Final Remediation Works for the Former Cresco Site, Bayswater

CSBP Limited

Report and recommendations
of the Environmental Protection Authority

Environmental Protection Authority
Perth, Western Australia
Bulletin 1175
June 2005

Environmental Impact Assessment Process Timelines

Date	Progress stages	Time (weeks)
26 May 2003	**Level of Assessment set (following any appeals upheld)**	
14 September 2004	**Proponent Document Released for Public Comment**	**68 weeks**
8 November 2004	**Public Comment Period Closed**	**8 weeks**
20 May 2005	**Final Proponent response to the issues raised and provision of the required information**	**27 weeks**
7 June 2005	**EPA report to the Minister for the Environment**	**3 weeks**

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Summary and recommendations

CSBP Limited (CSBP) proposes to remediate contamination on the former Cresco site in Bayswater such that it is suitable for further commercial/industrial use. This report provides the Environmental Protection Authority's (EPA's) advice and recommendations to the Minister for the Environment on the environmental factors relevant to the proposal.

Section 44 of the *Environmental Protection Act 1986* requires the EPA to report to the Minister for the Environment on the environmental factors relevant to the proposal and on the conditions and procedures to which the proposal should be subject, if implemented. In addition, the EPA may make recommendations as it sees fit.

The EPA is also required to have regard for the principles set out in section 4A of the *Environmental Protection Act 1986.*

Relevant environmental factors and principles

The EPA decided that the following environmental factors relevant to the proposal required detailed evaluation in the report:

(a) Soil contamination – removal of source contamination and prevention of groundwater contamination; and

(b) Water quality – groundwater flowing to the Swan River.

There were a number of other factors which were relevant to the proposal, but the EPA is of the view that the information set out in Appendix 3 provides sufficient evaluation.

Conclusion

The EPA has considered the proposal by CSBP Limited to remediate contamination on the former Cresco site in Bayswater.

The EPA notes that adequate site validation and groundwater monitoring will be required at the completion of active remediation. The EPA also notes that mechanisms to prevent the use of groundwater should be introduced prior to any future development of the site.

There has been considerable concern over this particular contaminated site since the 1980's and the EPA is pleased to see that appropriate remediation has now been proposed.

The EPA has therefore concluded that it is unlikely that the EPA's objectives would be compromised provided there is satisfactory implementation by the proponent of the their commitments and the recommended conditions set out in Appendix 4 and summarised in Section 4.

Recommendations

The EPA submits the following recommendations to the Minister for the Environment:

1. That the Minister notes that the proposal being assessed is the remediation of the former Cresco site in Bayswater by CSBP Limited;
2. That the Minister considers the report on the relevant environmental factors and principles as set out in Section 3;
3. That the Minister notes that the EPA has concluded that it is unlikely that the EPA's objectives would be compromised, provided there is satisfactory implementation by the proponent of the recommended conditions set out in Appendix 4, and summarised in Section 4.
4. That the Minister imposes the conditions and procedures recommended in Appendix 4 of this report.

Conditions

Having considered the proponent's commitments and information provided in this report, the EPA has developed a set of conditions that the EPA recommends be imposed if the proposal by CSBP to remediate contamination on the former Cresco site in Bayswater is approved for implementation. These conditions are presented in Appendix 4. Matters addressed in the conditions include the following:

(a) site validation following active remediation;

(b) groundwater discharge criteria, both during and after active remediation;

(c) measures to prevent the use of groundwater; and

(d) the requirement for a dust management plan.

Contents

1. Introduction and background

This report provides the advice and recommendations of the Environmental Protection Authority (EPA) to the Minister for the Environment on the environmental factors and principles relevant to the proposal by CSBP Limited, to remediate contamination on the former Cresco site in Bayswater.

The site is located north east of the Tonkin Highway/Railway Parade intersection in the City of Bayswater (Figure 1).

Cresco, a South Australian fertiliser company, established the site in 1928 for the large scale manufacturer of fertiliser. From 1928 until 1970, Cresco manufactured products such as superphosphate and sulphuric acid. CSBP purchased the site in 1970 and continued manufacturing chemicals until 1990. These historical activities, mainly the large scale on-site disposal of waste materials, have left the site with soil and groundwater contamination.

Further details of the proposal are presented in Section 2 of this report. Section 3 discusses the environmental factors and principles relevant to the proposal. The Conditions to which the proposal should be subject, if the Minister determines that it may be implemented, are set out in Section 4. Section 5 provides Other Advice by the EPA, Section 6 presents the EPA's conclusions and Section 7, the EPA's Recommendations.

Appendix 5 contains a summary of submissions and the proponent's response to submissions and is included as a matter of information only and does not form part of the EPA's report and recommendations. Issues arising from this process, and which have been taken into account by the EPA, appear in the report itself.

2. The proposal

CSBP Limited propose to remediate the former Cresco site in Bayswater.

Soil contamination

There is up to 280,000 m^3 of contaminated soil present on site. The contamination was caused by the disposal of pyritic wastes or cinders, lead chamber washings, sodium bisulphate, den-scrubber effluent, superphosphate and other building wastes during the site's history. The cinders, sodium bisulphate and den-scrubber effluent were deposited in excavated pits while the other wastes were disposed of on a more random basis. The proposed soil remediation involves the excavation of contaminated soil and disposal to landfill or treatment and reuse.

Groundwater contamination

Groundwater under and down-gradient of the site has become acidic and is contaminated by heavy metals. Contaminated groundwater has moved towards the Swan River, and therefore poses a risk to the river.

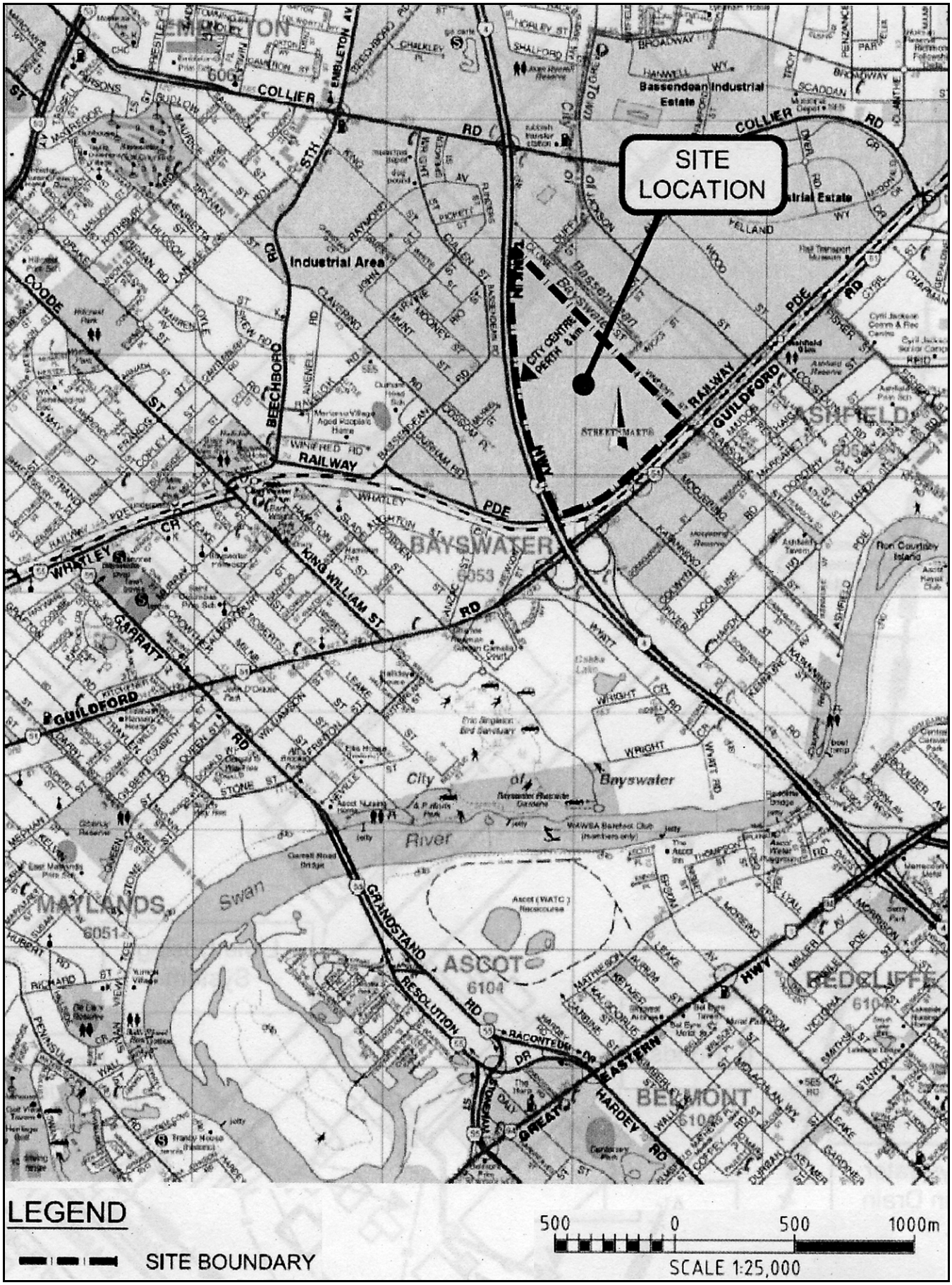

Figure 1: Site location

In 2004, CSBP obtained approval for a groundwater interception system. This system recovers contaminated groundwater then treats it through a lime-dosing plant before allowing it to reinfiltrate on the centre of the site. The layout is shown in figure 2.

The Cresco operations also resulted in contamination of what is now the Tonkin Highway road reserve to the west of the site. This land is the responsibility of Main Roads Western Australia (MRWA) and has never been owned by CSBP. At the south west corner of the site is an Alinta Gas compound which also contains contaminated material.

The main characteristics of the proposal are summarised in Table 1 below. A detailed description of the proposal is provided in Sections 4, 5 and 6 of the PER (CSBP, 2004).

Table 1: Summary of key proposal characteristics

Element	Description
Volume of contaminated material:	Up to approximately 280 000 cubic metres.
Nature of contaminants:	Heavy metals, acidity and fluoride.
Management of soil contamination:	Excavation and removal so that site would be suitable for future commercial/industrial use. Contaminated soil either disposed to landfill or cleaned and reused.
Management of groundwater contamination:	Pump and treat groundwater to remove contaminants. Disposal of treated groundwater via infiltration or direct discharge to the Bayswater Main Drain.
Remediation time frame:	Approximately 5 years

Since release of the PER, the proponent has advised that they have offered both MRWA and Alinta Gas the opportunity of joining CSBP in remediating their respective contaminated land.

3. Relevant environmental factors and principles

Section 44 of the *Environmental Protection Act 1986* requires the EPA to report to the Minister for the Environment on the environmental factors relevant to the proposal and the conditions and procedures, if any, to which the proposal should be subject. In addition, the EPA may make recommendations as it sees fit.

The identification process for the relevant factors selected for detailed evaluation in this report is summarised in Appendix 3. The reader is referred to Appendix 3 for the evaluation of factors not discussed below. A number of these factors, such as noise,

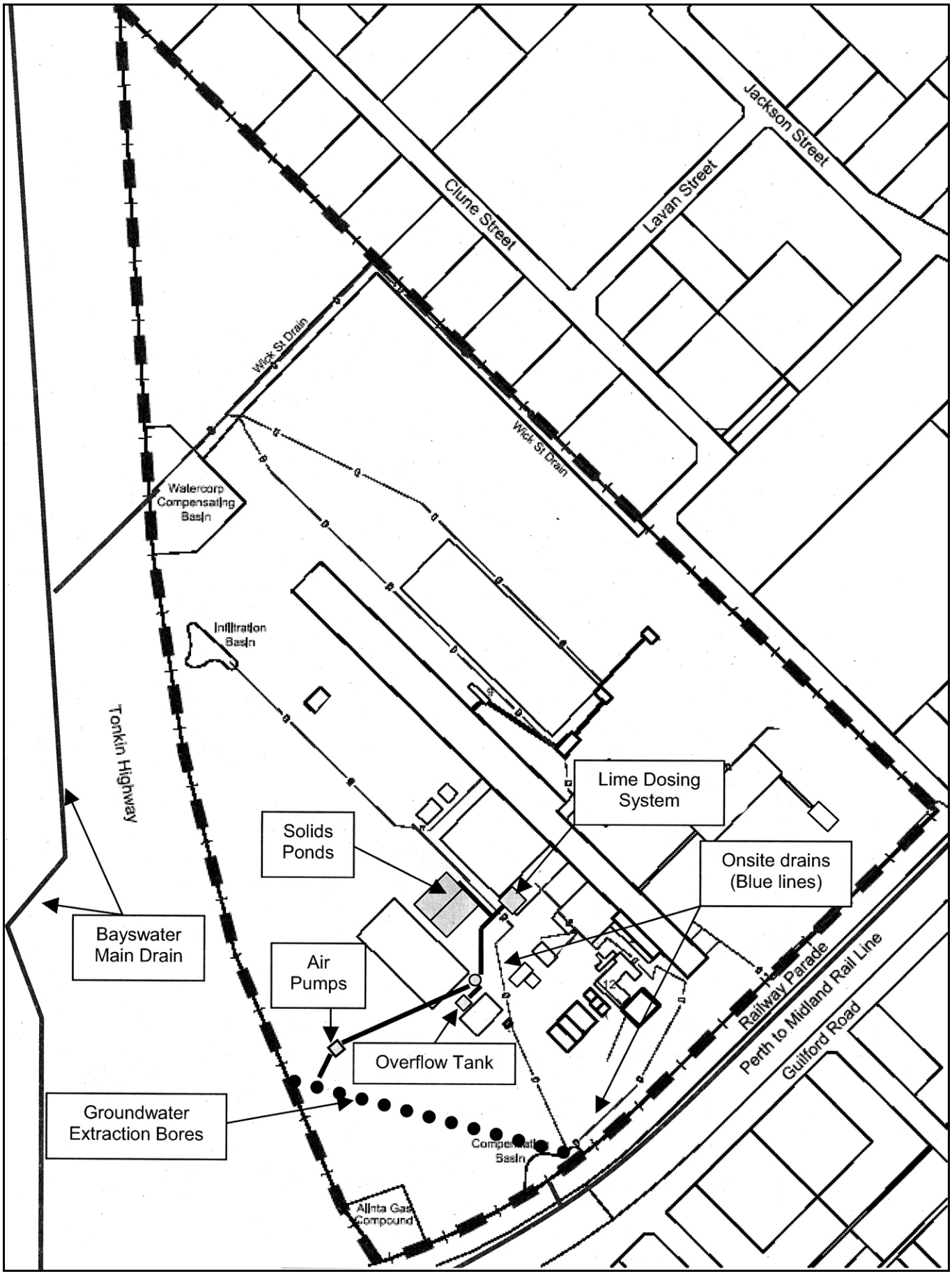

Figure 2: Site layout

dust and transport, are relevant to the proposal, but the EPA is of the view that the information set out in Appendix 3 provides sufficient evaluation.

It is the EPA's opinion that the following environmental factors relevant to the proposal require detailed evaluation in this report:

(a) Soil contamination – removal of source contamination and prevention of groundwater contamination; and

(b) Water quality – groundwater flowing to the Swan River.

The above relevant factors were identified from the EPA's consideration and review of all environmental factors generated from the PER document and the submissions received, in conjunction with the proposal characteristics.

Details on the relevant environmental factors and their assessment are contained in Sections 3.1 - 3.2. The description of each factor shows why it is relevant to the proposal and how it will be affected by the proposal. The assessment of each factor is where the EPA decides whether or not a proposal meets the environmental objective set for that factor.

3.1 Soil contamination – removal of source contamination and prevention of groundwater contamination

Description

There is up to 280,000 m^3 of contaminated soil present on site. The contamination was caused by the disposal of pyritic wastes or cinders, lead chamber washings, sodium bisulphate, den-scrubber effluent, superphosphate and other building wastes during the site's history. The cinders, sodium bisulphate and den-scrubber effluent were deposited in excavated pits while the other wastes were disposed of on a more random basis.

The pyritic wastes are compounds of silicate sands and haematite/magnetite (iron oxide minerals), together with small amounts of sulphur present in gypsum (calcium sulphate) and jarosite (iron sulphate mineral).

There have been numerous site investigations and these have shown that the contaminants found in high concentrations are sulphate, arsenic, aluminium, lead, cadmium, chromium, iron, nickel, fluoride and copper. The proponent has undertaken an ecological and health risk assessment. This suggests that aluminium, fluoride and zinc, in particular, in the contaminated groundwater could affect the ecosystem in the Swan River.

The main issue of concern in relation to soil contamination at the site is the ongoing contamination of groundwater and the potential long term impact on the Swan River via discharge of contaminated groundwater. The risk of leaching is greater in winter when the pyritic material becomes immersed in the groundwater due to higher water tables. Leaching may also occur when rainwater infiltrates through the stockpile, however this risk is not considered as significant as that posed through contact with groundwater.

To address the impact of soil contamination on groundwater and the environment, the proponent has adopted an 'environmental outcome' based remediation strategy. The proponent has not selected a specific option, but, the selected option will involve one or a combination of :

(a) on-site treatment and reuse; and/or
(b) off-site disposal to landfill.

On-site treatment and reuse

The proponent has investigated a number of treatment options and these are detailed in the PER (CSBP, 2004). The most feasible option is magnetic separation which separates the iron oxide from sand for reuse by a third party (eg as feed stock in iron smelting). The clean silica sand resulting from the process would be reused as fill to re-contour the site. This option is dependant on CSBP being able to reach commercial agreement with a customer for the separated iron oxide.

Off-site disposal to landfill

The contaminated soil would be excavated, analysed then disposed of to an appropriate class of landfill (either Class III or Class IV) depending on the level of contamination. Clean fill would then be imported to restore site contours.

Remediation outcome

With either option the result would be a site that meets the criteria for the intended future use as commercial/industrial land.

On completion of the site remediation, the proponent has committed to undertake site validation tests to demonstrate that the site has been remediated such that it is suitable for commercial/industrial use. This means that it will need to meet the Health Investigation Level (HIL) "F" criteria (DoE, 2003).

Submissions

The Department of Health (DOH) advised that it had no in-principle objection to the proposed soil remediation and management options. The DOH thought more information on the risk from dust was needed.

Assessment

The area considered for assessment of this factor of soil contamination is the CSBP site in Bayswater bounded by Tonkin Highway, Railway Parade and Vincent Street.

The EPA's environmental objective for this factor is:

- to ensure the rehabilitation of the site to an acceptable standard that is compatible with the intended land use and consistent with appropriate criteria.

EPA Guidance Statement No.17 (EPA, 2000), lists the preferred hierarchy of approaches for site remediation. The preferred option is for contaminated material to:

- be treated on-site and the contaminants reduced to acceptable levels; or
- be treated off-site and returned for reuse after the contaminants have been reduced to acceptable levels.

Disposal to an approved landfill and 'cap and contain' isolation measures should only be used if the preferred approaches are not practicable and if undertaken in an environmentally acceptable manner. However, in practice, remediation often involves disposal to an approved landfill and 'cap and contain' measures.

The proposal involves the excavation and handling of large volumes of soil and this has the potential to create dust problems. To address dust, the EPA has recommended a condition requiring a Dust Management Plan which addresses risk, monitoring and contingency measures.

Following remediation of the site by removal and reuse of the wastes and/or disposal of the wastes to landfill, the EPA considers that validation of the site to demonstrate its suitability for further commercial/industrial use is essential.

The EPA considers that the proposal to remove and treat/dispose of the wastes can be managed to meet the EPA's objective provided that the proponent:

- undertakes excavation activities in accordance with a Dust Management Plan (recommended Environmental Condition 6);
- undertakes site validation tests, prior to development of site (recommended Environmental Condition 5-7); and
- places memorials on titles to prevent groundwater abstraction for domestic or irrigation purposes (recommended Environmental Condition 5-9).

Summary

Having particular regard to:

a) all wastes exceeding HIL "F" criteria being removed; and
b) the recommended conditions, requiring site validation and memorials on titles,

it is the EPA's opinion that the removal and reuse or disposal of the wastes can be managed to meet the EPA's environmental objective for soil contamination provided that the recommended conditions are made legally enforceable.

3.2 Water quality – groundwater flowing to the Swan River

Description

Groundwater under and down-gradient of the site has become acidic and is contaminated by heavy metals. Contaminated groundwater has moved towards the Swan River, and therefore poses a risk to the river. Groundwater discharge to the Swan River is via the Bayswater Main Drain (BMD).

The primary concern is that the BMD is subject to recharge by local groundwater and once contaminated groundwater reaches the drain, it can discharge directly to the Swan River. Regional groundwater flow is in a south-east direction towards the Swan River and groundwater discharge to the BMD is greater in winter.

Given the characteristics of the soil type and the pyritic waste at the site, it is evident that contaminants leaching from the waste are causing the groundwater

contamination. Removing the waste pyritic material from the site would significantly minimise further groundwater contamination.

The proponent has installed a groundwater interception field near the south-west corner of the site to abstract contaminated groundwater and prevent it from migrating offsite. The groundwater is treated through a lime dosing plant located on-site. This plant became operational in October 2004 and at present the treated groundwater is reinfiltrated toward the centre of the site (upstream of the interception bore field) thus causing the treated groundwater to recirculate on-site.

The proponent has refined the lime dosing process to optimise the mechanical and chemical performance of the plant. The plant has been effective in neutralising the pH of the groundwater and removing contaminants (removal efficiency of 73% for F, 96% for Al and Zn).

While the treated groundwater is currently recirculated, the intention is for the treated groundwater to be disposed of either directly or via infiltration to the BMD once it meets appropriate criteria.

Remediation outcome

The proponent has chosen an 'environmental outcome' based approach to groundwater remediation. The outcome for remediation is that the sensitive receptors identified in the ecological and health risk assessment will be protected.

Since a degree of uncertainty exists in the effectiveness of remediation at the site, the proponent has proposed an adaptive management approach such that, should monitoring indicate a likelihood of adverse impacts, a further management response will be triggered.

Submissions

The DOH advised that it had no in-principle objection to the proposed groundwater remediation and management options. The Conservation Council of Western Australia (CCWA) believed monitoring was required to demonstrate that the discharge to the BMD met appropriate criteria prior to any development on the site and that the monitoring should occur for a minimum of ten years. A submitter asked why monitoring had not been undertaken at the Brady's Ceiling site.

Assessment

The area considered for assessment of this factor is the CSBP site in Bayswater and the contaminated groundwater down-gradient of the site.

The EPA's environmental objective for this factor is to improve the quality of groundwater to ensure that existing and potential uses, including ecosystem maintenance, are protected.

The EPA notes that the waste at the CSBP site has affected the quality of groundwater in the superficial aquifer down-gradient of the site and is causing ongoing contamination. However, contaminant release to the groundwater should be significantly reduced once the pyritic material has been removed.

The EPA considers that the proposed outcome for groundwater remediation (i.e. that the sensitive receptors identified in the ecological and health risk assessment will be protected) is appropriate.

The proponent has recently completed an ecotoxicity study to derive site specific (using local species) trigger values for aluminium and fluoride. A direct toxicity assessment using BMD water was also undertaken and this showed no statistical toxicity difference between the drain water and the reference seawater. These studies have provided information for setting the remediation criteria.

The proponent has also undertaken further studies into the natural attenuation of the soils and this has shown that it is better to infiltrate the treated water rather than discharge directly to the BMD since infiltration would achieve significant attenuation of ammonia.

Since groundwater treatment will need to continue for a number of years, the EPA agrees that an adaptive management approach is appropriate. The EPA has thus recommended a number of conditions (6-1 to 6-5), some of which specify action levels to be met during remediation. The EPA has also recommended that the groundwater remediation endpoint be based on the groundwater quality entering the BMD. The remediation is likely to take 5 years and the EPA notes that monitoring will need to continue after treatment ceases to ensure the remediation is successful and to detect any problems. The EPA recommends that the proponent:

- demonstrate that the remediation endpoint has been achieved (recommended Environmental Condition 6-8); and
- continues to monitor for two years following remediation (recommended Environmental Condition 5-6).

Summary

Having particular regard to the:

a) source of contamination being removed;
b) interception and treatment of groundwater; and
c) recommended condition to continue monitoring for 2 years following remediation,

it is the EPA's opinion that the proposal can be managed to meet the EPA's environmental objective for protection of water quality, provided the recommended conditions are made legally enforceable.

4. Conditions and Commitments

Section 44 of the *Environmental Protection Act 1986* requires the EPA to report to the Minister for the Environment on the environmental factors relevant to the proposal and on the conditions and procedures to which the proposal should be subject, if implemented. In addition, the EPA may make recommendations as it sees fit.

In developing recommended conditions for each project, the EPA's preferred course of action is to have the proponent provide an array of commitments to ameliorate the

impacts of the proposal on the environment. The commitments are considered by the EPA as part of its assessment of the proposal and those that the EPA believe require auditing are made into conditions, modified if necessary to ensure enforceability. These then form part of the conditions to which the proposal should be subject, if it is to be implemented.

4.1 Recommended conditions

Having considered the proponent's commitments and information provided in this report, the EPA has developed a set of conditions that the EPA recommends be imposed if the proposal by CSBP to remediate contamination on the former Cresco site in Bayswater is approved for implementation. These conditions are presented in Appendix 4. Matters addressed in the conditions include the following:

(c) site validation following active remediation;

(d) groundwater discharge criteria, both during and after active remediation;

(e) measures to prevent the use of groundwater; and

(f) the requirement for a dust management plan.

It should be noted that other regulatory mechanisms relevant to the proposal are:

- Part V of the *Environmental Protection Act 1986*, and
- Pending contaminated sites regulations.

5. Other Advice

The EPA notes that the historical Cresco operations have resulted in contamination on land adjacent to the CSBP site which is now owned by MRWA and Alinta Gas.

Clearly, the best long term environmental outcome would be the clean up of all the contamination that resulted from industrial use on the former Cresco site. Excavation of contaminated material on the MRWA and Alinta Gas land would also be considerably easier with access from the CSBP site. This easy access and the economies of scale for disposal/treatment could reduce the cost of remediation to MRWA and Alinta Gas considerably.

The remediation of the adjacent sites would require referral to the EPA, however, the EPA believes it is likely that these could attract a lower level of assessment if combined with the CSBP remediation. Thus, the EPA recommends that MRWA and Alinta Gas consider joining with CSBP in removing contamination from their respective sites.

6. Conclusions

The EPA has considered the proposal by CSBP Limited to remediate contamination on the former Cresco site in Bayswater.

The EPA notes that adequate site validation and groundwater monitoring will be required at the completion of active remediation. The EPA also notes that

mechanisms to prevent the use of groundwater should be introduced prior to any future development of the site.

There has been considerable concern over this particular contaminated site since the 1980's and the EPA is pleased to see that appropriate remediation is now proposed.

The EPA has therefore concluded that it is unlikely that the EPA's objectives would be compromised provided there is satisfactory implementation by the proponent of the their commitments and the recommended conditions set out in Appendix 4 and summarised in Section 4.

7. Recommendations

The EPA submits the following recommendations to the Minister for the Environment:

5. That the Minister notes that the proposal being assessed is the remediation of the former Cresco site in Bayswater by CSBP Limited;
6. That the Minister considers the report on the relevant environmental factors and principles as set out in Section 3;
7. That the Minister notes that the EPA has concluded that it is unlikely that the EPA's objectives would be compromised, provided there is satisfactory implementation by the proponent of the recommended conditions set out in Appendix 4, and summarised in Section 4.
8. That the Minister imposes the conditions and procedures recommended in Appendix 4 of this report.

Appendix 2

References

CSBP (2004) *Final Remediation Works for the Former Cresco Site, Bayswater*. CSBP Limited, Parsons Brinckerhoff, September 2004.

DoE (2003) *Contaminated Sites Management Series: Assessment Levels for Soil, Sediment and Water- Draft for Public Comment.* Department of Environment, November 2003.

EPA (2000) *Guidance for the Assessment of Environmental Factors No. 17, Remediation Hierarchy for Contaminated Land*. Environmental Protection Authority, July 2000.

Appendix 3

Summary of identification of relevant environmental factors

Identification of Relevant Environmental Factors

Preliminary Environmental Factors	Proposal Characteristics	Government Agency and Public Comments	Identification of Relevant Environmental Factors
POLLUTION			
Management of soil contamination	Up to 280 000 cubic metres of contaminated material.	The Department of Health (DOH) advised that it had no in-principle objection to the proposed soil remediation strategy. The City of Bayswater would have preferred that a remediation option had been selected prior to the release of the PER. The Conservation Council of Western Australia (CCWA) commented on the need for the site to be remediated until appropriate criteria were met. A submitter thought that the contamination in the adjacent Tonkin Highway reserve should also be remediated.	**Considered to be a relevant environmental factor**
Management of groundwater contamination	The groundwater is contaminated with heavy metals, acidity and fluoride.	The DOH advised that it had no in-principle objection to the proposed groundwater remediation strategy. The CCWA commented on the need for monitoring to ensure appropriate criteria were met and would like to see a portion of the site permanently set aside for the treatment of groundwater.	**Considered to be a relevant environmental factor**
Dust	The excavation activities have the potential to cause dust.	The DOH would have preferred an assessment of the risk from dust to be included in the PER.	This factor is addressed via the requirement for a dust management plan – see commment in factor 'Management of soil contamination'. **Not considered to be a relevant environmental factor**

Noise	The excavation activities have the potential to cause noise.	No comments received.	Factor can be adequately managed via the *Environmental Protection (Noise) Regulations 1997*. **Not considered to be a relevant environmental factor**
Demolition	The large buildings on site contain asbestos materials and their demolition has the potential to release fibres.	No comments received.	This factor can be adequately managed via the regulation governing the removal and disposal of asbestos cement material. **Not considered to be a relevant environmental factor**
SOCIAL SURROUNDINGS			
Transport	The proposal would require approximately 40 trucks per day.	No comments received.	Since trucks can access Tonkin Highway via the industrial area, there is unlikely to be any loss of amenity to surrounding residences. **Not considered to be a relevant environmental factor**
Consultation	The proponent has undertaken a community consultation program and this would continue throughout the remediation.	The City of Bayswater advised that it would like a role in approving the management plans.	The proponent advised that they will continue to liase with the City of Bayswater. **Not considered to be a relevant environmental factor**

Appendix 4

Recommended Environmental Conditions

STATEMENT THAT A PROPOSAL MAY BE IMPLEMENTED
(PURSUANT TO THE PROVISIONS OF THE
ENVIRONMENTAL PROTECTION ACT 1986)

FINAL REMEDIATION WORKS FOR THE FORMER CRESCO SITE, BAYSWATER

Proposal: Remediation of the former Cresco site in the City of Bayswater so that it is suitable for future commercial/industrial use, as documented in schedule 1 of this statement.

Proponent: CSBP Limited.

Proponent Address: PO Box 345
KWINANA WA 6966

Assessment Number: 1477

Report of the Environmental Protection Authority: Bulletin 1175

The proposal referred to above may be implemented by the proponent subject to the following conditions and procedures:

1 Implementation

1-1 The proponent shall implement the proposal as documented in schedule 1 of this statement subject to the conditions of this statement.

2 Proponent Nomination and Contact Details

2-1 The proponent for the time being nominated by the Minister for the Environment under section 38(6) or (7) of the *Environmental Protection Act 1986* is responsible for the implementation of the proposal until such time as the Minister for the Environment has exercised the Minister's power under section 38(7) of the Act to revoke the nomination of that proponent and nominate another person as the proponent for the proposal.

2-2 If the proponent wishes to relinquish the nomination, the proponent shall apply for the transfer of proponent and provide a letter with a copy of this statement endorsed by the proposed replacement proponent that the proposal will be carried out in accordance with this statement. Contact details and appropriate documentation on the capability of the proposed replacement proponent to carry out the proposal shall also be provided.

2-3 The nominated proponent shall notify the Department of Environment of any change of contact name and address within 60 days of such change.

3 Commencement and Time Limit of Approval

3-1 The proponent shall substantially commence the proposal within five years of the date of this statement or the approval granted in this statement shall lapse and be void.

Note: The Minister for the Environment will determine any dispute as to whether the proposal has been substantially commenced.

3-2 The proponent shall make application for any extension of approval for the substantial commencement of the proposal beyond five years from the date of this statement to the Minister for the Environment, prior to the expiration of the five-year period referred to in condition 3-1.

The application shall demonstrate that:

1. the environmental factors of the proposal have not changed significantly;

2. new, significant, environmental issues have not arisen; and

3. all relevant government authorities have been consulted.

Note: The Minister for the Environment may consider the grant of an extension of the time limit of approval not exceeding five years for the substantial commencement of the proposal.

4 Compliance Auditing and Performance Review

4-1 The proponent shall prepare an audit programme and submit compliance reports to the Department of Environment which address:

1. the status of implementation of the proposal as defined in schedule 1 of this statement;

2. evidence of compliance with the conditions and commitments; and

3. the performance of the environmental management plans and programs.

Note: Under sections 48(1) and 47(2) of the *Environmental Protection Act 1986*, the Chief Executive Officer of the Department of Environment is empowered to monitor the compliance of the proponent with the statement and should directly receive the compliance documentation, including environmental management plans, related to the conditions, procedures and commitments contained in this statement.

4-2 The proponent shall submit a performance review report every five years following the formal authority issued to the decision-making authorities under section 45(7) of the *Environmental Protection Act 1986*, to the

requirements of the Minister for the Environment on advice of the Environmental Protection Authority, which addresses:

1. the major environmental issues associated with implementing the project; the environmental objectives for those issues; the methodologies used to achieve these; and the key indicators of environmental performance measured against those objectives;

2. the level of progress in the achievement of sound environmental performance, including industry benchmarking, and the use of best practicable measures available;

3. significant improvements gained in environmental management, including the use of external peer reviews;

4. stakeholder and community consultation about environmental performance and the outcomes of that consultation, including a report of any on-going concerns being expressed; and

5. the proposed environmental objectives over the next five years, including improvements in technology and management processes.

4-3 The proponent may submit a report prepared by an auditor approved by the Department of Environment under the "Compliance Auditor Accreditation Scheme" to the Chief Executive Officer of the Department of Environment on each condition or commitment of this statement which requires the preparation of a management plan, programme, strategy or system, reporting on the fulfilment of the requirements of each condition or commitment.

5 Remediation

5-1 During the remediation, the proponent shall operate the lime-dosing plant such that:

1) the removal efficiency of aluminium and zinc remains greater than 85 percent;
2) the tail-water concentration of aluminium remains less than 5 mg/L;
3) the tail-water concentration of zinc remains less than 0.25 mg/L; and
4) the pH of the tail-water remains between 7 and 9.

5-2 During the remediation, the proponent shall monitor the natural attenuation of ammonia to demonstrate whether:

1) the average attenuation rate constant (k) for Pathway 1 remains above 0.001 per day at all times; and
2) the ammonia concentration at the Bayswater Main Drain Gauge Station remains below 0.91 mg/L at all times.

5-3 In the event that either requirement (1) or (2) of condition 5-2 is not met, then a management response shall be carried out which may include the following contingency measures;

1) on-site recirculation of tail-water from the dosing plant to prevent direct discharge to the Bayswater Main Drain; and/or
2) interception and re-infiltration of groundwater (recirculation),

to the requirements of the Minister for the Environment on advice of the Environmental Protection Authority.

5-4 During the remediation, the proponent shall monitor the concentration of fluoride at the Bayswater Main Drain Gauge Station, as an indicator of groundwater quality, and if fluoride concentrations exceed 1.6 mg/L, then further investigations shall be carried out to determine the cause of the exceedance, to the requirements of the Minister for the Environment on advice of the Environmental Protection Authority.

5-5 During the remediation, the proponent shall monitor the concentration of fluoride at the Bayswater Main Drain Gauge Station, as an indicator of groundwater quality, and if fluoride concentrations exceed 2.0 mg/L, then a management response shall be carried out which may include the following contingency measures;

1) on-site recirculation of tail-water from the dosing plant to prevent direct discharge to the Bayswater Main Drain;
2) interception and re-infiltration of groundwater (recirculation); and/or
3) the use of a Permeable Reactive Barrier, or similar between the site and the Bayswater Main Drain,

to the requirements of the Minister for the Environment on advice of the Environmental Protection Authority.

5-6 The proponent shall monitor groundwater for not less than two years following the fulfilment of the requirements of conditions 5-7 and 5-8, to the requirements of the Minister for the Environment on advice of the Environmental Protection Authority.

5-7 Prior to ceasing active remediation of the site, the proponent shall carry out site validation tests to demonstrate that in-situ soils at the site meet the criteria for commercial/industrial land use, being the Health Investigation Levels “F” criteria.

5-8 Prior to ceasing active remediation of the site, the proponent shall demonstrate that groundwater entering the Bayswater Main Drain from the site does not increase the concentrations of fluoride, aluminium and/or zinc in the Bayswater Main Drain above background levels, with a 95 percent confidence level.

5-9 Prior to the commencement of any development of the site, the proponent, in conjunction with the Minister for Lands and the Department of Environment,

shall make provision for the placement of memorials on the titles of lots, preventing the abstraction of groundwater for domestic or irrigation purposes. Such memorials shall meet the requirements of the Minister for the Environment.

6 Dust

6-1 The proponent shall not undertake earth moving activities, other than in accordance with a Dust Management Plan prepared to the requirements of the Minister for the Environment on advice of the Environmental Protection Authority.

The Dust Management Plan shall set out measures for:

1. assessing the potential for health risk and the required management;

2. controlling the generation of dust during excavation activities;

3. establishing and implementing an ambient air quality monitoring programme;

4. a complaints process; and

5. reporting monitoring results.

6-2 The proponent shall implement the Dust Management Plan required by condition 6-1.

6-3 The proponent shall make the Dust Management Plan required by condition 6-1 publicly available.

Procedures

1 Where a condition states “to the requirements of the Minister for the Environment on advice of the Environmental Protection Authority", the Environmental Protection Authority will provide that advice to the Department of Environment for the preparation of written notice to the proponent.

2 The Environmental Protection Authority may seek advice from other agencies or organisations, as required, in order to provide its advice to the Department of Environment.

3. Where a condition lists advisory bodies, it is expected that the proponent will obtain the advice of those listed as part of its compliance reporting to the Department of Environment.

Notes

1. The Minister for the Environment will determine any dispute between the proponent and the Environmental Protection Authority or the Department of Environment over the fulfilment of the requirements of the conditions.

2. The proponent is required to prepare and implement a Construction Noise Management Plan in accordance with Regulation 13 of the *Environmental Protection (Noise) Regulations 1997*, to the requirements of the City of Bayswater.

Schedule 1

The Proposal (Assessment Number 1477)

The proposal is for the remediation of the former CRESCO site in Bayswater.

The proposal has the following main components:

- soil remediation; and
- groundwater remediation .

The key characteristics of the proposal are described in Table 1 below.

Table 1: Key Proposal Characteristics

Element	Description
Volume of contaminated material:	Up to approximately 280 000 cubic metres.
Nature of contaminants:	Heavy metals, acidity and fluoride.
Management of soil contamination:	Excavation and removal so that site would be suitable for future commercial/industrial use. Contaminated soil either disposed to landfill or cleaned and reused.
Management of groundwater contamination:	Pump and treat groundwater to remove contaminants. Disposal of treated groundwater via infiltration or direct discharge to the Bayswater Main Drain.
Remediation time frame:	Approximately 5 years

Figures attached

1: Site location
2: Site layout

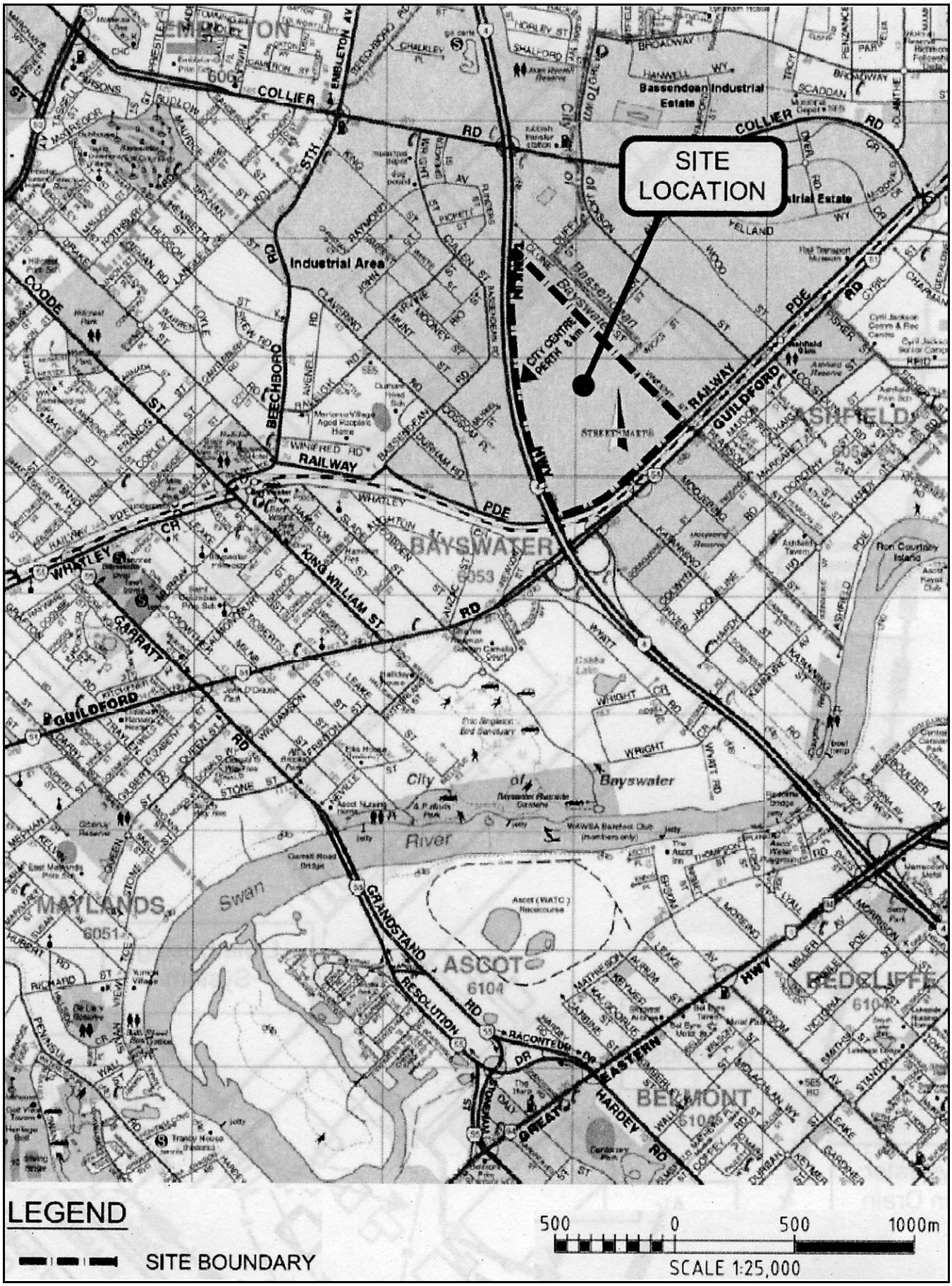

Figure 1: Site location

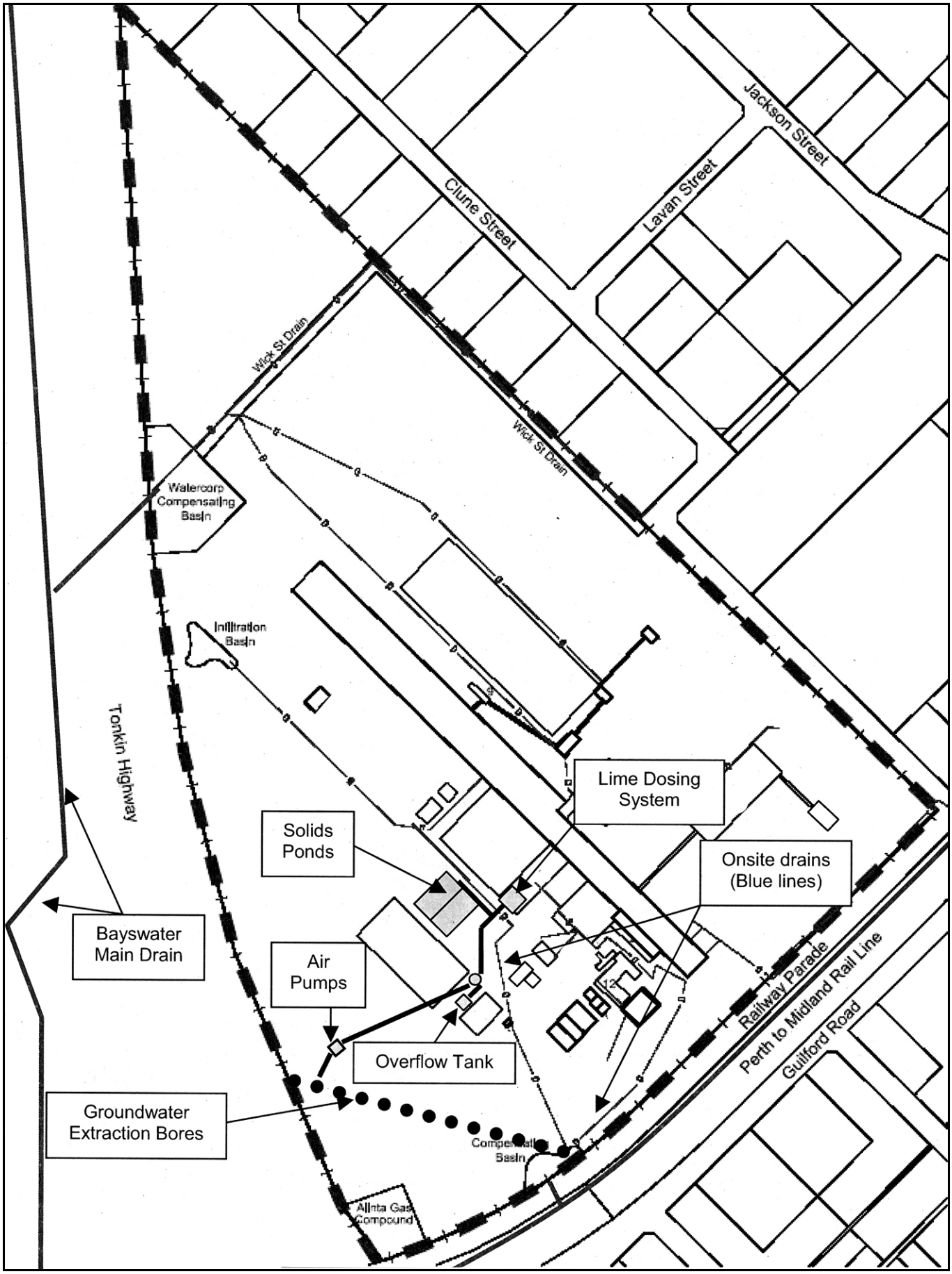

Figure 2: Site layout

Appendix 5

Summary of Submissions and
Proponent's Response to Submissions

Response to Submissions - CSBP Final Remediation Works for the Former Cresco Site, Bayswater

Submission 1: Conservation Council of Western Australia

Issue #1

Stripping of contaminants by means of water containment basins on the site, and utilising appropriate monitoring needs to occur until contaminants are reduced to levels that are satisfactory to the EPA (World Health Organisation drinking water and irrigation standards?) and for a minimum of ten years. Appropriate rehabilitation and containment needs to occur until contaminants are reduced to levels that are satisfactory to the EPA (World Health Organisation) prior to any new land use of the site, including industrial subdivision.

Proposed rehabilitation needs to be strengthened as follows: -Water leaving the site needs to meet World Health Organisation (WHO) drinking water and irrigation standards. As it will eventually enter the Swan River, and lower standards may result in impacts to the river and its biota, including fish; and human health could be affected-given that recreational fishing commonly occurs in this part of the river.

Response

CSBP is committed to ensuring that the remediation of the site will be undertaken in a manner to minimise impacts on the surrounding biophysical and social environments.

Western Australia is party to the *National Water Quality Management Strategy* and the accompanying *Australian Drinking Water Guidelines* and *Australian and New Zealand Guidelines for Fresh and Marine Water Quality* (being Volumes 6 and 4 of the strategy, respectively). As such, these guidelines have primacy over other national and international-based criteria as these have been derived specifically for Australian conditions. Indeed, the DoE's own Assessment Levels for Soil, Land and Water (DoE, 2003) refer to these guidelines and associated trigger values. Accordingly, while the significance of WHO guidelines are acknowledged they remain sub-ordinate to the Australian guidelines in terms of any inconsistencies between the two.

CSBP has committed to undertaking the remediation project using a risk based management approach and has set trigger values that are appropriate for the site. CSBP will use the risk management approach to evaluate the performance (and ultimately the cessation) of the remediation project and does not advocate the need for an arbitrary time frame for monitoring (e.g. 10 years) necessarily to be imposed. Rather, CSBP advocates the use of performance monitoring to appraise the impacts of remediation on soil and water quality and attainment of agreed endpoints for the project.

Given the future land use of the site is general industrial, the Western Australian Department of Environment's Health Investigation Levels for commercial industrial sites (HIL F) are considered to be the most appropriate endpoint for soil contaminants. Therefore, CSBP has committed to conducting remediation of the Bayswater site until the soils meet health and environmental guidelines applicable to its existing zoning of industrial/commercial landuse (HIL 'F').

Issue #2

Excavation or works that could expose either sub-soil or groundwater should not be undertaken at any time. Proposed rehabilitation needs to be strengthened as follows: -All contamination needs to be treated and rectified onsite.

Response

CSBP is undertaking a remediation project that will, by necessity, involve exposing contaminated materials prior to removal. CSBP has considered the potential for the exposure of pyritic cinders to cause increased chemical solubility and contaminant mobilisation and for a 'slug' of contaminants to occur as a result of soil-disturbing activities. Accordingly, CSBP has obtained approval under section 38(1) of the *Environmental Protection Act, 1986* to construct and operate a groundwater interception field near the south-west corner of the site to abstract contaminated groundwater and treat this through a lime dosing plant located onsite.

CSBP has publicly committed to not pursue onsite "cap and containment" as the permeable nature of the soils; future end landuse; proximity of the watertable and the Swan River (and associated ongoing liability) is not conducive to this method of disposal. These considerations have been detailed within the PER.

Further, CSBP has committed to monitoring and reporting the performance of the lime dosing plant prior to any offsite discharge. The groundwater interception and lime dosing treatment systems are a core component of the broader groundwater remediation strategy for the site. The system uses lime dosing to correct (neutralise) the pH and has been demonstrated to consistently remove over 92% of the heavy metal contamination in the abstracted groundwater. CSBP has also detailed a contingency strategy to prevent the migration of contamination to downstream receptors including the installation of a semi-permeable membrane barrier which permits the selective transmission of certain molecules, but not contamination.

Further details regarding performance of the lime dosing plant is regularly posted on the CSBP website (www.csbp.com.au).

Issue #3

An appropriate and adequate portion of the site should be permanently set aside for optimal treatment of water flowing through the site, prior to its release into the Bayswater Main Drain.

Response

CSBP anticipates remediation of the site to commence in late 2005 and has already commissioned a groundwater abstraction and treatment system (as referred to the EPA under section 38 of the Act).

More recently CSBP has demonstrated that, although the lime dosing plant reduces metal contaminants to acceptable levels, residual ammonia concentrations require further consideration. CSBP has therefore proposed to utilise the existing natural attention of groundwater across the site to reduce these concentrations to acceptable levels in accordance with the DoE's guideline on Monitored Natural Groundwater Attenuation. Currently, groundwater attenuation across the site sees ammonia reduced from ~70mg/L to less than 0.5 mg/L in proximity to the Bayswater Main Drain.

CSBP acknowledges that future development of the site for light industrial/commercial uses would require preparation of a suitable stormwater and drainage management plan to appropriately manage surface water discharge and infiltration at the site. However, this is beyond the scope of the project as referred to the EPA at this time.

Issue #4

It needs to be determined if pollution of the Bayswater Main Drain will be caused by entry of water from the site, including during or subsequent to future subdivision of the site. If so, it is strongly suggested that the proponent provides appropriate contributions to remediate this pollution, and the upkeep of the Bayswater Main Drain.

Response

CSBP acknowledges that future development of the site for light industrial/commercial uses would require preparation of a suitable stormwater and drainage management plan to appropriately manage surface water discharge and infiltration at the site. However, this is beyond the scope of the project as referred to the EPA at this time.

CSBP understands that the Bayswater Main Drain is vested in, and that upkeep of the drain remains the statutory responsibility of, the Water Corporation. Drainage rates are applied to landowners by the Water Corporation for the purpose of maintaining this (and other) drainage systems.

Submission 2: Department of Environment

Issue #1

Groundwater treatment before discharge

Lime dosing treatment processes are not always effective in removing aluminium and zinc from acidic water (depending on its chemical composition, retention time etc). Both of these metals are very sluggish in precipitating out of a neutralised solution, and aluminium is most toxic at near-neutral pH values just as it is about to precipitate. There needs to be sufficient testing to ensure that treatment is effective and that deviation from trigger levels in treated water will be detected before discharge to the Bayswater Main Drain.

Response

CSBP has installed a lime dosing plant to remove heavy metals from groundwater abstracted via interception bores which lie across the south-west corner of the site (already approved under Part IV of your Act). The groundwater interception and lime dosing treatment system is part of a broader remediation strategy for the site as outlined in the PER.

CSBP has been undertaking performance monitoring and adjustments to the dosing regime during the commissioning period to optimise the operational, mechanical and chemical performance of the plant. The plant became operational in October 2004 and has been effective by neutralising the pH of the acidic groundwater and precipitating in excess of 96% of Al and Zn (Table 1).

Table 1: Lime Dosing Plant Performance for October and November, 2004-

Month	Feed Water, mg/L			Clear Water Tank, mg/L			Removal efficiency, %	
	pH	Al	Zn	pH	Al	Zn	Al	Zn
October	2.31	81	9.49	8.22	1.98	0.225	97.8	99.7
November	2.67	72.2	12.2	8.36	2.99	0.205	95.9	98.3

CSBP remains committed to monitoring the performance of the treatment system and reporting to the DoE prior to any direct discharge from the site. The system has been designed to contain and

cycle the extracted water between the lime dosing plant and solids ponds until sufficient water quality is achieved to discharge to the Bayswater Main Drain.

Issue #2

Change in climatic / groundwater conditions

Management of the groundwater interception system - has worked reasonably well because of low rainfall. Has CSBP considered a contingency in the instance the Perth metropolitan area experiences very high rainfall and the watertable rises considerably (i.e. is there sufficient freeboard to allow for variation in rainfall)?

Response

The groundwater interception system was designed following analysis of pump test data and groundwater gradients observed across the site. The design of the system was based upon a generous maximum flow rate estimation of 4.5 L/sec. The interception system has been operational for some 12 months during which time peak flows of 2 L/sec have been observed. The interception system was deliberately over-designed, and is currently running at approximately half the design capacity of the system and thus has sufficient freeboard to allow for the variation caused by increased rainfall events.

Issue #3

Assessment criteria for groundwater / BMD and discharge to Swan River

In liaison with the Swan River Trust (SRT), it was noted that the water quality criteria used to assess the acceptability of treated groundwater discharging to the Bayswater Main Drain and the Swan River was not that of a freshwater system.

Firstly, the Swan River in the vicinity and downstream of the Bayswater Main Drain may be described as a freshwater system, with salinity ranging from 3-4 parts per thousand. In the summer months it is fresh-brackish. The PER references marine ecosystem values as being appropriate for the water discharged from the BMD outfall, and treated water quality (following remediation) is to be assessed against these values. Could the proponent comment on whether freshwater ecosystem trigger values would be more relevant[1] for the assessment of concentrations of heavy metals and chemicals and that for physical and chemical stressors such as total nitrogen and total phosphorus, estuarine ecosystem values [2].

Secondly, although aluminium is naturally prevalent in waters within the metropolitan region due to the geology, it is thought that using up-gradient background concentrations for this substance (especially within the Bayswater Catchment) is not appropriate as these drainage systems are

[1] Freshwater ecosystem values as presented in Assessment Levels for Soil, Sediment and Water, DoE, November 2003.

[2] As presented in Table 3.3.6 of the ANZECC Australian and New Zealand Guidelines for Fresh and Marine Water Quality, 2000.

influenced directly by point source pollutants. The use of background concentrations is more suitable for river, streams and estuaries systems where there is more dispersion of pollutants. These systems are not generally heavily impacted upon by point source discharges.

Thirdly, could the proponent comment on the use of freshwater ecosystem trigger levels for an urban drainage system (Bayswater Main Drain) that discharges to the Swan River.

Response

(1) The Swan River Estuary in the vicinity of Bayswater is (at the very least) seasonally tidal, exhibits a variable salinity regime and is subject to riverine and tidal influences. Clearly, the 'river' at this point clearly meets the definition of an 'estuary'.

Under the *Australian and New Zealand Guidelines for Fresh and Marine Water Quality* (ANZECC/ARMCANZ, 2000), an ecosystem classification decision tree (Figure 3.1.3, see below) is applied such that toxicants are split into one of two aquatic ecosystem types - marine and/or freshwater ecosystems. Importantly, the decision tree does not differentiate estuarine ecosystems, but rather sees these 'lumped' with marine ecosystems.

Under the above agreed national framework (upon which DoE's draft Assessment Levels for Soil, Sediment and Water is based), toxicants in estuarine ecosystems are to be appraised using marine trigger values.

It should also be mentioned that in a recent study of water, sediment and fish quality in the Bayswater Main Drain and the adjacent Swan River (DoE 2003), the Department of Environment itself considered this section of the river to be a marine dominated estuary. The report identified salinities of approximately 24‰ and applied marine trigger values (95 percentile) for the purpose of assessing potential toxicant effects on the Swan River ecosystem. The report was prepared by the Department of Environment with the assistance of the Swan River Trust.

In terms of physical and chemical stressors (including total nitrogen and total phosphorus), the *Australian and New Zealand Guidelines for Fresh and Marine Water Quality* (ANZECC/ARMCANZ, 2000) differs from that for toxicants in as much as trigger values specific to estuarine systems may also be applied. CSBP concurs with the Swan River Trust's view that for physical and chemical stressors, estuarine trigger values should be applied (in accordance with the decision tree, see below).

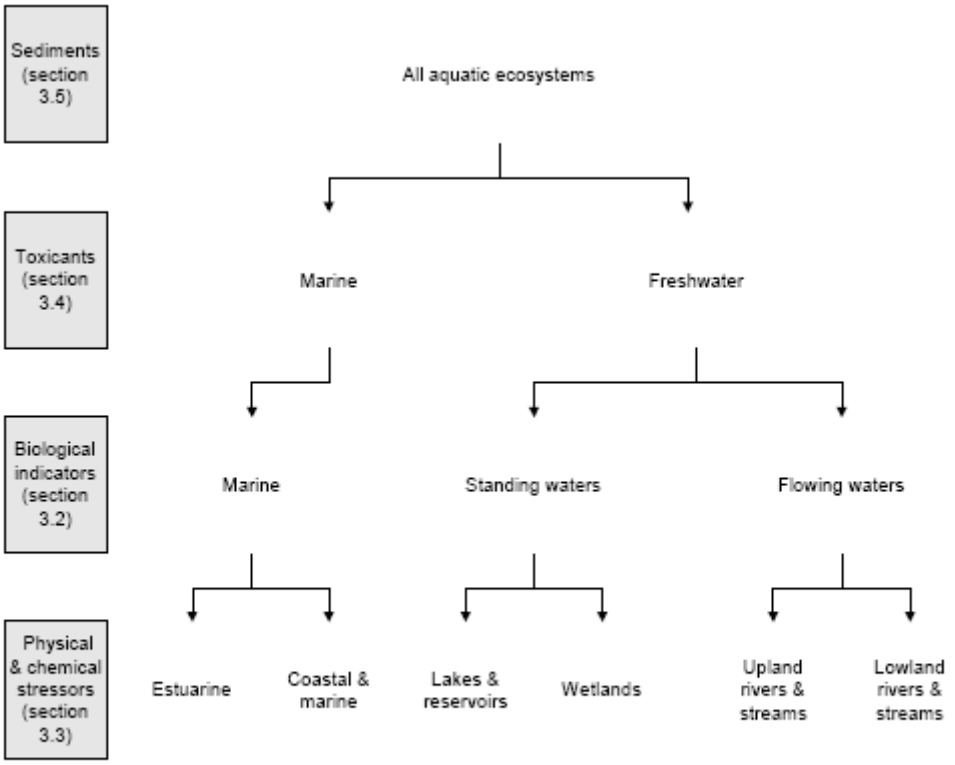

Figure 3.1.3 Classification of ecosystem type for each of the broad categories of indicators (in grey boxes at left of the diagram)

(2) All urban drainage systems are influenced by diffuse and point sources of pollution to some extent or other. Baseline monitoring undertaken by DoE and SRT over a number of years clearly shows that urban drainage systems discharging to the Swan River rarely, if ever, meet marine trigger values for aluminium (and other toxicants). This is to be expected because the drainage systems themselves are not ecosystems, but rather it is the effects that these loads and concentrations may have on the receiving waterway (the river) that is paramount and which requires management.

CSBP has investigated contaminant concentrations in both the water column and riverine biota in the vicinity of the Bayswater Main Drain outfall. These studies found no significant bioaccumulation of metals in the vicinity of the outfall and that the mixing zone was of limited spatial extent (suggesting effective mixing). These findings accord with those associated with recent investigations undertaken by the DoE. CSBP contend that remediation of the Bayswater site will significantly diminish the already minimal impact the site may be having on the river.

CSBP does not believe that as a constructed urban stormwater system, the Bayswater Main Drain should be recognised as an aquatic ecosystem and afforded a level of ecosystem protection *per se*. Notwithstanding, the potential for discharge from the drain to adversely impact the river is recognised by CSBP and is a key area of focus for the PER and the remediation strategy for the site.

Section 8.3.5.5 of the *Australian and New Zealand Guidelines for Fresh and Marine Water Quality* (ANZECC/ARMCANZ, 2000) recommends actions for determining ambient water quality at particular reference sites (for water quality comparisons) as follows:

- Determine a reliable background level for the study chemical at a reference site, equivalent to the specific site;

- If the trigger value is less than the reliable background figure, the 80th percentile of the background becomes the site-specific guideline; and/or
- Users may wish to undertake direct toxicity assessment on acclimatised species relevant to the local environment.

Therefore, CSBP considers it inappropriate to compare the water quality of an urban stormwater drainage system with that of the downstream estuarine ecosystem. CSBP, however, remains committed to ensuring that water quality in the Bayswater Drain is no worse than that already evident from upstream sources by using ambient upstream background water quality as water quality remediation targets.

Notwithstanding the above, CSBP is currently undertaking a program of ecotoxicological testing to ascertain the potential for adverse environmental impacts. The testing will involve derivation of site specific trigger values for aluminium and fluoride for the Swan River and direct toxicity assessment (DTA) using drain water to ascertain whether adverse effects are likely at observed toxicant concentrations. The project will be subject to peer review by a nationally-recognised expert and all chemical analyses conducted through a NATA accredited laboratory. However, recent mussel sampling near the outfall suggests the potential for impacts are currently likely to be low (PB April 2004). In designing and undertaking the above works, PB is liaising with the DoE regarding target species and proposed test procedures.

(3) In accordance with the *Australian and New Zealand Guidelines for Fresh and Marine Water Quality* (ANZECC/ARMCANZ, 2000), the Bayswater Main Drain has not been assigned a level of ecosystem protection because it constitutes a stormwater system and is not an ambient (receiving) waterway. Therefore the application of marine and freshwater ecosystem protection trigger values to the drain is inappropriate. However, CSBP has assigned aesthetic and cultural values to the drain as the BMD flows through open channels near residential properties. Accordingly, the landscape and aesthetic values of the drain have been recognised within the PER such that unsightly slicks, scums, foams or turbidity should be avoided.

CSBP does not believe that as a constructed urban stormwater system, the Bayswater Main Drain should be recognised as an aquatic ecosystem and afforded a level of ecosystem protection *per se*. Notwithstanding, the potential for discharge from the drain to adversely impact the river is recognised by CSBP and is a key area of focus for the PER and the remediation strategy for the site.

Issue #4

Remediation to Ecological Investigation Levels (EILs) / Health Investigation Levels (HIL-Fs) [3]

The PER reports that the concentration of arsenic, copper and lead exceed HIL-F criteria on the former Cresco site. It was stated that aluminium did not have a published EIL or HIL-F with which to compare concentrations levels. The Assessment Levels for Soil, Sediment and Water, (DoE 2003) guideline clearly states that where assessment levels are not included in the DoE published guidelines, then alternative assessment levels should be used. The reasons for, or for not, using assessment levels from other sources should be documented.

Response

[3] Ecological Investigation Levels (EILs) and Health Investigation Levels "F" (HIL-F) as documented in the Assessment Levels for Soil, Sediment and Water, November 2003.

There are no published EIL or HIL-F for aluminium within the Assessment Levels for Soil, Sediment and Water, (DoE 2003) guidelines. Similarly the Dutch guidelines (Dutch 1994) do not contain soil target values or intervention levels for aluminium. Aluminium is naturally prevalent in soil minerals and is assumed to be the reason target values are generally not prescribed.

Due to its geochemical complexity and the minimal impact the site now exerts on the river (as demonstrated by in-river sampling by Parsons Brinckerhoff and DoE), CSBP has adopted a risk-minimisation approach where the priority has been placed on removing a significant quantity of the source material from the site. Residual soil contaminant levels at the site will also meet appropriate HIL-F levels (as outlined in the PER) such that the site will be suitable for commercial end uses.

In terms of potential residual impacts on the river, CSBP has commissioned studies to determine appropriate marine trigger values for aluminium or fluoride for the Bayswater section of the Swan River and will gauge success of site remediation against these and other data.

Issue #5

Post remediation monitoring and validation programme

It is proposed to develop a *Remediation and Validation Programme* to implement and monitor the planned activities. The proposed programme should be provided to the LWQB for review prior to soil and groundwater remediation commencing, with a progress report and then a final Remediation and Validation Report provided upon completion of the remediation works.

Post remediation water quality monitoring is proposed for a period of 1 year once remediation is completed. It is requested that this monitoring period be extended to two years as a minimum, to cater for seasonal fluctuations and provide a greater quantity of monitoring data in which to assess whether remediation has been successful.

Response

CSBP has been previously granted approval to establish and operate a groundwater interception system and lime dosing plant under Part IV of the *Environmental Protection Act*. This system is now operational. It is therefore not possible to develop a *Remediation and Validation Programme* prior to commencing groundwater remediation. However, CSBP has provided commitments within the PER to provide performance monitoring and reporting associated with remediation of the site. CSBP will submit a *Remediation and Validation Programme* prior to commencement of soil remediation works at the site.

It appears unlikely that remediation will be completed within 12 months of the commencement of soil remediation works, largely due to the seasonal nature of the receiving landfill site. Accordingly, CSBP agrees to the DoE request to continue monitoring and reporting for a period of 2 years once remediation has completed and will appraise the need for further monitoring at the conclusion of this period.

Submission 3: Department of Health WA

Issue #1

The PER provides only summary and statistical data from the sampling and analysis of the soil at the site. Although this gives a reasonable conceptual model of the site it is difficult for the DoH to

determine the accuracy of summary information without the raw data, data collection and analysis process.

Response

CSBP decided not to include raw data within the PER, but instead include summaries of this data in order to improve the readability of the document. CSBP, recognising the differing needs of the various regulatory authorities, commissioned an independent consultant (Parsons Brinckerhoff) to tabulate the extensive surface and groundwater monitoring data and prepare reports for the area. Copies of these reports will be provided to DoE, and DoH, and are available from CSBP upon request.

Soil and water sampling has been conducted in accordance with the *Contaminated Sites Act* (2003) and the data and its interpretation is subject to independent peer review by the CSIRO. Copies of this independent peer review will be made available upon the CSBP website when it is completed and will be provided to the EPA for referencing in preparing its Bulletin on this proposal.

Soil contamination at the site was analysed using 3D modelling software (commonly used in the mining industry) to enable visualisation of the site and to verify estimates of the quantity of soil to be removed. CSBP would be pleased to arrange for an inspection and explanation of the 3D model if required (Contact Adam Speers on 9 411 8777).

Issue #2

The exposure of off-site human receptors to potentially contaminating dusts has not been considered under section 4.2.4 of the PER. Given the proximity to residential areas and the extensive period of remediation, this potential exposure pathway should have been addressed in the report. The risks from exposure to contaminated dusts should have been considered in the risk assessment in addition to being addressed in the outline of the dust management plan described in section 7.1.1.

Response

CSBP accepts that Section 4.2.4 did not specifically mention exposure of residents to contaminated dust, but the issue was nevertheless addressed in section 7.1.1, Table ES1 and is a core component of the recently completed Dust Management Plan (DMP). The full set of Environmental Management Plans (EMPs) will be forwarded to the DoE for approval, consistent with commitments provided by CSBP within the PER. The DMP in draft form will be provided to DoH for comments as well.

There is no evidence of adverse environmental or public health issues associated with the soils or dust to date, and with the implementation of a thorough dust management strategy (through the Dust Management Plan), CSBP does not consider that remediation activities will appreciably increase this risk.

CSBP will detail (in its Dust Management Plan) dust minimisation strategies and air quality monitoring to be conducted during the remediation process to ensure activities do not pose a significant risk to nearby residents or workers.

Should separation and reuse of iron oxides prove viable, then any treatment activity will be undertaken inside one of the existing storage sheds at the site which would further reduce any potential dust impacts.

Submission 4: - City of Bayswater

Issue #1

CSBP have explored many options with regard to soil and groundwater remediation, however, the final methods have yet to be finalised. It would have been preferable if these issues could have been decided upon prior to the release of the PER as the methods chosen will affect the content of future management plans.

Response

CSBP has explored a number of options for remediation of the former Cresco site and has outlined its preferred strategy in the PER. In accordance with the waste hierarchy, CSBP prefers to pursue the reuse of waste that involves the separation of high grade iron oxide from the cinders. However, the reuse option is unfortunately reliant upon third parties who are yet to decide whether to accept the separated iron oxide as feedstock for their industrial processes or for resale to others. CSBP will modify its environmental management plans, as appropriate, once it has determined the preferred final remediation strategy (reuse or landfill disposal). The remediation of this site outlined in the PER has been deliberately based on environmental outcomes, not specific technologies to allow CSBP flexibility to adapt to market conditions and improvements in technology and processing. CSBP remains committed to the outcomes proposed in the PER.

Issue #2

The City of Bayswater seeks a role in the approval of Management Plans that will be used to control environmental and social issues when the remediation process commences.

Response

The *Environmental Protection Act* (1986) is administered by the DoE, which assists the EPA in assessing the environmental acceptability of proposals under the Act and then recommend legally-binding conditions in relation to the project. CSBP has committed to submitting its Environmental Management Plans to the regulatory authorities for approval prior to commencing soil remediation works at the site. CSBP understands that the regulatory authorities will consult the City of Bayswater and the Town of Bassendean prior to approval of the Management Plans.

It is worth noting that the site does lie within the City of Bayswater and CSBP recognises the potential for offsite impacts to impact upon residents and workers within adjoining areas (for example, traffic management issues). Accordingly, CSBP is committed to consulting and reporting to both the City of Bayswater and the Town of Bassendean during preparation of the EMPs and throughout the remediation of the former Cresco site.

Submission 5: – Undisclosed Submitter

Issue #1

Figure 3.1 on page 43 shows the location of historical disposal areas and indicates that the cinders disposal pits encroach significantly onto the Tonkin Highway easement in two areas. Whilst much of the cinders contained in this road easement will be under road pavement there is still a quantity in the sandy area between the road and the CSBP boundary fence. This

contamination should be fully addressed by the proponent and be included as part of a prudent remediation of the site, regardless of the current ownership.

Response

Tonkin Highway, the easements and land bounded by the CSBP fence were resumed by the State Government and have never been owned by CSBP. Furthermore, as a proponent under the *Environmental Protection Act* (1986), it would be inappropriate for CSBP in the PER to imply liability or include management requirements for lands other than that which it owns or controls. .

Notwithstanding the above, CSBP agrees with the sentiment expressed and has previously approached MRWA regarding potential opportunities to remove contaminated soils from the easements and unpaved areas next to Tonkin Highway, while remediation of the former Cresco site is underway. This matter is beyond the scope of the PER itself and it may be more appropriate to redirect this question to MRWA for further comment.

Issue #2

Off-site monitoring program did not include areas such as the Brady's Ceiling site on the corner of the Tonkin Highway easement and Railway Parade. Were efforts made to ascertain the groundwater quality in this area?

Response

Groundwater monitoring bores were explicitly sited on public lands because of the potential for future changes in land ownership to restrict access to the monitoring bores. Accordingly, no bores were established on the Brady's property by CSBP (and in fact we understand the site was recently sold and may be subject to a further development proposal).

CSBP currently monitors groundwater both upstream and downstream of the Brady's site using bores located on CSBP and/or public lands which provide for unfettered access for monitoring.

Efforts were made to install monitoring bores along Tonkin Highway in the vicinity of Brady's boundary, however the steepness of the road side and traffic safety issues associated with gaining vehicular access from the highway itself led CSBP to dismiss this option (in consultation with MRWA).

CSBP understands the DoE has undertaken limited groundwater sampling in the vicinity of the Tonkin Highway and the Brady's property in particular, but has no specific information as to the outcomes of this monitoring.

Our reference: 825.cc

Wednesday 2 March, 2005

Greg Davis
CSIRO Land and Water
Private Bag No. 5
WEMBLEY WA 6913

Dear Greg

Response to Independent Peer Review, Public Environmental Review (PER) for Remediation of the Former Cresco Site Bayswater.

Thank you for your comprehensive review of our proposed remediation works associated with the former Cresco site.

In consultation with Parsons Brinckerhoff, the following comments are offered on a 'without prejudice' basis and in response to issues you raised during your review. Obviously there were quite a number of deliberations between various parties during preparation of the PER to which CSIRO were not privy. The following may assist in understanding how these deliberations have influenced the material presented in the PER and where, for example, reference data relating to the site and remediation planning may be referenced.

General Comments

As you have observed, the remediation plan was prepared in light of the *National Environmental Protection (Assessment of Site Contamination) Measure 1999* and its mirror legislation within Western Australia. It is probably worth noting that Parsons Brinckerhoff has also reported some significant errors within the Contaminated Sites Management Series 'Assessment Levels for Soil, Sediment and Water' (DoE, 2003) and expressed concern that these levels be given primacy over the original source information (for example, *Australian and New Zealand Guidelines for Fresh and Marine Water Quality*). Aware of these inconsistencies, the PER was prepared with reference to the primary source information and legislative requirements, as appropriate.

Contaminant Pathways

Extensive surface and groundwater data has been compiled and analysed during preparation of the PER. It was decided not to include this extensive body of data within the PER *per se*, but rather to focus on summarising this information and its implications upon remediation planning for the site.

It is recognised that regulatory authorities (such as DoE and the Health WA) will likely wish to scrutinise the original data, however it was felt that inclusion of this data within the PER would detract from its readability by the general public. In recognition of this, two additional reports are currently being finalised for both the surface (drain) and groundwater monitoring conducted to date which present chain of custodies, analytical results and their interpretation and inferred contaminant pathways. These reports are available upon request.

The actual percentage of groundwater captured by the BMD that emanates from beneath the site has been previously modelled using MODFLOW and reported within 'Numerical Modelling of Groundwater Recovery and Recycling' (Nield Consulting Pty Ltd, 2003). Parsons Brinckerhoff considers the model to be a reasonable reflection of groundwater and contaminant throughflow at the site (and hinterland). A further

degree of confidence in the model was gained when, upon commissioning, the yields from the groundwater interception system were found to closely match those predicted by the model.

Instantaneous flow and contaminant load data ('snapshots') have been collected at sites along the BMD upstream and downstream of the site. This information is presented within the report "Bayswater Main Drain Contaminant Flux Investigation" (PB, 2005) and provides a valuable insight into contaminant pathways, urban and upstream contaminant contributions and the seasonal groundwater accession to the regional drainage system.

In addition to analytical data, the report "Annual Groundwater Monitoring Review, June 2003 – June 2004, Former Cresco Site, Railway Parade, Bayswater" (PB, 2004) also includes borehole logs and stratigraphic profiles for the area.

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The summary groundwater report, as describe above, provides a detailed analysis of long term groundwater data for the site. In addition to fluoride, the report also includes analysis of the distribution of other contaminants which given further support to the inferred extent of the contaminant plume and use of fluoride as a (relatively) conservative tracer.

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A rigorous investigation of possible remediation technologies was undertaken during development of a preferred remediation strategy. However, as mentioned, a summary of this work is presented in the PER. The investigative work also included laboratory and pilot-scale tests to verify treatment efficiencies for soil and groundwater remediation options.

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Other Minor Comments

The amendments as suggested have been generally accommodated within the PER prior to its publication.

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If you have any further queries regarding the above, please do not hesitate to call me on 9411 8234.

Yours sincerely

Cameron Schuster

Manager, Environment & Manufacturing Support

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17 March 2005

Cameron Schuster
Manager, Environment and Manufacturing Support
CSBP Ltd
PO Box 345
Kwinana, WA 6966

Dear Cameron,

Re: Final comment on your Response to Independent Review, Public Environmental Review (PER) for Remediation of the Former Cresco Site Bayswater

Grant Douglas and I have read your letter of response to our independent review of the PER, which was dated 2 March 2005.

Your letter of response addresses the range of comments we made. It is agreed that it would be difficult to show the large body of data in the main PER review.

As we could not source the modelling carried out by Simon Nield, it was difficult to assess the extent of groundwater captured by the Bayswater main drain. It is pleasing to hear that the modelling agrees with the field data. It seems that much of the data that we were interested in accessing is now in the later report in late 2004 and the early 2005 report.

Thankyou for the opportunity to contribute to the review of the PER

Yours sincerely

Drs Greg Davis and Grant Douglas
CSIRO Land and Water

Our reference: 825.cc

Wednesday 2 March, 2005

Greg Davis
CSIRO Land and Water
Private Bag No. 5
WEMBLEY WA 6913

Dear Greg

Response to Independent Peer Review, Public Environmental Review (PER) for Remediation of the Former Cresco Site Bayswater.

Thank you for your comprehensive review of our proposed remediation works associated with the former Cresco site.

In consultation with Parsons Brinckerhoff, the following comments are offered on a 'without prejudice' basis and in response to issues you raised during your review. Obviously there were quite a number of deliberations between various parties during preparation of the PER to which CSIRO were not privy. The following may assist in understanding how these deliberations have influenced the material presented in the PER and where, for example, reference data relating to the site and remediation planning may be referenced.

General Comments

As you have observed, the remediation plan was prepared in light of the *National Environmental Protection (Assessment of Site Contamination) Measure 1999* and its mirror legislation within Western Australia. It is probably worth noting that Parsons Brinckerhoff has also reported some significant errors within the Contaminated Sites Management Series 'Assessment Levels for Soil, Sediment and Water' (DoE, 2003) and expressed concern that these levels be given primacy over the original source information (for example, *Australian and New Zealand Guidelines for Fresh and Marine Water Quality*). Aware of these inconsistencies, the PER was prepared with reference to the primary source information and legislative requirements, as appropriate.

Contaminant Pathways

Extensive surface and groundwater data has been compiled and analysed during preparation of the PER. It was decided not to include this extensive body of data within the PER *per se*, but rather to focus on summarising this information and its implications upon remediation planning for the site.

It is recognised that regulatory authorities (such as DoE and the Health WA) will likely wish to scrutinise the original data, however it was felt that inclusion of this data within the PER would detract from its readability by the general public. In recognition of this, two additional reports are currently being finalised for both the surface (drain) and groundwater monitoring conducted to date which present chain of custodies, analytical results and their interpretation and inferred contaminant pathways. These reports are available upon request.

The actual percentage of groundwater captured by the BMD that emanates from beneath the site has been previously modelled using MODFLOW and reported within 'Numerical Modelling of Groundwater Recovery and Recycling' (Nield Consulting Pty Ltd, 2003). Parsons Brinckerhoff considers the model to be a reasonable reflection of groundwater and contaminant throughflow at the site (and hinterland). A further

degree of confidence in the model was gained when, upon commissioning, the yields from the groundwater interception system were found to closely match those predicted by the model.

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