5.2.6 Contingency Plans

The purpose of the contingency plan is to identify unexpected situations that could occur during the remediation works, and specify procedures that can be

implemented to manage such situations and prevent adverse impacts to the environment and human health, and manage unexpected situations.

Contingency plans should include:

- Sediment control measures and bunding will be regularly inspected and maintained. If required, additional measures should be established.
- Dust emissions are to be confined within the site boundary. The following dust control procedures may be employed to comply with this requirement:
  - minimise work areas;
  - erection of dust screens around the perimeter of the site or dust generating activities;
  - securely covering all loads entering or exiting the site;
  - use of water sprays across the site to suppress dust (but not to generate runoff);
  - all stockpiles of soil or other materials likely to generate dust or odours are to be covered; and
  - changing or modifying work practices based on climatic conditions.
- No odours attributed to the work are to be detected at any boundary of the site during the works. The following procedures may be employed to comply with this requirement:
  - minimise work areas;
  - use of appropriate covering techniques such as the use of plastic sheeting to cover excavation faces or stockpiles; and
  - use of fine mist sprays and hydrocarbon odour mitigating agent on the impacted areas/materials.

5.2.7 Community Relations

As part of the Project, CHCC will nominate a community liaison contact and have procedures in place for the handling of complaints during operation.

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