Cleanup of contaminated site McCabe Street, Mosman Park

Landcorp and Octennial Holdings Pty Ltd

Report and recommendations
of the Environmental Protection Authority

Environmental Protection Authority
Perth, Western Australia
Bulletin 699
August 1993

THE PURPOSE OF THIS REPORT

This report contains the Environmental Protection Authority's environmental assessment and recommendations to the Minister for the Environment on the environmental acceptability of the proposal.

Immediately following the release of the report there is a 14-day period when anyone may appeal to the Minister against the Environmental Protection Authority's report.

After the appeal period, and determination of any appeals, the Minister consults with the other relevant Ministers and agencies and then issues his decision about whether the proposal may or may not proceed. The Minister also announces the legally binding environmental conditions which might apply to any approval.

APPEALS

If you disagree with any of the contents of the assessment report or recommendations you may appeal in writing to the Minister for the Environment outlining the environmental reasons for your concern and enclosing the appeal fee of $10.

It is important that you clearly indicate the part of the report you disagree with and the reasons for your concern so that the grounds of your appeal can be properly considered by the Minister for the Environment.

ADDRESS

Hon Minister for the Environment
12th Floor, Dumas House
2 Havelock Street
WEST PERTH WA 6005

CLOSING DATE

Your appeal (with the $10 fee) must reach the Minister's office no later than 5.00 pm on 9 September, 1993.

Environmental Impact Assessment (EIA)

Process Timelines

Date	Timeline commences after receipt of full details of proposal from the proponent	Time
21/7/93	Proponent Document Released for Public Comment	3 weeks
11/8/93	Public Comment Period Closed	
13/8/93	Issues Raised During Public Comment Period Summarised by EPA and Forwarded to the Proponent	2 days
17/8/93	Proponent response to the issues raised received	4 days
27/8/93	EPA reported to the Minister for the Environment	10 days

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Summary and recommendations

Octennial Holdings Pty Ltd and Landcorp, the proponents, propose to develop the site of an old fertilizer works in McCabe Street Mosman Park for residential purposes.

The site had been used from 1910 to 1969 primarily as a fertilizer manufacturing works. Since the early seventies the site has not been actively used. In 1987 Landbank (now Landcorp) proposed development of the site for a mix of residential and parkland purposes. In that proposal, the proponent proposed to remove highly contaminated material from the site and stockpile low level contaminants into sealed dumps on the site. The Environmental Protection Authority assessed that proposal and found it acceptable. However, at that time the Town of Mosman Park was not willing to accept that any waste could be left on the site. Accordingly, environmental conditions for the site were never finalised.

In 1992 a new proposal to develop the site for residential purposes, that included the removal of all waste material from the site, was received. This proposal concentrated on the site cleanup issue and did not address issues such as the amount of public open space or proposed housing density. This proposal also lapsed because a suitable offsite secure landfill could not be identified.

The current proposal received by the Environmental Protection Authority for development of the McCabe Street site can be described as a combination of the two original proposals. The proponents, Landcorp and Octennial Holding Pty Ltd, now intend to collect all waste and contaminated soils from over the site and place them into a secure underground storage cell to be constructed on the site.

From its evaluation of the proposal, and information gained from two previous incomplete assessments of this site, the Environmental Protection Authority considers that the key environmental factors are:

- the generation of wind-blown dust;
- leaching of heavy metals via stormwater infiltration or groundwater flows; and
- mobilisation of stockpiled wastes as suspended solids in stormwaters.

Additionally, the Environmental Protection Authority considers that the following issues are important to the approval of this project.

- protection of future residents and recreational users;
- protection of the river;
- cleanup of the site and foreshore area; and
- long term management of the underground storage cell.

On the basis that the proponent has provided a proposal that addresses these concerns, and which includes specific commitments, the Environmental Protection Authority considers that the proposal is environmentally acceptable.

The Environmental Protection Authority has accepted encapsulation onsite for this proposal on the basis that the environment has not been unacceptably impacted by the waste material which has been present for more than 20 years at the site. Additional testing of the waste material has also shown it has a low potential to leach contaminants. This low leaching potential together with the natural alkaline environment at McCabe Street has effectively contained the waste material and prevented unacceptable environmental impacts from occurring. The proposed cleanup operations will allow unrestricted development of most of the site for residential and recreational purposes.

Recommendation 1

The Environmental Protection Authority concludes that the proposal to cleanup contamination at a former industrial site in McCabe Street Mosman Park to allow residential development is environmentally acceptable.

This conclusion is based on consideration of the proponent's Consultative Environmental Review, submission received from the public and other Government agencies, responses to issues raised in submissions during the assessment and the proponent's commitments.

In reaching this conclusion, the Environmental Protection Authority identified the main environmental factors requiring consideration to be:

- **protection of future residents and recreational users;**
- **protection of the river;**
- **cleanup of the site and foreshore area; and**
- **long term management of the underground storage cell.**

The Authority considers that these issues have been adequately addressed and that this proposal could proceed subject to its recommendations in this report.

The cleanup of this site should provide for a mix of recreational and residential land uses and for the protection of the Swan River.

Recommendation 2

The Environmental Protection Authority recommends that cleanup of the site meets standards suitable for recreational and residential land uses and to ensure no adverse impacts on the Swan River in the long term to the requirements of the Environmental Protection Authority. (see Section 6, Recommended Environmental Condition 3).

With respect to the future development of this site it is important that, as an area on the site is cleaned of contaminated soil and waste, a mechanism is in place that ensures the condition of the area is compatible with future developments. The Environmental Protection Authority will provide advice on the acceptability or otherwise of an area of land for redevelopment. This advice will be based on the sampling and analysis undertaken by the proponents together with site inspections and a close interaction with the Town of Mosman Park. The McCabe Street site should not be approved for residential development before all areas are cleared of contamination.

The Environmental Protection Authority will advise on the success or otherwise of the cleanup operations against the Environmental Soil Quality Guidelines provided in the Australian and New Zealand Guidelines for the Assessment and Management of Contaminated Sites, January 1992. This document was jointly prepared by the Australian and New Zealand Environment and Conservation Council and National Health and Medical Research Council. All State Environment and Health agencies provided input to the document.

Recommendation 3

The Environmental Protection Authority recommends that the proponent collect, analyse and report to the Authority on soil samples, after contaminated waste or soil is removed and prior to further development of the site. (see Section 6, Recommended Environmental Condition 4).

The Authority is satisfied that, based on the information provided and its own investigations, the broad parameters of site cleanup are acceptable. However, it notes that there are some issues which will require specific details of how environmental management will be effected.

The Environmental Protection Authority advises that the management of dust should ensure that the annual mean concentrations of particulate matter should not exceed 90 micrograms per cubic metre (µg/m3) averaged over a 24-hour (1-day) time. Additionally, noise levels at residences should be:

- 40 dB(A) from 10pm to 7am, every day;
- 45 dB(A) from 7pm to 10pm every day and from 7am to 7pm Sunday and public holidays; and
- 50 dB(A) from 7am to 7pm on Monday to Saturday.

Vibration, particularly from compaction of the storage cell, also has the potential to cause nuisance impacts to nearby residents and the school which should be managed. Potential impacts from the transport of waste within the site boundary and movements outside the McCabe Street site will need to ensure that the above noise and dust requirements are met. The Town of Mosman Park is expected to address other transport issues offsite.

With respect to the proposed storage cell, the Environmental Protection Authority accepts that the proposed design, which includes a crushed limestone base and sides; compacted layers of waste material; and a suitable capping together with an ongoing groundwater monitoring programme, is appropriate. However final details on the underground storage cell should be available for approval together with details on the proposed monitoring programme. The Environmental Protection Authority will review the design detail and monitoring programme to ensure that they will be effective. The proponent should also closely consult with the Town of Mosman Park, Water Authority of WA and Geological Survey on these issues.

In order to ensure that the issues described above are properly managed and that:

- potential impacts of cleanup operations associated with this site are clearly identified and managed;
- there are no adverse impacts on the Swan River; and
- the Town of Mosman Park together with other interested government agencies can clearly review the ongoing performance of the cleanup operation,

the Environmental Protection Authority considers that the proponents should prepare an environmental management programme.

Recommendation 4

The Environmental Protection Authority recommends that the proponent should prepare an environmental management programme prior to commissioning the proposal. The programme should address operations at the site describing cleanup criteria and how the Swan River will be protected.

It should describe how:

- **dust;**
- **noise;**
- **vibration; and**
- **transport issues will be addressed.**

Additionally, The Environmental Protection Authority recommends that:

- **the final design details; and**
- **monitoring programme for the storage cell be prepared,**

to meet the requirements of the Environmental Protection Authority and in consultation with the Town of Mosman Park, Water Authority of WA and Geological Survey (see Section 6, Recommended Environmental Conditions 3 and 5).

1. Introduction

Landcorp and Octennial Holdings Pty Ltd (as joint proponents) propose to develop a former fertiliser works at McCabe Street Mosman Park (Figure 1) for residential land use.

The site was first used for commercial purposes in 1895 as a limestone quarry. Between 1910 and 1969 sulphuric acid was produced in lead lined chambers using a variety of sulphur compounds, for the manufacture of fertilizers. Many of the compounds, including pyrites from the Goldfields, contained heavy metals which, in addition to lead, now contaminate the site. Later, improved gold cyanide extraction techniques allowed further gold extraction from the pyrites waste, hence the presence of cyanide in the eastern cinders dump (Figure 2).

The proponents have limited their proposal for the cleanup of this site to the issues immediately relevant to ensuring waste material and contaminated soil at the site is properly dealt with. Issues that can be managed through the planning process (eg. residential development details) have not been addressed.

The purpose of this assessment is to ensure that development of the site does not adversely impact on the environment and people that may live or recreate on or near the site.

The McCabe Street site is bounded on the south by the Swan River foreshore reserve, on the east by a recreational reserve and the Buckland Primary School, to the north and northwest by a light industrial subdivision and to the west by the recently developed residential subdivision on the old State Engineering Works site. The closest residences to the areas proposed to be excavated are approximately 250m distance to the north, within the southern part of the Buckland Hill residential development.

In November 1987 the Environmental Protection Authority found acceptable Landcorp's (then known as Landbank) proposal to clean up the McCabe Street site by consolidating the waste on site and removing an amount of lead contaminated soil. However, at that time the Town of Mosman Park determined that it would not support the proposal because it did not included total removal of all contaminants from the site. This situation resulted in environmental conditions not being finalised by the Minister for the Environment.

In September 1992 the Environmental Protection Authority agreed to the release for public comment of a second proposal to clean up the site. This time, Octennial Holding Pty Ltd (which held an option on the portion of the site owned by the University of WA) proposed to clean-up the site by excavating and removing all of the contaminated materials, and to rehabilitate the site to render it suitable for future residential development. The excavated material was proposed to be disposed of to secure landfill at the Shire of Williams sanitary landfill site.

The Environmental Protection Authority did not report on the second proposal as the Shire of Williams withdrew its support for the proposal and Octennial Holdings was unable to locate an alternative acceptable landfill site.

As a consequence of not being able to find an acceptable landfill site Octennial Holdings restructured its proposal. The new proposal included Landcorp as a joint proponent and envisaged the burial of all waste and contaminated soil in a secure engineered underground storage cell, within the McCabe Street site.

This report is an assessment of the new proposal.

The proponents consulted widely during the preparation of the Consultative Environmental Review which the Environmental Protection Authority released for a two week review period. The review period was extended for a further week based on requests for an extension of time to prepare submissions. The reduced review period (normally CERs are provided a four week review period) was associated with the consultation already undertaken by the proponents and history of assessments on this site. The written support (subject to approval under the Environmental Protection Act) of the Town of Mosman Park and Health Department of WA has already been received by the proponent for this proposal.

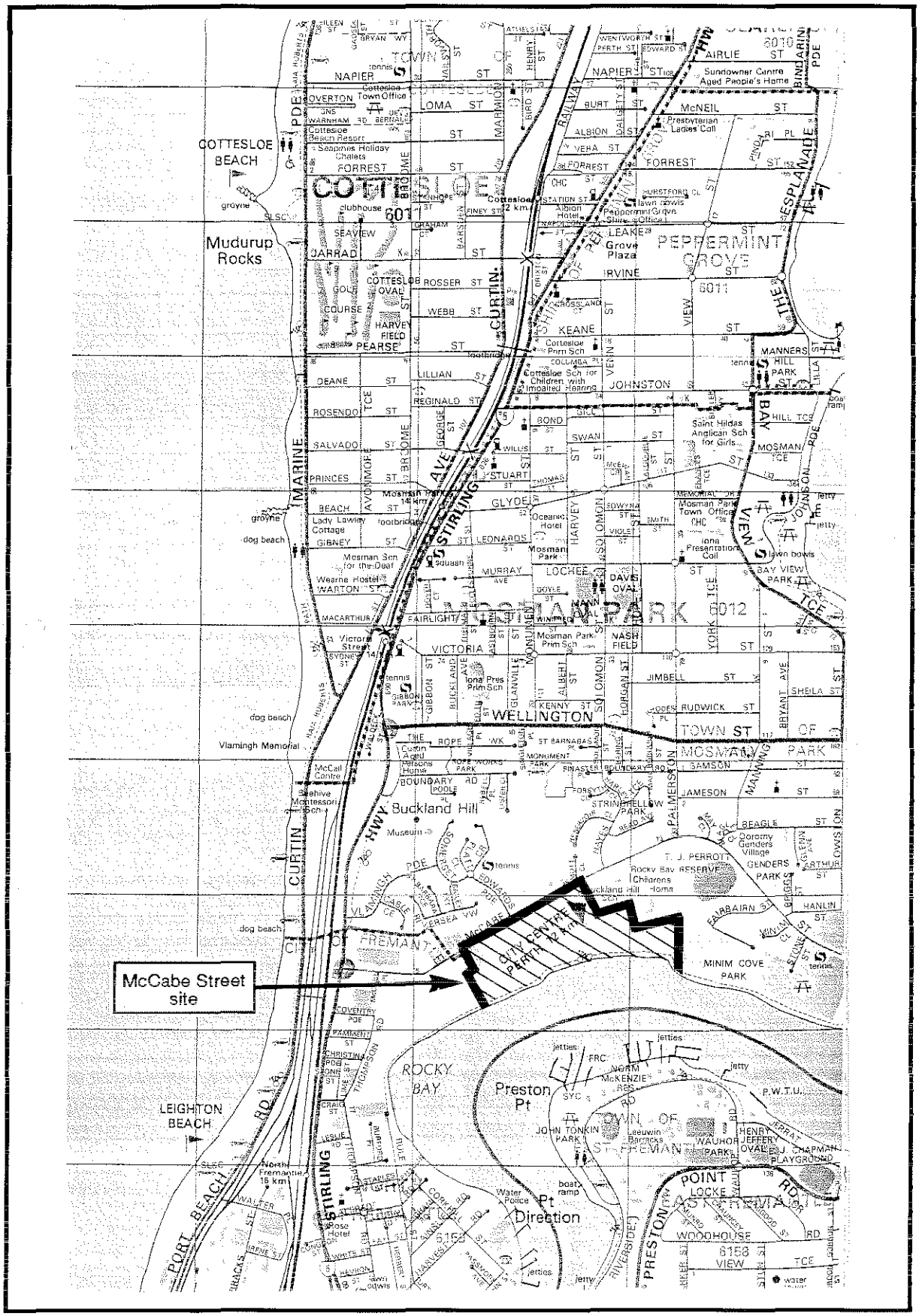

Figure 1. Site location (Courtesy of proponent CER: July 1993).

2. The proposal

The proponents intend to remove waste material and contaminated soil (approximately 170,000 m^3, Figure 2) on the McCabe Street site and dispose of it to a single area of secure underground storage at the same site (Figure 3).

The waste on the site is contaminated with lead and other metals such as arsenic, cadmium, copper, zinc and mercury. Cyanide is present as a by-product of the gold extraction process used at the site. The waste materials identified on the site are contaminated to varying degrees when compared against the Environmental Soil Quality Guidelines contained in the Australian and New Zealand Guidelines for the Assessment and Management of Contaminated Sites document. High levels of lead contamination are present in about 10,000m^3 of the waste. However, the contamination is not mobile in its present form.

The proposal comprises:

- excavation of all waste material and contaminated soils on the McCabe Street site (including the foreshore area);
- deposition and storage of the material in an underground storage cell; and
- long-term management of the storage cell.

The underground storage cell would be prepared by excavating the limestone at the nominated McCabe Street site to a depth of five metres above the groundwater (nominally 20 metres below the surface). The cell would be approximately 160 metres long and 70 metres wide. It will be capped and secured once filled.

A small deposit of amosite (asbestos fibre) in the northern part of the site would be excavated and removed, in accordance with Department of Occupational Health, Safety and Welfare and Department of Health requirements, to an approved metropolitan landfill site.

Once waste and contaminated soil had been removed and transferred to the storage cell, a survey will be undertaken to show that no significant contaminated soil remained over the site. Proposed residential lots would then be covered with at least one metre of clean sand.

Land above the storage cell would be left as Crown Reserve and controlled by the Department of Land Administration. The Department of Land Administration has advised that it would be willing to accept responsibility for this land following completion of earthworks. This offer is conditional upon funds being made available to monitor and maintain the site in perpetuity.

3. Issues raised in submissions and advice from other government agencies

The Authority received 19 submissions on this proposal (Appendix 1). Nine of those provided general support for development of the site. Of the remaining ten, most asked for further details on:

- dust controls;
- noise controls;
- vibration controls;
- operating hours;
- the design detail and effectiveness of the proposed storage cell;
- the proposed monitoring programme;
- the amount of protection the river and foreshore area will receive;
- the source and amount of cleanfill; and
- the long term protection of residents and those that use the river and foreshore area.

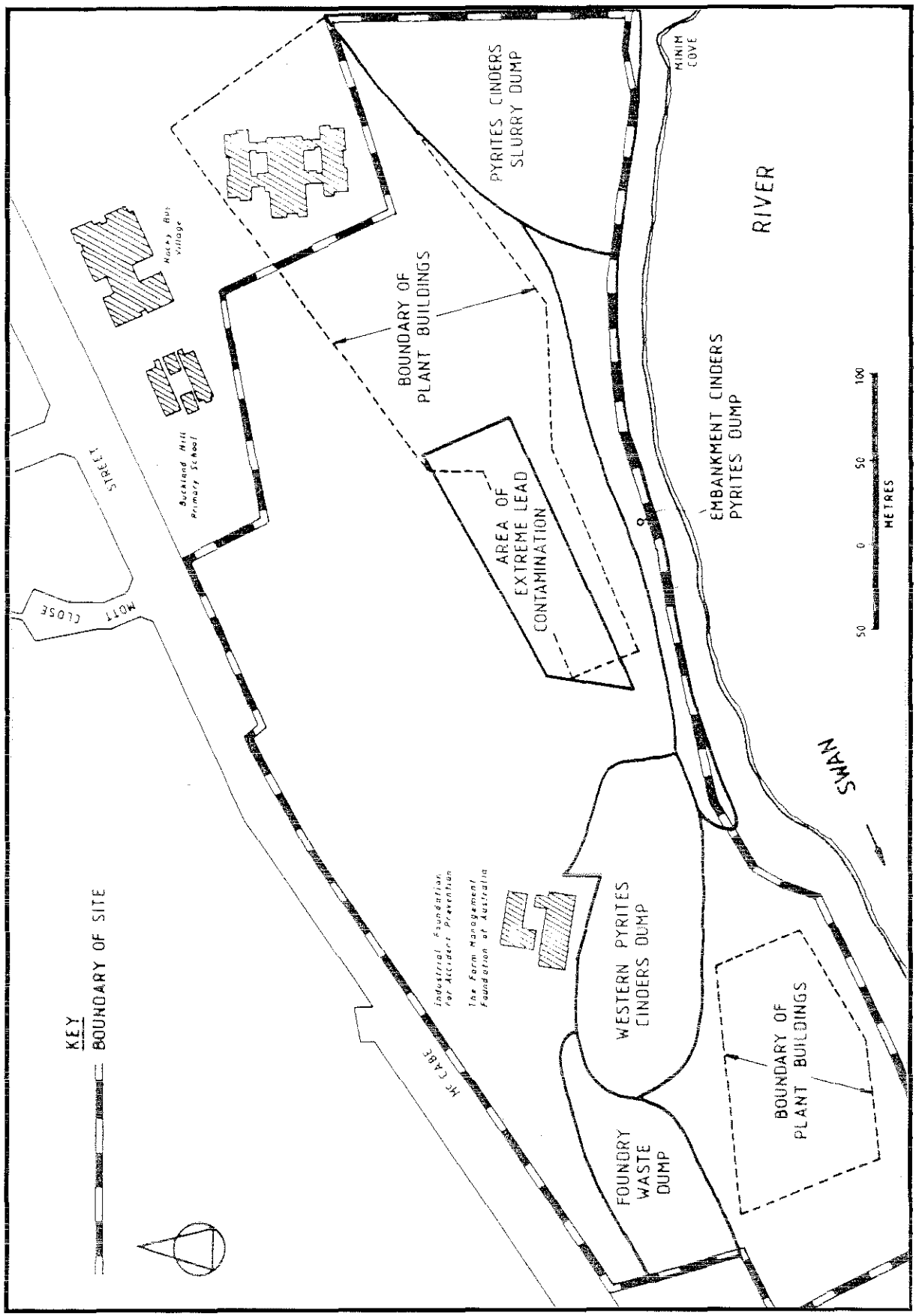

Figure 2. Location of former plant and waste disposal areas (Courtesy of Landbank PER: November 1987).

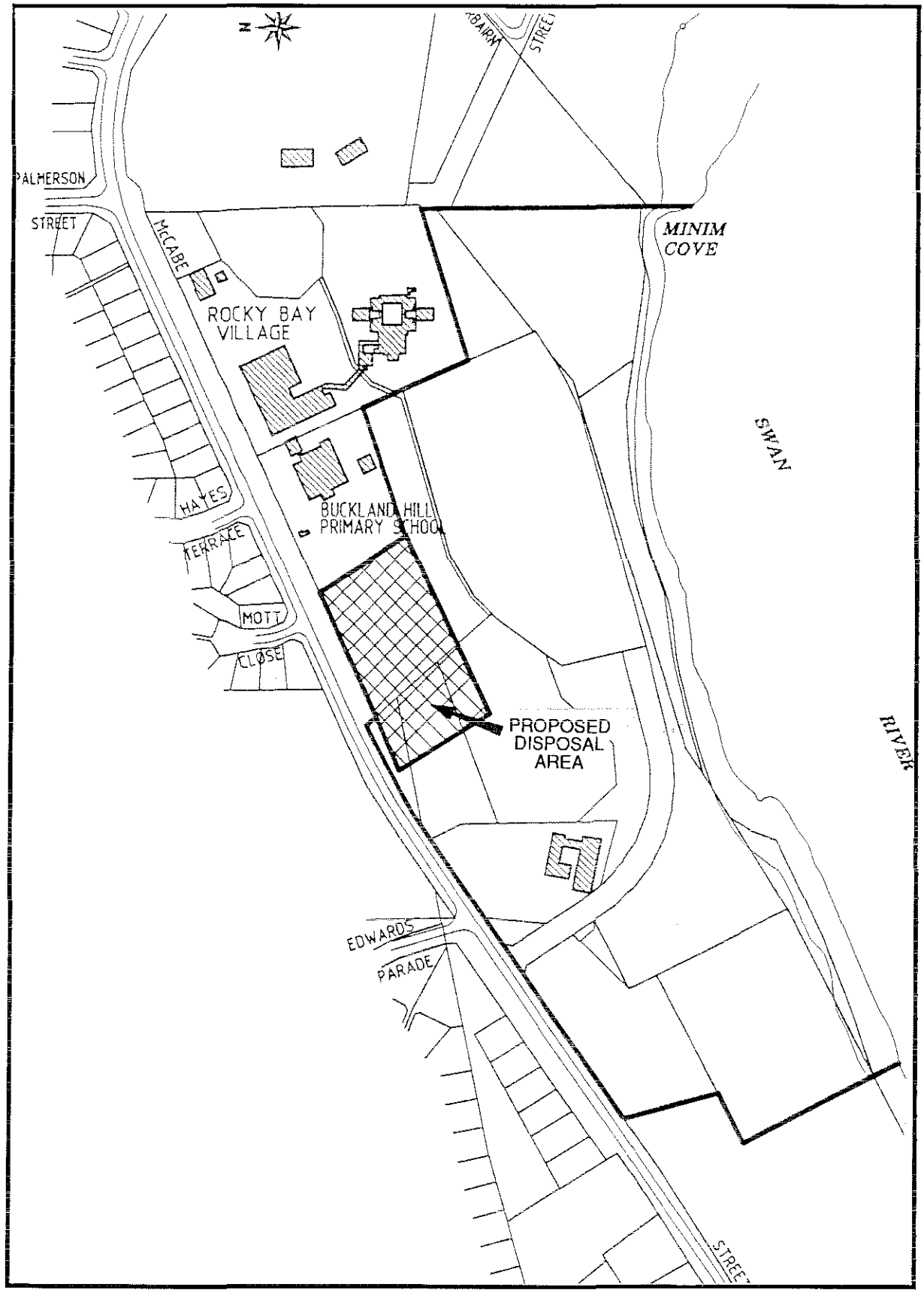

Figure 3. Proposed location of storage cell (Courtesy of proponent's CER: July 1993).

The Environmental Protection Authority summarised the environmental issues raised in submissions and provided a list of questions to the proponents. The proponents responses are provided in Appendix 2.

Attachment 1 to Section 6 of this report also provides a number of commitments the proponents have made regarding this proposal.

4. Environmental Protection Authority's assessment

4.1 Background

The preferred order of options for site clean-up and management of contaminated sites, as outlined by "Australian and New Zealand Environment and Conservation Council and National Health and Medical Research Council (1992)" and supported by the Environmental Protection Authority are:

- *on-site treatment of the soil so that the contaminant is either destroyed or the associated hazard is reduced to an acceptable level.*
- *off-site treatment of excavated soil which, depending on the residual levels of contamination in the treated material is then returned to the site, removed to an approved waste disposal site or facility or used as fill for landfill.*

Should it not be possible for either of these options to be implemented, other options that could be considered include:

- *removal of contaminated soil to an approved site or facility followed where necessary by replacement with clean fill;*
- *isolation of the soil by covering with a properly designed barrier;*
- *choosing a less sensitive land use to minimise the need for treatment of the contamination (this may include partial treatment of the site); and*
- *leaving the contaminated material in-situ providing there is no immediate danger to the environment or community and the site has appropriate controls in place.*

In cases where a limited number of highly localised 'hot-spots' are involved, approvals may be given to mixing with clean soil or subsoil to reduce the concentration of contaminants to acceptable levels. However it is emphasised that this is not a preferred clean-up strategy.

While the Environmental Protection Authority would continue to consider proposals involving the removal of materials to secure landfill sites, a better approach in the formulation of proposals would be to consider treatments for the destruction or reduction/extraction of contaminants. Unfortunately, the cost associated with alternative options are likely to be much higher than the theoretically available landfill option.

The proposal to bury the waste on the McCabe Street site is the proponent's choice. It reflects a situation where landfill is still seen as the predominant solution to contaminated sites problem. The Environmental Protection Authority would hope that as contaminated site problems begin to be recognised, more innovated options will be researched and developed.

4.2 Potential environmental impacts and their management

In this section, the Environmental Protection Authority has considered the proposal under four separate headings.

4.2.1 The majority of the site

The proponents have indicated that potential unacceptable environmental impacts of the contaminated site relate to:

- the generation of wind-blown dust (affecting nearby residences and the primary school);

- leaching of heavy metals via stormwater infiltration or groundwater flows; or
- mobilisation of stockpiled wastes as suspended solids in stormwaters.

The Environmental Protection Authority considers that containment of the contaminated waste in an appropriately engineered and monitored storage cell is adequate to address these potential environmental impacts.

This proposal should result in most of the land being unrestricted for development of public open space and residences. The exception is the land above the storage cell.

The Authority notes that engineering works required to remove the waste and contaminated soils from over the site (Figure 2) to the underground storage cell (Figure 3) would be supervised by the Town of Mosman Park.

The Environmental Protection Authority's role would be in providing advice on the cleanup criteria and on the final clearance of the site indicating that the cleanup has been effective and that the site could then be developed (Section 6, Attachment 1, Commitment 3). Issues related to noise, dust and vibration from the site have been dealt with in a number of commitments made by the proponents (Section 6, Attachment 1, Commitments 12,13, 14, 16 and 18).

The Environmental Protection Authority recommends that the proponents prepare an environmental management programme should this project proceed The programme should address operations at the site describing cleanup criteria and how the Swan River will be protected. It should describe how dust, noise, vibration and transport issues will be addressed. The programme should be prepared in consultation with the Environmental Protection Authority, Town of Mosman Park, Swan River Trust, City of Fremantle, Water Authority of WA and Geological Survey (see Recommendations 2 and 4 in the Summary and Recommendations section of this report). The proponent should ensure that its dust control measures are carefully considered given the nature of contaminants on the site (see Environmental Protection Authority dust control guidelines 1990).

The Environmental Protection Authority would envisage three parts of that programme requiring its direct involvement. First, the cleanup criteria for areas on the site as waste is removed and before clean fill is placed over it. Second, the final design of the storage cell. Third, the monitoring programme for the storage cell. (see Recommendation 4 in the Summary and Recommendations section of this report).

The Environmental Protection Authority has been advised that in a meeting between the proponents and Chief Executive Officer from the Rocky Bay Village, the proponents have confirmed an earlier undertaking to cleanup any surface soil contaminants found at the Rocky Bay Village.

4.2.2 The foreshore/embankment area

The proponents have committed (Section 6, Attachment 1, Commitment 2) to a cleanup programme that includes the eastern pyrites cinders slurry dump and the embankment cinders pyrites dump (Figure 3). These dump sites are located adjacent to the river. **The cleanup will be to levels in accordance with the proponents' proposal which is consistent with the Environmental Soil Quality Guidelines provided in the Australian and New Zealand Guidelines for the Assessment and Management of Contaminated Sites, January 1992** (see Recommendation 3 in the Summary and Recommendations section of this report).

The Environmental Protection Authority is aware that previous work identified some contamination of molluscs in the river (although investigations did not show there to be a health risk). The Environmental Protection Authority considers that removal of contaminated waste away from the river will improve this situation because underground pipes at the site (thought to be a pathway for contamination to the river) will be removed.

The excavation of waste from these areas is likely to require subsequent recontouring. It is important that the final levels are such that the public amenity/utility of the area is not lost and that any alteration to the river frontage is first approved. It is envisaged that the Swan River Trust and Town of Mosman Park will play the major role in assuring this happens. In a submission received from the Swan River Trust, the type of fill and levels proposed were identified as important considerations for their approval.

The proponent has made a commitment (Section 6, Attachment 1, Commitment 15) to ensuring that the existing cycleway/pedestrian path along the southern boundary of the site is restored as soon as possible if it is disturbed. A temporary pathway would be constructed. Additionally, a commitment (Section 6, Attachment 1, Commitment 9) has been made to remove all existing drainage outfalls to the Swan River on the site.

The Environmental Protection Authority considers that these commitments will result in a clean foreshore environment.

4.2.3 The proposed storage cell

The acceptability of this proposal is tied to the effectiveness of the storage cell. The proponents have recognised this and committed (Section 6, Attachment 1, Commitment 6) to construct the cell as described in the CER or to other similar approved standards.

The exact design details of the storage cell are not yet prepared. The advice of the Water Authority of WA, Geological Survey and Town of Mosman Park should be sought on this issue.

The design objectives described by the proponent include:

- a crushed and compacted limestone base;
- crushed limestone walls;
- a capping system to prevent surface water getting into the cell; and
- a monitoring programme.

Additionally, the waste material will be placed in the storage cell in layers and compacted to reduce the potential for water to flow through it.

The Environmental Protection Authority considers that the natural limestone environment in which the storage cell will be excavated has a number of advantages. Firstly, it will provide potential clean fill together with lining material for the storage cell (top, side and bottom). Furthermore, it will act to prevent heavy metals leaching by providing an alkaline environment in which heavy metals can be trapped.

An important consideration in the design of the storage cell is to ensure saturated conditions are avoided (ie. ensure reduced water ingress/retention from either the surface or groundwater columns). This is because when the pyrite cinders waste is wet and sufficient oxygen is available, bacterial oxidation of residual sulphides in the waste occurs and produces an acidic environment which would increase the potential for leaching heavy metals.

Based on the information provided and the Environmental Protection Authority's own experience, the Authority considers that the proposed storage cell is environmentally acceptable. The final design details will be completed by the proponents if this proposal is found environmentally acceptable (see above, Section 5.2.2).

4.2.4 Monitoring

Once constructed, the effectiveness of the storage cell must be monitored. The proponents have addressed this issue in their commitments (Section 6, Attachment 1, Commitments 17 and 21). It should be recognised that the existing conditions of groundwater at the site should be known before major works begin. This will be essential background data for the monitoring programme. Furthermore, the Environmental Protection Authority considers that all sampling programmes and management strategies that stem from the results should be available to the public.

The issue of long term management of the storage cell has also been addressed by the proponent with respect to maintenance of the capping system (Commitment 22), ownership of the waste and land above the waste (Commitment 23) and maintenance of the land above the storage cell (Commitment 24).

4.3 Comparing the previous Environmental Protection Authority assessment of this site and the current assessment.

In its simplest form, the current proposal (August 1993) differs from the previous assessment (April 1988) in that all the waste (apart from some identified asbestos material) is proposed to be contained onsite. The 1988 proposal provided for the removal of a limited amount of lead contaminated soil to an approved offsite landfill. The current proposal will include that soil in the storage cell along with the contaminated wastes from the remainder of the site.

The Environmental Protection Authority was provided information in Appendix A of the proponents CER that showed the lead contaminated soil was more leachable (with respect to lead) than the other contaminated wastes on the site. The contaminated soil leaching tests provided a result between four and 25 times higher than other contaminated waste on the site. This information was gained from the application of a test procedure which the Health Department of WA is currently considering for use in characterising waste.

The test procedure is known as the 'Toxicity Characteristic Leaching Procedure' (TCLP) and it is used widely in other states of Australia for the same purpose. The Environmental Protection Authority is currently considering the application of the TCLP test and expects to comment on its applicability in its assessment of the southern landfill project - South Cardup in September 1993.

For this project the Environmental Protection Authority considers that;

- given the TCLP criteria for lead was not exceeded (for lead it is 5 milligrams per litre and the contaminated soil test result was 2.45 milligrams per litre); and
- that there is a limited quantity of this type of waste involved (approximately 10,000 of the likely 170,000 cubic metres of waste to be placed in the storage cell),

the lead contaminated soil could be left onsite in the storage cell.

In the unlikely event that monitoring detects a problem with this situation, it would be prudent to have secured the lead contaminated soil in a specific area in the storage cell. This area could be clearly identified in plans of the storage cell and if future monitoring shows a problem has developed, it could be more easily accessed and removed.

5. Conclusion

The Environmental Protection Authority has assessed the potential environmental impacts of the proposal, as described in the Consultative Environmental Review, and utilised additional information supplied by other government agencies, the public and the proponent, in response to issues raised in submissions. Additionally, officers of the Environmental Protection Authority have carried out site inspections and discussed environmental issues with members of the public and relevant government authorities.

The Authority considers that it could be necessary or desirable to make minor and non-substantial changes to the designs and specifications of the proposal which were examined as part of the Environmental Protection Authority's assessment. Accordingly, the Environmental Protection Authority considers that subsequent statutory approvals for this proposal could make provision for such changes, where it can be shown that the changes are not likely to have a significant effect on the environment.

Furthermore, the Authority believes that any approval for the proposal based on this assessment should be limited to five years. Accordingly, if the proposal has not been substantially commenced within five years of the date of this report, then such approval should lapse. After that time, further consideration of the proposal should occur only following a new referral to the Environmental Protection Authority.

Accordingly, subject to the recommendations in this report, the Environmental Protection Authority considers that this proposal is environmentally acceptable.

6. Recommended environmental conditions

Based on its assessment of this proposal and recommendations in this report, the Environmental Protection Authority considers that the following Recommended Environmental Conditions are appropriate.

1. Proponents Commitments

The proponent has made a number of environmental management commitments in order to protect the environment.

1-1 In implementing the proposal, the proponent shall fulfil the commitments (which are not inconsistent with the conditions or procedures contained in this statement) made in the Consultative Environmental Review and included in the Environmental Protection Authority's Bulletin 699. (see Attachment 1 following these recommended environmental conditions.)

2. Implementation

Changes to the proposal which are not substantial may be carried out with the approval of the Minister for the Environment.

2-1 Subject to these conditions, the manner of detailed implementation of the proposal shall conform in substance with that set out in any designs, specifications, plans or other technical material submitted by the proponent to the Environmental Protection Authority with the proposal. Where, in the course of that detailed implementation, the proponent seeks to change those designs, specifications, plans or other technical material in any way that the Minister for the Environment determines on the advice of the Environmental Protection Authority, is not substantial, those changes may be effected.

3. Site Cleanup Management Plan

3-1 The proponent shall protect the beneficial uses of the Swan River and amenity of the public during cleanup operations on this site.

3-2 The proponent shall prepare an environmental management programme to achieve the objectives of Condition 3-1. This plan shall address, but not be limited to, the following: dust, noise, vibration and transport issues. The proponent shall consult with the Town of Mosman Park, the Swan River Trust, the City of Fremantle, the Water Authority of WA and Geological Survey in preparation of this programme.

3-3 The proponent shall implement the programme required by Condition 3-2 to achieve the objectives of Condition 3-1.

4. Contaminated Site Clearances

4-1 The proponent shall only proceed with the cleanup of the site after having demonstrated that the site cleanup criteria identified in Section 2.2 of the Consultative Environmental Review, July 1993 have been met (the proposed soil quality objectives are sourced from the Australian and New Zealand Guidelines for the Assessment and Management of Contaminated Sites, January 1992).

4-2 The proponent shall collect, analyse and report on soil samples, after contaminated waste or soil is removed and prior to further development of an area.

5. Underground Storage Cell

5-1 The proponent shall design and monitor the performance of the underground storage cell to ensure that there is no unacceptable release of contaminants.

5-2 The proponent shall prepare the final design details of the storage cell in consultation with the Environmental Protection Authority, the Town of Mosman Park, the Water Authority of WA and Geological Survey.

5-3 The proponent shall construct the storage cell to achieve the objectives of condition 5-1.

5-4 The proponent shall prepare the final monitoring programme for the storage cell in consultation with the Environmental Protection Authority, the Town of Mosman Park, the Water Authority of WA and Geological Survey.

5-5 The proponent shall implement the monitoring programme prepared under condition 5-4 to meet the objectives of condition 5-1.

6. Proponent

These conditions legally apply to the nominated proponents.

6-1 No transfer of ownership, control or management of the project which would give rise to a need for the replacement of the proponent shall take place until the Minister for the Environment has advised the proponent that approval has been given for the nomination of a replacement proponent. Any request for the exercise of that power of the Minister shall be accompanied by a copy of this statement endorsed with an undertaking by the proposed replacement proponent to carry out the project in accordance with the conditions and procedures set out in the statement.

7. Time Limit on Approval

The environmental approval for this proposal is limited.

7-1 If the proponent has not substantially commenced the project within five years of the date of this statement, then the approval to implement the proposal as granted in this statement shall lapse and be void. The Minister for the Environment shall determine any question as to whether the project has been substantially commenced. Any application to extend the period of five years referred to in this condition shall be made before the expiration of that period, to the Minister for the Environment by way of a request for a change in the condition under Section 46 of the Environmental Protection Act. (On expiration of the five year period, further consideration of the proposal can only occur following a new referral to the Environmental Protection Authority.)

8. Compliance Auditing

In order to ensure that environmental conditions and commitments are met, an audit system is required.

8-1 The proponent shall prepare periodic "Progress and Compliance Reports", to help verify the environmental performance of this project, in consultation with the Environmental Protection Authority.

Procedure

The Environmental Protection Authority is responsible for verifying compliance with the conditions contained in this statement, with the exception of conditions stating that the proponent shall meet the requirements of either the Minister for the Environment or any other government agency.

If the Environmental Protection Authority, other government agency or proponent is in dispute concerning compliance with the conditions contained in this statement, that dispute will be determined by the Minister for the Environment.

Note

Where required, the Environmental Protection Authority will address specific incidents regarding noise, dust or other pollution control issues under the provisions of Part V of the Environmental Protection Act.

Attachment 1

Landcorp and Octennial Holdings Pty Ltd list of environmental management commitments

The following commitments are made to ensure that this proposal proceeds in an environmentally acceptable manner. Those commitments flagged by an asterisk (*) have been identified as requiring specific auditing by the EPA. Other commitments will be implemented and reviewed by the Town of Mosman Park and other relevant Government agencies.

CLEANUP PHASE
PROPONENTS: LANDCORP AND OCTENNIAL HOLDINGS PTY LTD

The joint Proponents make the following commitments in respect of the cleanup of contamination from the McCabe Street site:

1. Any activity pertaining to the cleanup undertaken on the McCabe Street site will comply with all legislative requirements.

2. The site cleanup will excavate and remove all pyrite cinders from the three dump areas (the western cinders dump, the pyrite slurry dump and the embankment cinders dump), the foundry waste dump, contaminated surface soils from the two areas around the former acid plants that have been identified as having high lead levels, and any discrete pockets of contaminated topsoils that occur elsewhere on the site.

3.* The effectiveness of the site cleanup will be confirmed by chemical analyses, to the satisfaction of the EPA.

4. All contaminated soils and pyritic cinders material, building rubble etc. on the site will be excavated and consolidated within an engineered storage cell located on the site.

5. The storage cell will be constructed to ensure waste is separated by a minimum of 5m vertical distance from the groundwater table.

6. The storage cell will be constructed to the details described in this CER, or to a similar approved standard.

7. The site cleanup will be supervised by professionals in the environmental and engineering fields, to ensure the work is carried out to the standards required by the EPA, the Health Department and the Department of Occupational Health, Safety and Welfare.

8. A separate Lot will be created to contain the waste storage cell. This Lot will remain as Crown land.

9. All existing drainage outfalls to the Swan River will be removed from the site. No other direct stormwater discharges to the Swan River will be constructed on the site.

10.* Subdivision and sale of the land will not occur until the site cleanup is completed to the satisfaction of the EPA, the Town of Mosman and all other relevant Government agencies.

11. Areas of the site to be sold as freehold residential lots will be covered with a minimum of 1m of clean fill.

12. Special precautions will be taken to control dust generation and protect workers from dust inhalation during site cleanup.

13. No water used during the cleanup works will be sourced from groundwater beneath the site.

14. All cleanup work will be supervised by professionals in the engineering and environmental fields using recognised quality control and quality assurance procedures to ensure the work is carried out to the highest standard.

15. In the event that the remedial works need to disturb the existing cycleway/pedestrian path along the southern boundary to the site, an alternative thoroughfare will be provided and the path restored as soon as possible, to the satisfaction of the Town of Mosman Park.

16.* Noise, dust and vibration from the site will be controlled to prevent unacceptable environmental impacts. In the event that the EPA receives ongoing complaints relating to noise or dust emissions from the site, the Proponents will conduct surveys and assessments in consultation with the EPA.

17. The Proponents will install two groundwater monitoring bores in accordance with the proposed monitoring programme in this report. An assessment of the results will be provided to the EPA, WAWA and Town of Mosman Park.

18. Upon completion of the remedial work programme, excavated areas will be sprayed with mulch and planted with grass to minimise any ongoing potential for dust emissions.

19. All areas of remedial works will be surrounded with appropriate fencing to exclude public access. Vehicle entry and exit points will have a gate that will be locked during non-working hours. Appropriate signs will be displayed along the perimeter fencing to inform the public of the nature and purpose of the remedial works, and to prohibit public access to the site.

20. The excavated disposal pit will be separately surrounded with 2m high wire mesh fencing capped with barbed wire, with appropriate signs to warn of the deep excavation. The security of this fence will be regularly inspected and maintained during the remedial works programme.

LONG TERM CONTAINMENT
PROPONENT: DEPARTMENT OF LAND ADMINISTRATION

The Proponent makes the following commitments in respect of the long term containment of wastes on the McCabe Street site:

21.* Conduct ongoing monitoring of groundwater quality and the storage cell capping system (refer Commitment 17) and if necessary, based on the results, implement actions necessary to prevent unacceptable environmental impacts.

22. Ensure all maintenance works necessary to ensure the ongoing integrity of the storage cell capping system are identified promptly by regular monitoring and carried out in a thorough and professional manner as quickly as is practicable.

23. Maintain a Crown Reserve over the waste storage cell and ensure adequate notification is given to all interested parties concerning the function and status of the Reserve.

24. Ensure that the surface of the Crown Reserve is properly maintained to a standard in keeping with the function of the land as part of the public recreational resource of the area to the satisfaction of the Town of Mosman, DPUD and any other relevant Government agency.

Appendix 1

List of government agencies and members of the public who made submissions

City of Fremantle
Department of land Administration
Swan River Trust
Murdoch University
North Fremantle Community Association
Pollution Action Network
Mr R Chapple (Chapple Research)
Mr D Kaesehagen
Mr T Aitken
Mrs M Cullen
MR R Forbes
Mr J Noble
Ms M Muibly
J & E Connolly
A & G Wark
M & J Ahern
Dr R Wright
Mr C Boulter
Conservation Council of WA

Appendix 2

Proponent's response to public submissions

CLEANUP OF THE McCABE STREET SITE

PROPONENTS' RESPONSE TO ISSUES RAISED

1. THE RIVER/FORESHORE

1.1 *The southern foreshore area was identified in the 1987 Maunsell report as containing high levels of heavy metals. What will this proposal do about those contaminants?*

The findings of the 1987 Maunsell report relate the high levels of heavy metals with the location of areas of obvious staining which corresponded to the drainage outfalls from the site. It was suggested that this is related to the carriage of sediments onto the beach by high velocity stormwater flows.

As detailed in the CER all existing drainage outfalls to the Swan River will be removed. At the same time any identified concentration of sediments from the outfalls will be removed as part of the cleanup.

1.2 *Approximately 70,000m^3 of soil will be removed from the eastern pyrites dump. How will the conservation value of Minim Cove immediately adjacent to the dump be assured (has the proponent consulted the relevant Government department on this issue)?*

The proponents have consulted the relevant Government departments in the preparation of this cleanup proposal. This consultation process will continue during the cleanup of this site.

It is proposed that all cleanup works will be undertaken from within the site. This will enhance the conservation value of the adjacent reserve as the embankment will be extensively landscaped at the completion of the works.

Minim Cove has been the site of prolonged environmental mismanagement for many years. From the early days of quarrying, Council rubbish tip, CSBP activities, the construction of overhead powerlines through to the present vandalism of people removing fossiliferous shell deposits. The proponents believe that this proposal will form the basis for a management strategy that, by subtle management of access to the site, will assist in preserving it from fossickers and others.

If it is necessary to undertake any cleanup works within this reserve, then rehabilitation to a standard satisfactory to the regulatory authorities will be undertaken.

1.3 *How will the proponent prevent erosion of contaminated soil to the Swan River during cleanup operations at Mosman Park?*

The cleanup operation will be tightly controlled at all times and commence from the top of the stockpiles. This will allow the existing bunds that support these stockpiles to be progressively removed as the cleanup progresses. As extensive areas of pyrites will not be exposed at any one time, the opportunity for erosion of the pyrites will be minimised.

1.4 *Does the proponent intend to strip any of the river embankment to remove waste? Has the Swan River Trust approved this activity?*

Waste will not be removed from the river embankment except in the vicinity of the existing drainage outfalls. These outfalls will be removed as part of the cleanup.

Approval by the Swan River Trust is part of the environmental approval process.

1.5 *How much public open space is expected to be available along the foreshore?*

It is intended to retain a significant foreshore reserve sensitively landscaped to enhance the visual and recreational amenity of the foreshore and to provide a vegetated buffer between the residential development and river. It is proposed that the existing cycleway remain generally in its present location. A retaining wall may be necessary along sections of the path to retain the newly formed embankment once the waste materials are removed. The slope of the embankment will not exceed one vertical to two horizontal. At the top edge of the embankment a 4m wide level platform will accommodate a pedestrian path. The width of the foreshore reserve will therefore depend upon the location of the existing cycleway and the level of the first row of lots.

Generally the reserve will have a minimum width of 30m and a total area of about 2.7ha or about 15% of the nett site area.

2. THE MOSMAN PARK SITE

2.1 *Who will be involved in monitoring the effectiveness of the cleanup?*

As stated in the CER the cleanup will be supervised by qualified and experienced professionals.

Soil samples will be taken on a regular grid over the site. The samples will be analysed by a NATA registered laboratory with all results audited by the Environmental Protection Authority.

2.2 *Will potential purchasers be advised of the history of the site and location of the storage cell?*

The site will be cleaned-up to a standard satisfactory to the Environmental Protection Authority and suitable for residential development. Information regarding the cleanup of the site will not be withheld from potential purchasers of the proposed subdivision. The location of the storage cell will be indicated to potential purchasers.

2.3 *What monitoring facilities would be put in place to ensure dust control measures are effective?*

A high volume dust sampler will be installed at the Rocky Bay Village to monitor the effectiveness of the dust control measures. This is the closest location of public occupation to the cleanup activity.

2.4 *What dust control measures will be used to ensure nearby residents are not adversely affected? Will cleanup work only be done in winter?*

Stringent management measures will be implemented during all siteworks to minimise potential dust generation. Detailed dust management procedures will be defined in a site management plan prior to the site cleanup, in accordance with the Dust Control Guidelines (EPA, 1990) and to the satisfaction of the Department of Occupational Health Safety and Welfare, the Health Department and the EPA. The cleanup operators will be contractually obliged to strictly adhere to the agreed procedures which will be enforced by a full time site supervisor. All working areas will be watered-down and areas that have the potential to generate dust will be sprayed with mulch or other suitable binding agent if they are to be left unwatered for an extended period. Watering operations will be controlled to prevent runoff or erosion to the river.

To date, no decision has been made on the timing of this project but it is not considered imperative that the works be undertaken in winter.

2.5 *Will the proposed 1 metre of clean fill be sufficient to protect residents? What level of fill is proposed for those areas that are not included in residential lots?*

All waste from the site will be relocated to the storage cell with the effectiveness of the cleanup audited by the EPA. The 1m of clean fill will be provided so that gardens can be established. In some areas of the site, limestone is present at the surface which would detract from the appearance of the site to potential purchasers.

2.6 *The CER draws upon information extracted from previous environmental assessments. What has the proponent done to ensure the accuracy of these data prior to its inclusion in the current CER?*

All information presented in the CER was obtained from professionals with appropriate expertise. The results presented in the CER are consistent with all previous studies carried out on this site.

3. THE STORAGE CELL

3.1 *Has the location of the storage cell been considered carefully? The proposed site is reported to contain an area with flora and vegetation of regional significance? It is also reported to be an area of significant landscape and cultural value? Is it possible to undertake a cleanup without impacting on these values?*

The location of the storage cell has been selected to best suit the topography and geology of the site.

Historical aerial photography illustrates that the entire area has been subject to disturbance and therefore the existing vegetation has regenerated or arisen through deliberate rehabilitation.

Again, historical aerial photography demonstrates that there has been significant alteration of the landforms on the site due to limestone quarrying. The potential landscape and cultural values of the remnant landform has been recognised in the cleanup and development proposals by incorporation of public open space on the remnant limestone mound.

The ground contours over the storage cell will be restored to match, as far as possible the existing contours to minimise the visual signs of its presence and to achieve a continuity of site contouring. This together with appropriate landscaping will enhance the landscape values of the site.

3.2 *Are there other more appropriate areas for the storage cell on the site?*

Refer to the response to 3.1 above.

3.3 *Given the long term nature of this proposal can anyone really guarantee that records will be kept to ensure the performance of the storage cell?*

Yes, the Government will retain control of and the responsibility for the storage cell. Commitments have been given in the CER regarding the monitoring and long term security of the storage cell.

3.4 *Are the proponents aware of long-term management responsibilities associated with the storage cell? These may include monitoring groundwater, leachate recovery, and maintenance and management of soil cover on the containment cell.*

The State Government has accepted the long term management responsibilities for the storage cell as detailed in Section 2.5 of the CER.

3.5 *When the waste is wetted, is oxidation of residual sulphides and bacterial activity likely to result in acidification and consequent mobilisation of the heavy metals through leachate generation and movement?*

The waste has been tested using the Toxicity Characteristic Leaching Procedure (TCLP), which provides a conservative measure of environmental hazard that is accepted internationally and elsewhere in Australia. The TCLP analysis confirmed that the waste is geochemically stable and, by definition, non-hazardous.

Experience at this site, where the pyrites has been stockpiled for up to forty years, has shown that the heavy metals can be mobilised within the stockpile. This is due to acidification resulting from the oxidation of residual sulphides and bacterial action. However, the heavy metals are well contained within the stockpiles by the neutralising action of the limestone surrounding the stockpiles. Investigations have not identified extensive mobilisation of heavy metals.

The relocation of the pyrites to the storage cell with its capping system will minimise the future leaching of heavy metals. Also, there will be a minimum of 5m of limestone between the base of the storage cell and the water table to provide adequate buffering capacity for any heavy metals that may be mobilised.

Consolidation of the wastes into the storage cell in a compacted state will minimise its permeability. Moisture ingress will be minimised by installation of the capping layer and the fact that the surrounding limestone will provide a preferential seepage path.

3.6 *Is there sufficient buffering capacity, as well as immobilisation capacity, in the proposed limestone lining of the storage cell to ensure neither acid or leachates will become a problem?*

The limestone lining to the base of the storage cell is not intended to be the only means of preventing heavy metal leaching. The 5m separation of the waste from the water table provides a significant volume of alkaline material to provide additional buffering capacity.

In addition, to exceed the available buffering capacity it would be necessary to generate very large quantities of leachate. As described in 3.5, reliable, long term measures will be taken to minimise leachate generation.

3.7 *The rock beneath the site is not true limestone but Tamala limestone. Tamala limestone has a higher silica content and lower alkaline properties. Has this been considered?*

All limestone in the Perth region is classified as Tamala limestone and its properties are well documented and understood. It is considered that this material is well suited for the containment of the waste.

3.8 *What potential is there that horizontal aquifers might flow through the proposed storage cell? The geology, together with the topography of the area, means that there is a high probability that horizontal aquifers could be present, especially during winter.*

The base of the storage cell will be a minimum of 5m above the water table. Due to the insitu limestone's high permeability there is virtually no potential that a perched water table or aquifer will occur in this area and impact on the storage cell. Borehole records on the site and in surrounding areas show no evidence of this phenomenon. The proponents do not agree with the statement that horizontal aquifers can be expected. Excavation of the storage cell will enable this to be confirmed prior to burial of any wastes.

3.9 *How would the base and sides of the storage cell be constructed?*

The construction of the storage cell is detailed in Section 2.3 of the CER.

3.10 *What would be the specifications for the placement and compaction of the capping layers over the contaminated material so that a high degree of impermeability is achieved?*

The material for the capping layer has not been specified to date. It will be either an impermeable membrane or a minimum of 500mm of clay, with a permeability of about $1x10^{-9}$m/sec. In either case, the capping will be installed to current engineering standards to minimise leakage through the layer.

3.11 *Will stormwater disperse sufficiently quickly from the flat top of the stockpile to ensure adequate dispersal and minimal infiltration?*

The capping layer will be installed with a central crown and a crossfall of 3% to rapidly disperse the stormwater. Also the capping will extend beyond the edge of the storage cell so that stormwater does not infiltrate into the pyrites. Sand and limestone surrounding the contained waste will have higher permeabilities and therefore offer preferential drainage paths.

3.12 *What action would be taken if contaminants from the disposal site were detected in the environment adjacent to the disposal site, and who would pay for remedial works?*

The cleanup proposal presented in the CER has been configured to minimise the risks of future environmental impacts. Experience with the lack of identifiable impacts arising from the relatively uncontrolled disposal of wastes on the site in the past illustrates this to be the case. This is also emphasised by the results of the TCLP testing that has been undertaken and showed that the waste is geochemically stable.

Following the cleanup of the site, the monitoring programme described in Section 2.5 of the CER will be implemented. In the extremely unlikely event of leaching of the heavy metals into the environment being found, appropriate studies will be initiated to assess if any unacceptable environmental impacts are occurring and if the identified leaching is attributable to the contained waste. This work would be funded by the State Government.

3.13 *Theoretically, if acid leachates were produced would this react with the cyanide present in some of the waste? What effect might this have and would it be controlled within the scope of the existing proposal, how?*

The pyrites have been stockpiled on this site for about forty years and during that period no indications have been obtained that any acid leachates have reacted with the cyanide in the stockpile. The relocation of this material to the storage cell and its capping with an impermeable layer will minimise the generation of leachates and significantly improve its long term security.

Also, as described in Section 3.2 of the CER, the waste will be surrounded by alkaline material which will minimise the generation and movement of acids.

3.14 *Would it be more useful to utilise red mud (bauxite refining residue) in the storage cell either in place of or to supplement the crushed limestone?*

Additional buffering capacity in the form of red mud is considered unnecessary for the storage cell as described in previous comments. Also, experience at this site has shown that the limestone provides adequate buffering capacity.

4. TRANSPORT

4.1 *What quantity of clean fill is expected to be needed at the site? How many truck movements over what period of time does this involve?*

It is not anticipated that clean fill would be required at this site.

4.2 *During transport of the clean fill to the site, what provisions will be made to:*

- *repair damage to road pavement caused by truck traffic;*
- *clear the road surface of material spilt from trucks accessing the site; and*
- *protect the amenity of nearby residents as well as those along the road routes?*

Normal procedures would be implemented if an accident occurs, ie cleanup of diesel spill, repair to road surface etc.

If clean fill is spilt on McCabe Street, then the on-site water tanker would be used to wash the pavement or sweeping will be undertaken if large spills occur.

The primary access to the site will be via the former administration building entry. The use of this entry will avoid the need for the trucks to travel in the vicinity of the residential areas further along McCabe Street.

4.3 *What will be the origins of soil used for fill at the Mosman Park site?*

The clean material excavated from the storage cell will be used to backfill the stockpile areas and any other areas that require recontouring as part of the development of this site. If any additional fill is required it will be clean sand imported from local commercial sources.

5. OTHER ISSUES

5.1 *Why can't the waste be taken offsite?*

There are no gazetted sites in Western Australia for the disposal of contaminated soils or materials of a similar nature.

5.2 *Could the waste be returned to a mining operation and placed in a tailings dam?*

Previous investigations have not been able to identify any suitable offsite disposal site for the pyrites.

5.3 *Will a caveat be placed on the land title for the area above the storage cell?*

A separate lot will be created over the storage cell. This will remain as Vacant Crown Land reserved for this specific purpose, as described in Section 3.3 of the CER.

5.4 *Is the proponent aware of the Leighton Peninsula Regional Park proposal? How does the Park proposal affect this proposal?*

The proponents are fully aware of the Leighton Peninsula Regional Park. Discussions will be held with the Department of Planning and Urban Development and other relevant parties regarding the regional park as part of the development approval. The environmental approval process for the cleanup of this site does not have any effect on the regional park although the proposed subdivision and creation of public open space will contribute substantially to the proposal for a regional park.

5.5 *Appendix A in the CER does not appear to reflect the high lead levels in some of the waste. Especially the lead in the area labelled "area of extreme lead contamination". Why not?*

The information presented in Appendix A of the CER is the result of additional drilling investigations on the site. Details of the 'area of extreme lead contamination' were presented in previous reports, eg PER - Proposed Development at McCabe Street, Maunsell 1987. The TCLP analysis results in Appendix A refer to a test on the Eastern Plant Area which refers to the area in question.

The proponents are committed to relocating all the contaminated soil from the site to the storage cell so that the site is suitable for residential development as described in Section 2.1 of the CER.

5.6 *Will the river be opened for better public access for crabbing and fishing? If yes does this mean that the embankment will be significantly reshaped?*

The foreshore reserve will be accessible to the public from several locations within the subdivision and linked directly to the Buckland Hill open space system by a dual-use path. Access will also be possible from either end of the foreshore reserve where it continues east and west along the river.

Due to the steep embankments, the river will remain accessible at two points, Minim Cove at the eastern end of the site and a small cove at the western end. Both coves have sandy beaches and access will be upgraded as part of the development of the site.

In those areas where the waste will be removed, the slope of the embankment will be flattened to a grade of one vertical to two horizontal. Other areas of the embankment will not be significantly reshaped.

5.7 *Does the proponent know the quality of groundwater under the site now? If not what plans are in place to collect background data?*

Information on the quality of the groundwater was obtained in previous studies of this site. Additional data will be collected as detailed in the monitoring programme described in Section 2.5 of the CER.

5.8 *Has the proponent undertaken a health risk assessment for the site? If not will one be prepared?*

The relocation of the waste to the storage cell and the construction of the capping system effectively eliminates the possibility of human contact with this material, thereby negating any health risk.