

NOTICE OF APPROVAL OF VOLUNTARY MANAGEMENT PROPOSAL

(Section 17 of the Contaminated Land Management Act 1997)

Approval No.: 20101723

Approval Date: 13 DEC 2010

Area No.: 3183

The approved proposal consists of this approval document and the attached proposal, which comprises three Parts: Part 1 – Preliminary Details; Part 2 – Undertakings; and Part 3 – Performance Schedule.

Proponent: Orica Australia Pty Ltd (ACN 004 117 828)

Site: Lot 3, DP 234288 (15 Greenleaf Road, Kooragang Island)

Proposal Date: 11 May 2010

BACKGROUND

The EPA is satisfied that the terms of the proposal, as modified by the conditions of this approval, are appropriate.

The EPA notes that the proponent has undertaken in writing to the EPA not to recover contributions under Part 3, Division 6 of the CLM Act in respect of implementation of the proposal.

For the purposes of section 17(4) of the *Contaminated Land Management Act 1997* (CLM Act); the EPA is satisfied that the proponent has taken all reasonable steps to identify and find every owner and notional owner of the land and every person responsible for significant contamination of the land and given those parties identified an opportunity to participate in the formulation and carrying out of the proposal on reasonable terms.

The contents of Part 1, Part 2 and Part 3 of the attached proposal form part of the terms of the approved proposal.

APPROVAL AND CONDITIONS

The EPA approves the proposal subject to the following conditions. These conditions form part of the terms of the approved proposal.

1. Each feature and milestone of the proposal is to be completed by the date specified in the proposal. Failure to satisfactorily complete any component by the due date for that feature or milestone may be taken as a failure to carry out the terms of the proposal for the purposes of section 17(6) of the CLM Act.
2. The proponent cannot recover contributions under Part 3 Division 6 of the CLM Act.
3. Reports R4 & R9 in section 4 of the proposal will include in addition to the parameters listed in the Work Plan dated 7 September 2010 the following;
 - a) Soil Exchangeable Cations (Ca, Mg, K, Na, Fe) and Soil Exchangeable Anions (PO₄, SO_x, HCO₃, AsO₄, Fe) soil pH, and total soil phosphate for selected Stage 2 and 3 soil samples upgradient, within and downgradient of the injection zone;
 - b) Mass balance calculations for arsenic for selected Stage 2 and Stage 3 soils upgradient, within and downgradient of the injection zone;

- c) Determination of soil arsenic immobilisation with a published standard test procedure e.g. AS 4439.3-1997 for selected Stage 2 and 3 soils, upgradient, within and downgradient of the injection zone.
4. The proponent shall implement clean up directions when issued orally by the EPA in accordance with section 93 of the *Protection of the Environment Operations Act* (1997).
 5. The proponent agrees to monitor groundwater conditions and report field results to the DECCW within 7 days as outlined in the attached memorandum dated 25 November 2010 referring to "Contingency Brief, Field Trial for In-situ Geochemical Fixation of Arsenic in Groundwater, Stage 4 Voluntary Management Proposal" by Peter Storch, URS.
 6. Where this proposal requires the proponent or any other person to give a document to the EPA, that document may be given to the EPA:
 - a. By delivering the document by hand to 14/59 Goulburn Street Sydney 2001
 - b. By posting the document to Manager Contaminated Sites Section DECCW PO Box A290 Sydney South NSW 1232
 - c. By faxing the document to Manager Contaminated Sites Section DECCW (02) 9995 5930
 - d. By emailing the document to ean.wilson@environment.nsw.gov.au

ADDITIONAL INFORMATION

7. The EPA may still exercise any powers it has under the CLM Act, or any other legislation, in relation to the site.
8. The EPA may require the proponent to pay all or any costs incurred by the EPA in connection with any one or more of the following:
 - a. Assessing and settling the terms of the approved voluntary management proposal;
 - b. Monitoring action under the approved voluntary management proposal;
 - c. Seeking the compliance of the proponent with the approved voluntary management proposal;
 - d. Any other matter associated with, or incidental to, the matters set out in 5.a. to 5.c. above

Signed:



13/12/2010

Erwin BENKER
A/Manager Contaminated Sites
Environment Protection and Regulation
Department of Environment, Climate Change and Water

(by delegation)

Date: 25 November 2010

To: Sherree Woodroffe, Orica Kooragang Island

From: Peter Storch

Subject: Contingency Brief, Field Trial for In-situ Geochemical Fixation of Arsenic in Groundwater, Stage 4 Voluntary Management Proposal

cc: Andrew Holloway, Golder & Associates, Sven Hoffmann, URS

Introduction

The proposed field trial for In-situ Geochemical Fixation of arsenic in groundwater consists of the injection of an oxidiser, hydrogen peroxide, and two iron reagents, ferrous chloride and zero valent iron, as described in the Stage 4 VMP Technical Proposal [URS, 2010a]. The potential impact of these reagents on the aquifer in the area of the injections has been addressed in the laboratory treatability testing report, "Bench-scale Refinement for In-situ Arsenic Removal from Groundwater" [URS, 2010b]. However, the Department of Environment, Climate Change and Water (DECCW) have queried the potential impact of the acidic ferrous chloride solution on the groundwater geochemistry.

The purpose of this brief is to summarise the laboratory scale testwork that has been undertaken to assess the potential impact of the field trial injection of an aqueous ferrous chloride solution on the native soil and groundwater. The brief also details the proposed monitoring program and the proposed Contingency Plan should adverse effects be observed in the aquifer and is intended to supplement the Work Plan (URS, 2010c) for the proposed injection trial.

Potential Detrimental Impact of Ferrous Chloride Injection

A comprehensive programme of bench-scale laboratory testwork was undertaken to evaluate both the efficiency of addition of ferrous chloride on the decrease in dissolved arsenic concentrations and the potential for significant changes in the groundwater geochemistry. The program involved testing of arsenic impacted soil and groundwater, an oxidiser (hydrogen peroxide) and ferrous chloride.

A total of 13,000 L of an 18.6 weight-percent (wt%) ferrous chloride solution is proposed for injection during the trial to be undertaken on the Orica property. This solution has an iron content of 8.2 wt% and a pH of <1, with a relatively low free acidity of 1.5 wt% hydrochloric acid. The reagent will be injected at depths of 1-9 metres below ground over an area of approximately 70 square metres.

The testwork included assessment of the impact of the addition of the reagents on both groundwater pH and the fate of other analytes within the system, including dissolved iron and manganese.

The natural condition of the soil at the site is highly alkaline with a pH ranging from 8.5 to 9.3, while the pH of the site groundwater is neutral to slightly alkaline ranging from 7.1 to 7.7 [URS, 2010c]. In the bench-scale laboratory testing, when a mixture of site soil and groundwater was dosed at the proposed ferrous chloride concentration, the resulting groundwater pH ranged from 7.5 to 8.0, essentially no change from the natural pH of the groundwater. Furthermore, when the

dosage of ferrous chloride was doubled, the pH reduced to only 6.9 and when it was increased to twenty times the proposed dosage, the pH only decreased to between 5.7 to 6.1[URS, 2009].

Therefore, URS concluded from the laboratory test work that the injection of a buffer was unnecessary to maintain near neutral conditions in the aquifer at the proposed dosage of FeCl₂.

Ferrous chloride injections also have the potential to increase dissolved iron levels due to residual, unreacted Fe²⁺ and possibly manganese if redox or pH changes. However, at the proposed dosage, the residual dissolved iron was less than 0.5 mg/L and the dissolved manganese ranged from 0.007 to 0.464 mg/L, both well below the existing groundwater concentrations. Only when the dosage is increased to the extreme (for example, twenty times the proposed level) do the levels of iron and manganese become significant.

Comprehensive analysis of the groundwater from the testwork did not identify any significant changes in other analyte concentrations.

Therefore, only localised and temporary changes in soil and groundwater pH are anticipated with the proposed ferrous chloride injection, with the aquifer system demonstrating significant buffering capacity.

In general, the impacts from reagent injection during the trial, other than the desirable reduction in dissolved arsenic concentrations, are expected to be temporary and localised based on the results of the bench scale test program detailed above. In addition, the ferrous chloride trial treatment zone is small (less than 1 percent) compare to the area of the aquifer, and the proposed injection volume is small compared (less than 10 percent) compared to the total pore volume of the treatment zone. Therefore, the potential for any significant changes to the aquifer is also small.

Based on the results of the bench-scale testing and knowledge of the current site conditions, it is highly unlikely that, at the proposed ferrous chloride dosage, the groundwater quality outside the treatment zone will be impacted to a significant extent.

Groundwater Monitoring Program

A comprehensive groundwater monitoring program in terms of both frequency of sample collection and breadth of chemical suite will be implemented as part of the field trial. This program is designed to monitor arsenic, the contaminant of concern, the extent of reagent distribution, as well as indicators of potential adverse effects on the aquifer geochemistry from the injection of reagents. Comprehensive monitoring of groundwater physical parameters will be undertaken both during and following the injection to monitor pH and oxygen reduction potential both within and down gradient of the injection zone. The monitoring program includes two baseline sampling events to establish the existing water quality condition prior to injection of chemicals post treatment monitoring (beginning with one sampling event per month for the first two months and then every 3 months thereafter) as specified in Appendix A of the Work Plan [URS, 2010b].

If during this monitoring significant adverse effects (that is unforeseen potentially detrimental changes from the baseline data), are observed from the injection of the reagents, the following additional monitoring requirements will be undertaken to assess the significance of the changes. Refer to Appendix A, Figure A of the Work Plan for well locations [URS, 2010c].

- **Immediately down-gradient of the treatment zones (Wells FT 17 or FT18)** – No action required, continue monitoring program as per Work Plan, but maintain observation at down-gradient locations for the identified analyte(s);
- **Five (5) m down-gradient of the treatment zone (FT19 through to FT25)** – Increase monitoring of the analyte(s) to weekly analysis until concentrations are confirmed. Notify the DECCW of the field testing results within seven (7) days of receipt. Review potential risk associated with the identified analyte(s) and continue monitoring based on risk analysis as agreed to by the DECCW.
- **Ten (10) m down-gradient of the treatment zone (i.e FT26 and FT27)** – Increase monitoring of the analyte(s) to weekly analysis until concentrations are confirmed. Notify the DECCW of the field testing results within seven (7) days of receipt. Review the Contingency Plan, and commence preliminary preparations for implementation of the plan, if required and as agreed to by the DECCW.
- **Fifteen (15) m down-gradient of the treatment zone (FT28 to FT33)** – if elevated concentrations of analyte(s) are confirmed at this location, consult with the DECCW and discuss the need to implement the Contingency Plan. Implement Contingency Plan as required and as agreed to by the DECCW.

It is noted that based on the average groundwater seepage velocity at the site (70 m/year) it would likely take at least 10 weeks (or much longer if considering retardation) for an inert, non-reactive reagent to reach 15 m downgradient of the treatment zone, indicating that there is sufficient time to implement contingency measures if required.

Contingency Plan

In the unlikely event that the monitoring program was to identify that significant impact on water quality of the aquifer system has occurred due to the chemical injections, Orica will implement actions to address the issue.

The most likely impact that would require such action is the reduction of pH that may have implications for down-gradient aquifer geochemistry, or in a worst case scenario, subsurface structures. In this case, a well-developed and tested buffering reagent, such as sodium or calcium hydroxide, will be applied to the aquifer. Changing pH alters the mineralogy of arsenic bearing iron oxides and the capacity of oxides and oxy-hydroxides to adsorb arsenic. The capacity will decrease if pH is raised too high and arsenic may be liberated. If the contingency plan is required, it is envisaged that a limited dosing batch test will be conducted in the laboratory to refine the required dosage and ensure that the buffer will be applied with adequate measure. Based on previous laboratory testing, an initial sodium hydroxide concentration of 0.1 Molar is anticipated. The conceptual design of the injections will consist of 0.1 M hydroxide solution injected along the anticipated leading edge of the reduced pH condition, across an interval of 1 to 9 metres below ground surface level. Injections will be conducted using a direct-push rig with an injection spacing of approximately 2 metres, or possibly using existing monitoring wells if appropriate. Groundwater monitoring will continue to assess the effectiveness of the buffer.

In the event that elevated iron and/or manganese concentrations were detected, an effective oxidiser such as hydrogen peroxide will be selected to create the oxidising conditions necessary to precipitate the dissolved metals. A similar approach to reagent injection would be taken as described for the application of the buffer.



Memo To: Sherree Woodroffe, Orica Kooragang Island
25 November 2010
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References

URS, 2009. "Stage 3 Voluntary Remediation Agreement: Treatability Study for In-situ Arsenic Removal from Groundwater, Orica Kooragang Island, NSW," Final Report, URS Corporation, 23 December 2009.

URS, 2010a. "Stage 4 Voluntary Management Proposal: Technical Proposal, Orica Facility, Kooragang Island, NSW, Final Proposal, URS Corporation, 13 April 2010.

URS, 2010b "Work Plan, Field Trial for In-situ Geochemical Fixation of Arsenic, Orica Facility, Kooragang Island, NSW," Revision 1, URS Corporation, 7 September 2010.

URS, 2010c. "Stage 4 Voluntary Remediation Proposal: Bench-scale Refinement for In-situ Arsenic Removal from Groundwater, Orica Kooragang Island, NSW," Final Report, URS Corporation, October 2010.

**VOLUNTARY MANAGEMENT PROPOSAL UNDER THE CONTAMINATED
LAND MANAGEMENT ACT 1997 (Stage 4)**

Orica Australia Pty, Ltd, Kooragang Island, NSW

PART 1

Preliminary Details

Date: 13 April 2010

1. Proponent's Details

a) Name and Contact Details

Proponent: Orica Australia Pty Ltd
(ACN: 004 117 828) of 15 Greenleaf Road, Kooragang Island NSW ("Orica")

ABN:99 004 117 828

CONTACT

Company:	Orica Australia Pty Ltd
Position title:	Environmental Manager, Kooragang Island
Type of business:	Ammonium Nitrate Manufacturing

b) Who the EPA should contact with technical enquiries about the proposal

Company:	URS Australia Pty Ltd
Position title:	Principal Remediation Engineer
Type of business:	Engineering and Environmental Services

2. Site to which proposal applies

The site to which this proposal relates is:

- The site is located at: 15 Greenleaf Road, Kooragang Island NSW. The total site area is approximately 21 hectares (ha). The property comprises Lot 3 in DP234288 in the local government area of Newcastle, New South Wales.
- Shown in the attached **Figure 1 (Attachment A)** and referred to in this proposal as "the site".

3. Contamination

Based on previous investigations the contaminant of concern ("the contaminant") identified is arsenic.

Arsenic is present in groundwater at the northwest site boundary down gradient of a former disposal pit in the immediate vicinity of monitoring well MW27A and off site to the northwest at Heron Road in the immediate vicinity of monitoring wells BP5, MW 50 and MW21A (refer to **Figure 2 in Attachment A**), at concentrations exceeding ANZECC and ARMCANZ (2000) Australian and New Zealand Guidelines for Fresh and Marine Water Quality.

4. Management Proposal

A Stage 4 management proposal ("the proposal") is to be undertaken to establish the feasibility of the in-situ geochemical fixation of arsenic in groundwater consisting of the following primary tasks:

- Site Groundwater Monitoring
- Implementation of an In-situ Field Trial
- Feasibility Study

The management proposal comprises:

1. the information set out above;
2. the proposed actions, works and other components as set out in the Stage 4 VMP Technical Proposal (URS Australia), dated 13 April 2010;
3. the undertaking set out in Part 2 of this document;
4. the performance schedule set out in Part 3 of this document;
5. the Signature of proponent; and
6. the "Undertaking not to recover contributions under Division 6 of the Contaminated Land Management Act 1997" form.

Part 2

Undertakings Included in Voluntary Management Proposal

Explanatory Note:

Before the EPA can approve a voluntary management proposal under section 17 of the Contaminated Land Management Act 1997, it has a statutory obligation to satisfy itself that the terms of the proposal (as modified by any conditions to be imposed by the EPA) submitted to it under section 17 are appropriate. In addition to including an appropriate investigation plan, remedial action plan or other plan of management, to be acceptable to the EPA a proposal would usually include the undertakings set out below. These undertakings are important and will form part of the terms of the proposal. If the proposal is approved, they must be complied with in order for the EPA to be satisfied that the terms of the proposal have been carried out.

THE PROPOSAL INCLUDES THE FOLLOWING UNDERTAKINGS:

General

1. All works carried out in connection with the proposal including sampling and preparation of associated reports ("the activities") will be carried out in accordance with applicable provisions of *State Environmental Planning Policy 55 – Remediation of Land* and any requirements imposed under it in relation to the activities.
2. All matters listed as relevant to a remediation action plan by the EPA's *Guidelines for Consultants Reporting on Contaminated Sites* (1997) will be taken into account in the carrying out of the activities.
3. All the activities will be carried out consistently with guidelines made or approved under section 105 of the CLM Act.
(See <http://www.environment.nsw.gov.au/clm/guidelines.htm>)
4. All the activities will be carried out in compliance with applicable NSW environmental legislation, and in particular:
 - i) All the activities, including:
 - (1) the processing, handling, movement and storage of materials and substances used to carry out the activities; and
 - (2) the treatment, storage, processing, reprocessing, transport and disposal of waste generated by the activities will be carried out in a competent manner;
 - ii) All plant and equipment installed at the site or used in connection with the activities:
 - (1) will be maintained in a proper and efficient condition; and
 - (2) will be operated in a proper and efficient manner.
5. All the activities at the site will be carried out in a manner that prevents or minimises the emission of dust, odour and noise from the site.
6. Waste generated or stored at the Site will be assessed and classified in accordance with the DECCWs *Waste Classification Guidelines Part 1: Classifying Waste*.
(See <http://www.environment.nsw.gov.au/waste/envguidlms/index.htm>)
7. All waste transported from the Site that is required by the *Protection of the Environment (Waste) Regulation 2005* to be tracked must be tracked using the DECCWs on-line tracking system or an alternative tracking system approved in writing by the DECCW.

(See <http://www.environment.nsw.gov.au/waste/wastetracking.htm>)

8. The proponent will, and acknowledges that the EPA may, make all documents and information relating to the proposal and activities carried out under the proposal available to the public free of charge.
9. The proponent consents to the EPA placing all documents relating to the proposal on its public website.
10. The proponent will:
 - i) prior to the implementation of the proposal provide for the EPA's approval a strategy for communicating about that implementation, particularly the actual management works, with members of the public who are likely to have a real interest in or be affected by that implementation; and
 - ii) implement the strategy as approved in writing by the EPA.

Monitoring, Record Keeping & Reporting

11. At least until the EPA has notified the proponent that the EPA no longer considers that the contamination is significant enough to warrant regulation under the Contaminated Land Management Act 1997, record and retain all monitoring data and information and provide this record to the EPA at any reasonable time if so requested by the EPA and as specifically provided under the proposal.
12. The EPA will be informed in writing within 7 days of the proponent becoming aware of information or data indicating a material change:
 - a) in conditions at the site, or
 - b) in its surrounding environment,which could adversely affect the prospects of successful management of the site or result in harm to the environment.
13. The EPA will be informed in writing within 7 days of the proponent becoming aware of any failure, either by the proponent or any other person, to comply with any term of the proposal.
14. The EPA will be informed in writing as soon as practicable of any notification by the proponent, its employees or its agents to an appropriate regulatory authority other than the EPA of any pollution incident at the site within the meaning of the *Protection of the Environment Operations Act 1997*.

(See <http://www.environment.nsw.gov.au/licensing/dutytonotify.htm>)

Performance Schedule

15. The performance schedule which is in Part 3 of this document will be adhered to.

PART 3

Performance Schedule

1. Objectives of the Proposal

1.1 Objectives

The objectives of this VMP are as follows:

- Describe proposed groundwater monitoring program to continue to monitor the onsite and offsite extent of the arsenic groundwater plume;
- Describe proposed field trial to demonstrate the effectiveness of in-situ geochemical fixation in reducing and stabilising arsenic in groundwater, and
- Provide a program of associated milestones and deliverables for execution of the VMP.

2. Principal Features of the Proposal

The principal features of the proposal agreed with the NSW DECCW can be summarised as follows. Detailed information on the proposed program is provided in Attachment D:

- a) **Site Groundwater Monitoring Program** – Continue biannual sampling of the identified arsenic-contaminated groundwater to monitor fluctuations in concentration and assess temporal trends. This monitoring will also establish baseline conditions for the field trial.
- b) **Field Trial**
 - **Bench-Scale Testing Refinement** – Bench-scale laboratory testing will be conducted to supplement the results from the initial bench-scale program. The objectives are to optimize the iron reagent dosage, identify the preferred oxidant, optimize the oxidant dosage, and confirm the geochemistry of the treated groundwater.
 - **Approvals** – Approval from DECCW in Sydney and Newcastle (Office of Water) for placement of reagents into the subsurface for the field trial will be obtained. An indication of approval-in-principal for full-scale implementation will also be obtained, if possible.
 - **Detailed Design (Work Plan)** – A Work Plan will present field trial design and include treatment zone installation strategy, reagent selection, reagent dose, site selection, method of application (injection), application specifications (width, depth, number of injections and radius of influence) and a monitoring program to assess effectiveness of remediation program. A contingency plan to address issues that may arise would also be included – e.g. if direct injection fails,

requirements for closer spaced injections or injection through wells would be implemented or physical construction of a barrier.

- *Health, Safety, and Environment* - site operational, health and safety requirements will be established and measures to address any issues will be developed.
- *Performance Criteria* – The metrics critical to assessment of whether the field trial has met the Stage 4 VMP objectives and the implications for long-term remediation objectives. e.g. injectability, longevity of reagents, groundwater concentrations of arsenic and other compounds, changes in general water quality parameters.
- *Performance Monitoring* – The monitoring program to enable assessment of the effectiveness of the trial, including frequency, locations, duration of monitoring (approximately 18 months, but dependent on results), project milestones and analytes.
- *Contingency Plan* – If it is determined that in-situ geochemical fixation is unlikely to meet the objective of reducing the transport of arsenic in groundwater, the assessment of hydraulic containment with ex-situ groundwater treatment started under the Stage 3 VRA would be completed. This would likely include a pump test to assess hydrogeological characteristics of the aquifer and a field trial of the preferred ex-situ treatment methods.
- *Communication Strategy* – Although Stage 4 VMP work will be conducted on Orica property, full-scale implementation (if feasible) will likely occur on land not owned by Orica. For this reason, implementation of an effective Communication Plan will be required to keep stakeholders informed of progress of the field trial and forward planning for full-scale implementation.
- *Scheduling and Reporting* – The schedule will detail the timing of key activities under the VMP and reporting on the outcomes of the trial.

3. Key Milestones for Investigation, Remediation, and other Actions

All works set out in this proposal will be completed by the deadlines shown below:

No.	Milestone	By Whom	Deadline
1	Begin Bench-scale Treatability Refinement	Orica	May 2010
2	Initial Installation of Performance Monitoring Wells. Conduct first performance baseline monitoring event.	Orica	June 2010
3	Conduct Bi-Annual Site Groundwater Monitoring	Orica	July 2010
4	Completion of Work Plan and Submittal of Approvals	Orica	July 2010
5	Begin Field Trial Implementation with Reagent Injection and Final Installation of Performance Monitoring Wells	Orica	September 2010

No.	Milestone	By Whom	Deadline
6	Performance Monitoring Event	Orica	September 2010
7	Conduct Bi-Annual Site Groundwater Monitoring (Performance Monitoring Event)	Orica	January 2011
8	Conduct Bi-Annual Site Groundwater Monitoring (Performance Monitoring Event)	Orica	July 2011
9	Completion of Field Trial - Conduct Bi-Annual Site Groundwater Monitoring (Final Performance Monitoring Event)	Orica	January 2012
10	Completion of Feasibility Study	Orica	June 2012

4. Reporting Requirements and Timeframe for Submission of Reports

The proposed reports will be submitted to the EPA by the deadlines shown below:

No.	Deliverable	By Whom	Deadline
R1	Work Plan	Orica	July 2010
R2	July 2010 Biannual Groundwater Data Submittal	Orica	August 2010
R3	January 2011 Biannual Groundwater Data Submittal	Orica	February 2011
R4	Trial Progress Report #1	Orica	March 2011
R5	Trial Progress Report #2	Orica	June 2011
R6	July 2011 Biannual Groundwater Data Submittal	Orica	August 2011
R7	Trial Progress Report #3	Orica	September 2011
R8	January 2012 Biannual Groundwater Data Submittal	Orica	February 2012
R9	Final Trial Performance Report	Orica	April 2012
R10	Feasibility Study	Orica	June 2012

5. Assumptions

The following assumptions have been considered in the schedule above:

- No allowance has been made for delays due to inclement weather, adverse subsurface conditions, subcontractor availability etc., which are beyond our control. If such delays are encountered, Orica will contact the DECCW immediately.

- An allowance of 6 weeks is made for DECCW approval of the Voluntary Management Proposal and supporting information.

Attachments:

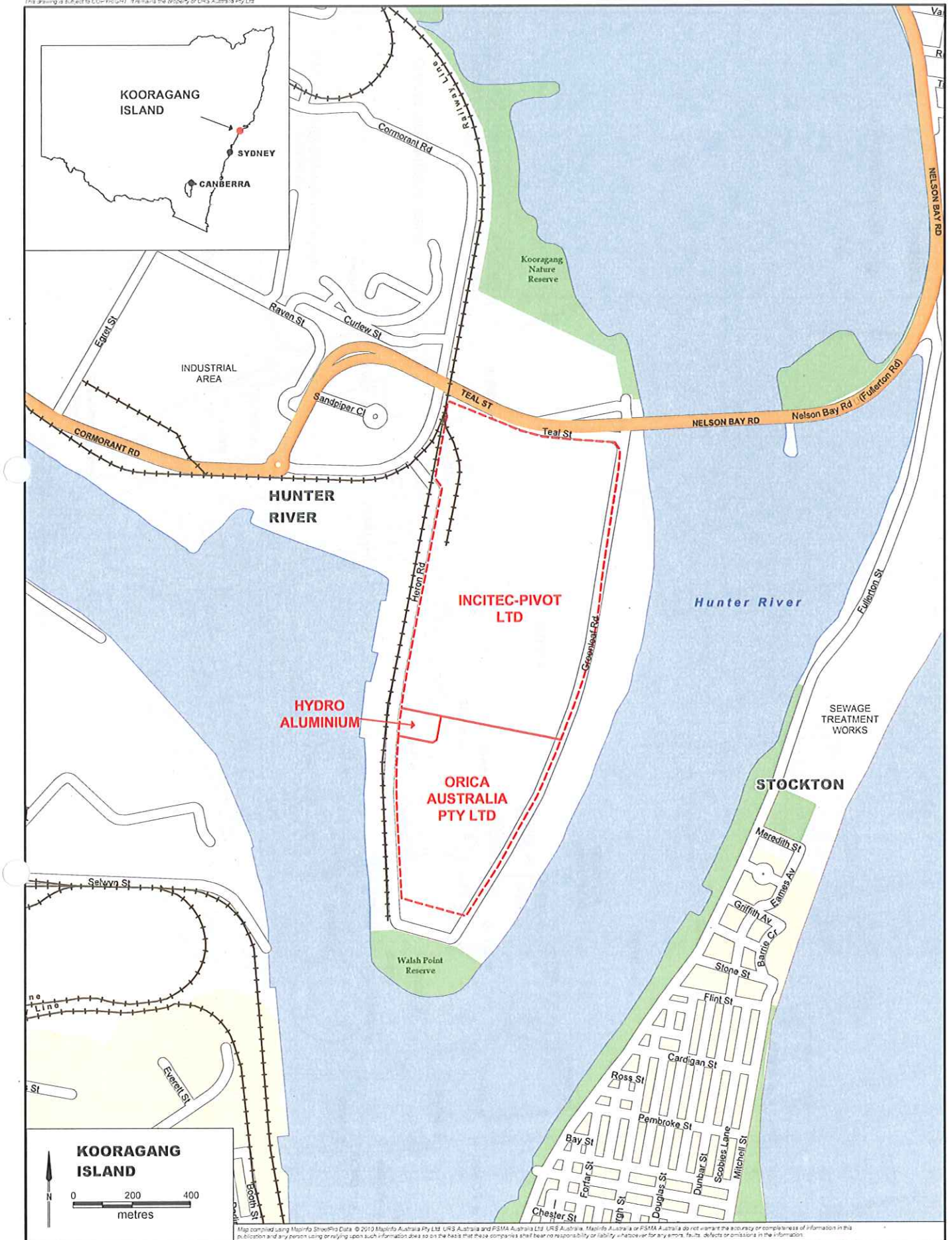
Attachment A – Figure 1 and Figure 2.

Attachment B – Signature of Proponent.

Attachment C – Undertaking not to recover contributions under Division 6 of the Contaminated Land Management Act 1997.

Attachment D – Technical Proposal

Attachment A Figures



Map compiled using MapInfo StreetView Data. © 2010 MapInfo Australia Pty Ltd. URS Australia and PSMA Australia Ltd. URS Australia, MapInfo Australia or PSMA Australia do not warrant the accuracy or completeness of information in this publication and any person using or relying upon such information does so on the basis that these companies shall bear no responsibility or liability whatsoever for any errors, faults, delays or omissions in the information.

Client ORICA AUSTRALIA PTY LTD	Project ORICA KOORAGANG ISLAND, VOLUNTARY MANAGEMENT PROPOSAL (STAGE 4)	Title SITE LOCATION PLAN
	Drawn: AO Approved: MW Date: 13/04/2010 Job No: 43217831 File No: 43217831.006.wor	Figure: 1

LEGEND

MONITORING WELLS



Drawn: AO Approved: MW Date: 13/04/2010
Job No: 43217831 File: 43217831.001.wor
Client

ORICA KOORAGANG ISLAND

Project

VOLUNTARY MANAGEMENT PROPOSAL
(STAGE 4)

Title

MONITORING WELLS LOCATIONS

Figure: 2

URS



Attachment B
Signature of Proponent

Signature of proponent

This application for approval of this voluntary management proposal may only be signed by a person(s) with the legal authority to sign it. The various ways in which the application may be signed, and the people who may sign the application, are set out in the categories below.

Please tick (✓) the box next to the category that describes how this application is being signed.

If the proponent is:	The application must be signed and certified by one of the following:
an individual	☐ the individual.
a company	☐ the common seal being affixed in accordance with the <i>Corporations Act 2001</i> , or ☐ two directors, or ☒ a director and a company secretary, or ☐ if a proprietary company that has a sole director who is also the sole company secretary – by that director.
a public authority other than a council	☐ the chief executive officer of the public authority, or ☐ by a person delegated to sign on the public authority's behalf in accordance with its legislation (Please note: a copy of the relevant instrument of delegation must be attached to this application).
a local council	☐ the general manager in accordance with s.377 of the <i>Local Government Act 1993</i> ('LG Act'), or ☐ the seal of the council being affixed in a manner authorised under the LG Act.

I/We (the proponent):

- *apply for approval of the voluntary management proposal set out in this proposal and in any documents referred to in Part 1.4 of this proposal*
- *declare that the information in this proposal form (including any attachment or document referred to in Part 1.4 of this proposal) is not false or misleading.*

Signed by Proponent 11 May 2010

Proponent:

Site:

Proposal Date:

Attachment C
Undertaking not to recover contributions under Division 6 of the
Contaminated Land Management Act 1997

**Voluntary Management Proposal:
Undertaking not to recover contributions under Division 6
of the Contaminated Land Management Act 1997**

To: ENVIRONMENT PROTECTION AUTHORITY
of New South Wales
59-61 Goulburn St
Sydney South NSW 1232

Attention: Manager Contaminated Sites

Company **Orica Australia Pty Ltd**
(ACN: 004 117 828) of 15 Greenleaf Road, Kooragang Island, NSW

UNDERTAKES not to recover contributions under Division 6 of the Contaminated Land Management Act 1997 ("the Act") in respect of the voluntary management proposal submitted to the EPA in accordance with Section 17 of the Act concerning land described as:

The site is located at: 15 Greenleaf Road, Kooragang Island NSW. The total site area is approximately 21 hectares (ha). The property comprises Lot 3 in DP234288 in the local government area of Newcastle, New South Wales.

The proposal is outlined as follows:

A Stage 4 management proposal ("the proposal") is to be undertaken to establish the feasibility of the in-situ geochemical fixation of arsenic in groundwater consisting of the following primary tasks:

- Site Groundwater Monitoring
- Implementation of an In-situ Field Trial
- Feasibility Study

SIGNED for and on behalf of:

Company: **Orica Australia Pty Ltd**

Signed by Proponent on 11 May 2010