# Tonkin Park Stage II Bassendean

## Centurion North West Pty Ltd

Section 46(1) Report and recommendations
of the Environmental Protection Authority

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## Summary and recommendations

Centurion North West Pty Ltd, the proponent, requests that existing condition 4 of Environmental conditions relating to Tonkin Industrial Park Stage II development be changed to allow the proponent to remediate the Tonkin Park Stage II site in Bassendean by the use of one or a combination of the following remediation options:

- containment on site; and/or
- disposal at a landfill site.

The Tonkin Park Stage I site was developed by Northcorp in 1990. Condition 4 requires the proponent for Stage II development to dispose of the wastes to a landfill site and does not allow the on-site containment of the wastes, which the proponent considers to be the most practical method of managing the wastes.

The Minister for the Environment has requested the Environmental Protection Authority (EPA) to consider the proposal and provide advice under Section 46(1) of the *Environmental Protection Act 1986* on Centurion North West Pty Ltd's request. This report provides the advice and recommendation of the Environmental Protection Authority (EPA) to the Minister for the Environment on the environmental factors relevant to the proposal.

Section 46(1) of the *Environmental Protection Act 1986* requires the EPA to report to the Minister for the Environment on whether or not the proposed changes to conditions and procedures should be allowed. In addition, the EPA may make recommendations as it sees fit.

### Relevant environmental factors

In the EPA's opinion, the following are the environmental factors relevant to the proposal, which require detailed evaluation in the report.

(a) Soil contamination - containment and prevention of groundwater contamination; and

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

### Conclusion

The EPA has considered the request by Centurion North West Pty Ltd for a change to the Environmental condition to allow Centurion North West Pty Ltd to manage the waste by on-site containment of the waste in a cell, and has concluded that on-site containment of wastes in a cell at the Tonkin Park Stage II site is an environmentally acceptable management option for the waste.

### Recommendations

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

1. That the Minister notes that this report is pursuant to Section 46(1) of the *Environmental Protection Act 1986* and thus is limited to consideration of proposed changes to the original conditions.
2. That the Minister notes the proposed changes are to allow the proponent to contain the waste on-site in an approved cell (as modified to meet the specifications developed during the assessment process) as opposed to the previous requirement that all wastes are removed from the site to an approved landfill site. However, the option for removal of some waste material will remain in place.
3. That the Minister notes that the EPA has concluded that:
    - the request for a change to the Ministerial Condition relating to the remediation option is acceptable;

- the on-site containment of the wastes at the Tonkin Park Stage II site is considered an environmentally acceptable management option for the waste; and
- the Environmental Conditions should also be updated into a consolidated list to reflect current environmental standards and practice.

4. That the Minister imposes the conditions and procedures set out in Appendix 7 of this report, noting that this new set of conditions and procedures would replace the original conditions and procedures set out in Appendix 6.

## Conditions

The EPA recommends that the following conditions, which are set out in formal detail in Appendix 7, be imposed if the proposed on-site containment of wastes in a cell at the Tonkin Park Stage II site is approved:

1. The existing Ministerial Conditions applied to the project (Ministerial Statement 82 dated 25 October 1989), be modified as necessary to:
   - change condition 4 to allow on-site containment of wastes as an environmentally acceptable management option;
   - update the statement into the current format; and
   - ensure compatibility with current environmental protection requirements.
2. Additional conditions apply and require:
   - remediation of Stage II site (Condition 3);
   - a Water Quality Management Plan (Condition 4);
   - an Environmental Management Programme (Condition 5);
   - containment cell management (Condition 6); and
   - commencement of remediation of Stage II site (Condition 8).

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# 1. Introduction and background

The Minister for the Environment has requested the Environmental Protection Authority (EPA) to consider and provide advice, under Section 46(1) of the *Environmental Protection Act 1986* , on the Centurion North West Pty Ltd (the proponent) request to grant a change to the existing Ministerial conditions (Statement 82 of 25 October 1989) on the Tonkin Industrial Park Stage II site in Bassendean. (Figure 1).

Condition 4 of Ministerial approval states that:

*"The proponent shall not proceed with the second stage of the development until wastes at the old pyrites cinders dump (in the south-west corner of the site) together with all other wastes including building rubble are disposed of at a landfill site, to the satisfaction of the EPA"*

The condition does not allow Centurion to treat or contain wastes on the Stage II site. The proponent requests that the existing condition be changed to allow the proponent to remediate the site by using one or a combination of the following remediation options:

- containment on-site, and/or
- disposal at a landfill site.

This report provides the advice and recommendations of the Environmental Protection Authority (EPA) to the Minister for the Environment on the environmental factors relevant to the proposal if a change to the existing condition was granted.

A Section 46 request under the *Environmental Protection Act 1986*, for a change to the Ministerial conditions, was submitted by the proponent to the Environmental Protection Authority in June 1998 so as to allow on-site containment as an additional remediation option to the approved disposal to landfill option. The Section 46 report was released for public review for a period of four weeks from 22 June 1998, closing on 20 July 1998. The Environmental Protection Authority received 10 submissions on the report. In response to submissions, the proponent upgraded the design of the containment cell to meet the Department of Environmental Protection criteria (as set out in schedule 4 of Appendix 7). The Department of Environmental Protection consulted with a number of agencies and sought comments on the conceptual design of the modified cell. The final design of the cell will be prepared as part of an environmental management programme which is to be released for public comment.

The Tonkin Park site is bounded by Collier Road and Railway Parade in Bassendean, and a 2.3 hectare (ha) wedge of land north-east of the site and bounded by Scadden and Iolanthe Streets. The total area of Stages I and II is 42ha.

The Tonkin Park site was previously used for a CSBP superphosphate works which operated for some sixty years and closed in 1970. During that time CSBP stockpiled raw materials and products on-site. In addition, CSBP deposited pyrite cinder wastes and other building rubble on-site resulting in groundwater contamination, mainly by acidic materials, and to a lesser extent, by heavy metals including arsenic, copper, mercury, lead and zinc (Maunsell & Partners, 1988). Most of the manufacturing of fertiliser occurred on the Stage I site immediately east of the Stage II site (Figure 2).

The contaminated groundwater has moved towards the Swan River, contaminating bore water in the Ashfield Flats area. Regional groundwater flow is in a south-east direction and discharge of groundwater to the Swan River occurs via the Chapman Main drain. Groundwater use for domestic and irrigation purposes has been affected in the immediate area.

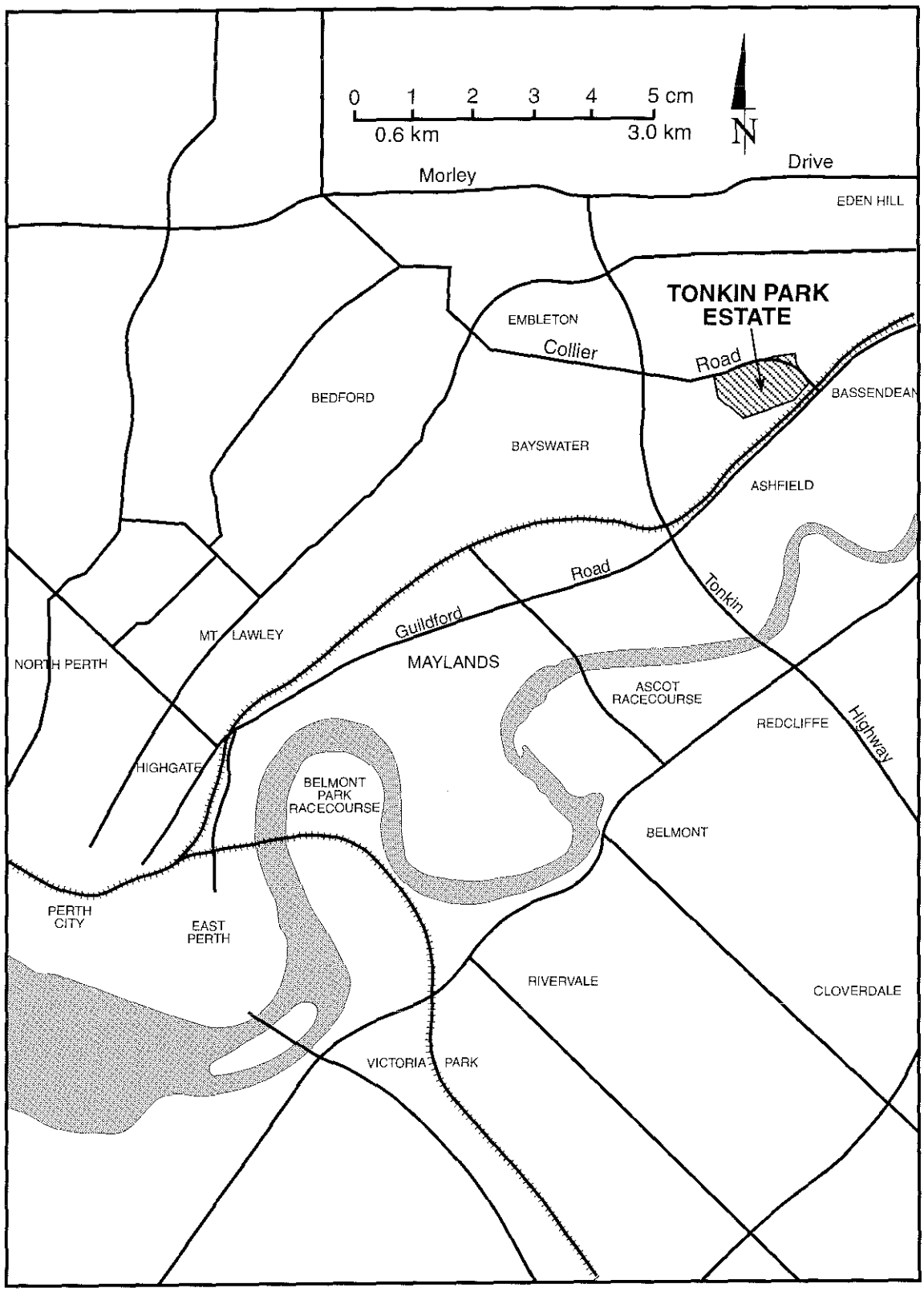


*Figure 1. Location of Tonkin Park Industrial Estate.*

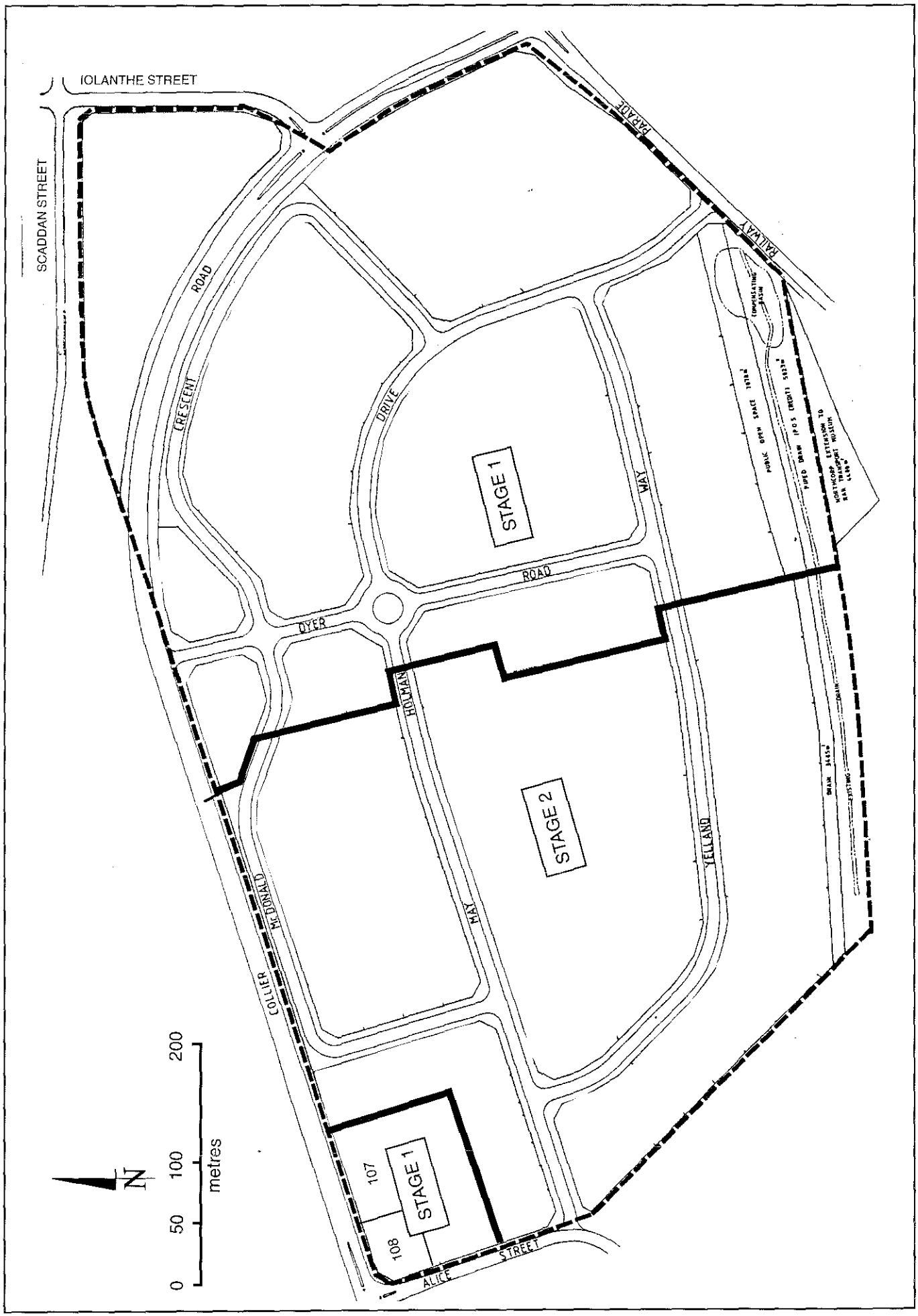


*Figure 2. Location of Tonkin Park Stage I and II development sites.*

In the 1980s, property developer Northcorp purchased the 42ha property with the intention to subdivide and develop the property. In 1988, Northcorp submitted a Public Environmental Review (PER) to the EPA to remediate the site. The PER was released for an 8 week public review period commencing on 14 December 1988 and concluding on 8 February 1989.

Following submissions, it became clear that the original proposal was unacceptable to the Town of Bassendean, as the Town Council would not assume responsibility for the long term management of the proposed drainage system as had been proposed by Northcorp. Northcorp amended the original proposal to a two stage development.

In 1989, Environmental conditions (Statement 82) were established which allowed Northcorp to clear Tonkin Park Stage I for development by relocating Stage I waste material to Stage II. The location of waste within Stage II is shown in Figure 3. As part of this agreement, all wastes from Stage II were to be subsequently relocated off-site to a suitable landfill before Stage II could be subdivided and sold. Development on the 25ha Stage I land, which includes lots 107 and 108, has been completed.

In 1995, Centurion North West Pty Ltd, the proponent, purchased the 17 ha Tonkin Park Stage II site from Northcorp with full knowledge of the Ministerial conditions requiring the removal of all wastes before development. The site is currently undeveloped, and has no services (power, gas, phone). It is zoned as industrial and is surrounded by other industrial properties. The nearest residential property is located approximately half a kilometre away to the north-east. Wastes consisting of pyritic cinders and building rubble are located within a 7 ha low-lying southern portion of the site. The extent of the contamination is estimated to be up to 250,000$m^3$. The remaining northern portion of the site (identified as lots 8494, 1041, 1057, 700 and 6869) (Figure 4) has been investigated and is considered by the Department of Environmental Protection to be suitable for light industrial and/or commercial development, without encumbrances (DEP letter, 1996).

In June 1998, Centurion submitted a Section 46 request which was released for a 4 week public review. The request is for a change to the Ministerial condition 4 on the Tonkin Park Stage II site to allow the proponent to manage the wastes by the use of one or a combination of remediation options, including on-site containment and disposal to landfill.

The EPA's decision to formally assess the proposal was based mainly on the impact of the waste material on public health and the environment, through contamination of soil and groundwater.

Further details of the proposal are presented in Section 2 of this Report. Section 3 discusses environmental factors relevant to the proposal. The conditions and commitments to which the proposal should be subject, if the Minister determines that it may be implemented, are set out in Section 4. Section 5 presents the EPA's conclusions and Section 6, the EPA's recommendations.

Appendix 8 contains a summary of submissions and 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

The request by Centurion North West Pty Ltd, the current proponent, is for a change to Environmental condition 4 to allow the proponent to manage the wastes in an on-site containment cell or in conjunction with off-site disposal of some wastes to landfill, prior to developing the site as a truck loading facility.

The waste material consists of pyritic cinders, raw pyrites and building rubble. The pyritic wastes are compounds of quartz and haematite (an iron-rich mineral), together with small

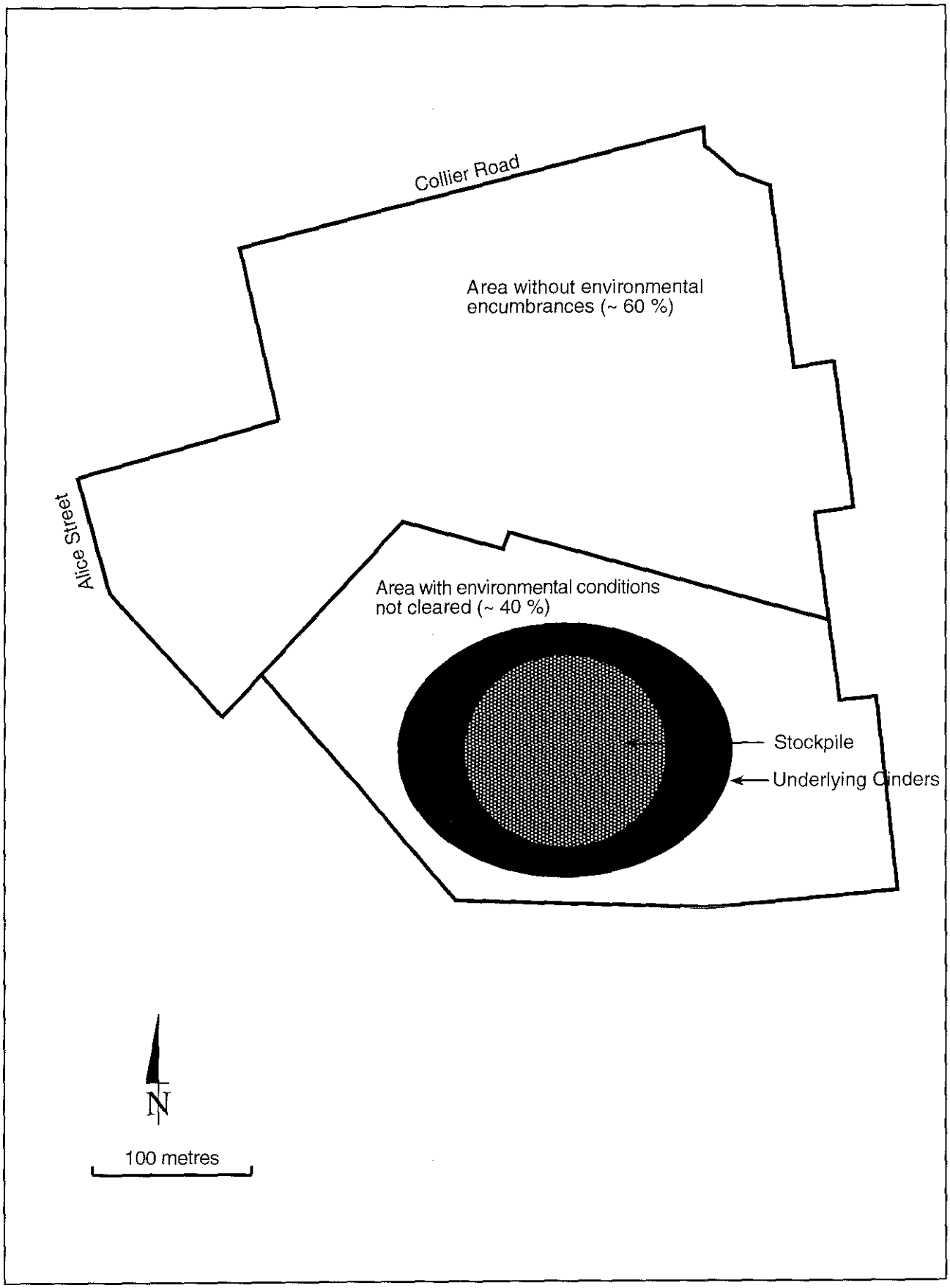


*Figure 3. Location of waste stockpile in southern portion of Stage II site.*

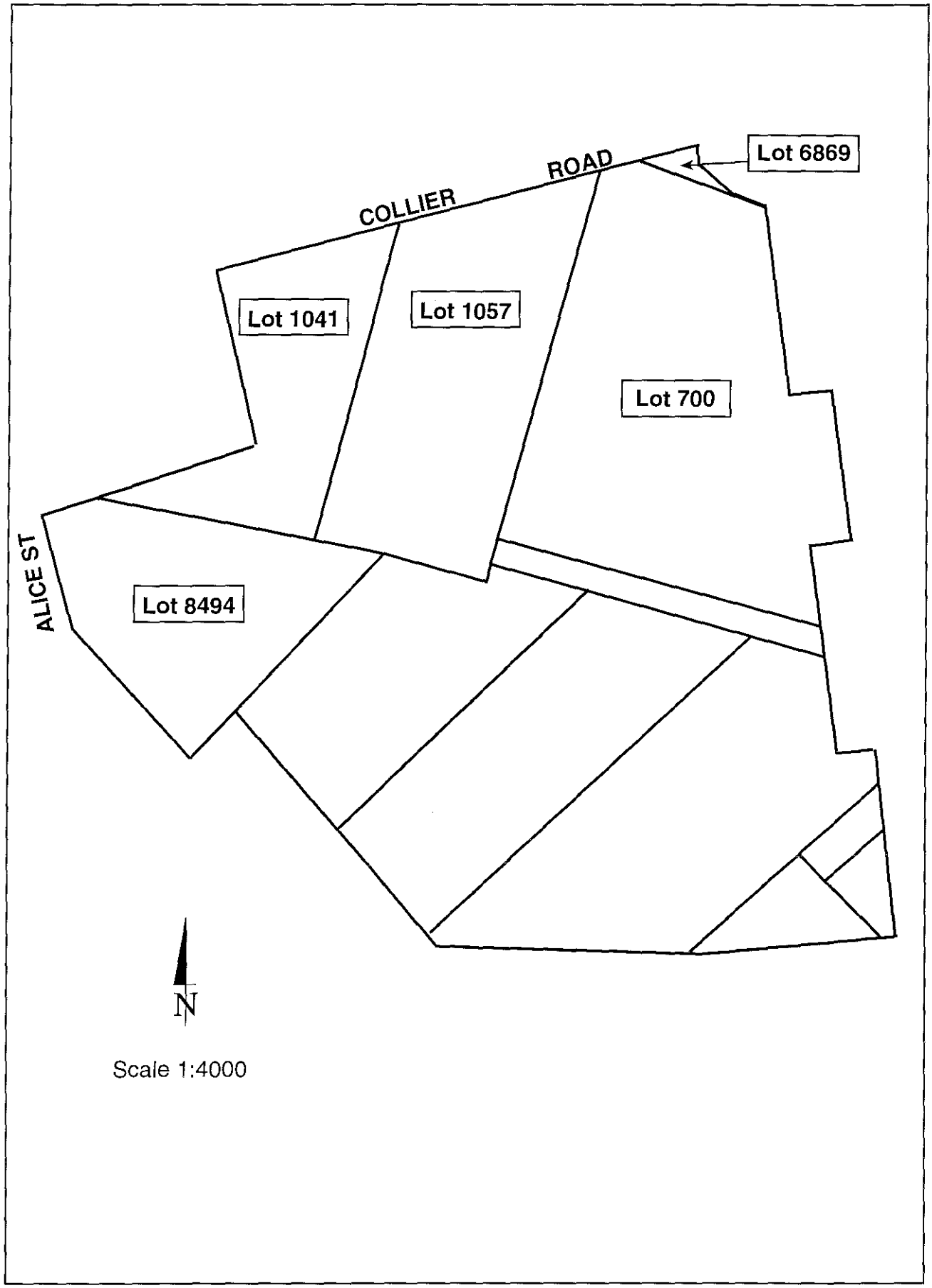


*Figure 4. Location of lots 8494, 1041, 1057, 700 and 6869 on Tonkin Park Stage II site, without environmental encumbrances.*

amounts of sulphur, gypsum, lime and jarosite (iron sulphate mineral). Up to 250,000 $m^3$ of this waste material is located in the southern portion of the Stage II site.

In response to public submissions on the Section 46 report, the proponent has modified the on-site containment cell design and has provided a conceptual plan (Figure 5) to ensure that the cell is designed and constructed for long term stability.

The proponent proposes to construct the modified cell with low-permeability material to prevent loss of contaminants to the environment by seepage. Details of the modified cell design are given below.

Modified Cell design and construction

The cell is to be constructed from low-permeability clay. The conceptual cell design is based on the following components as detailed below:

- excavation of wastes from the water table and relocation to high ground at least 2m above the seasonal high water table;
- backfill excavated area with inert clean fill;
- storage of the waste in a cell with a 50cm compacted clay base and 50cm compacted clay side barriers to cell;
- construction of clay cap with 50cm compacted clay;
- construction of leachate collection and drainage systems in the cell;
- provision of leachate monitoring facility external to the cell; and
- construction of stormwater drainage system.

Development on Stage II site

The proposed development on Stage II land, after remediation, would consist of a truck loading terminal which would have new warehousing, truck loading bays, roadways, and large bitumen-covered parking areas for road trains. Figure 6 shows a conceptual plan of the proposal.

This infrastructure would complement the existing Bayswater terminal which has limited growth potential due to lack of space. The development would also include paved entrances and exits to/from surrounding roads such as Collier Road and Alice Street.

Any change to the conceptual plan is to be referred to the EPA for consideration. If there are no significant environmental impacts from any such change, further formal assessment may not be required.

A summary of the key characteristics of the proposal is presented in Table 1. A detailed description of the proposal is provided in Section 4 of the Section 46 report (ERS, 1998).

Since the release of the Section 46 report, modifications to the request have been made by the proponent in response to submissions. This includes:

- submission of a modified conceptual plan of the design of the on-site containment cell to meet the requirements of the EPA.

Table 2 shows a comparison of the original cell structure proposed in the Section 46 report and the modified cell structure in response to public submissions.

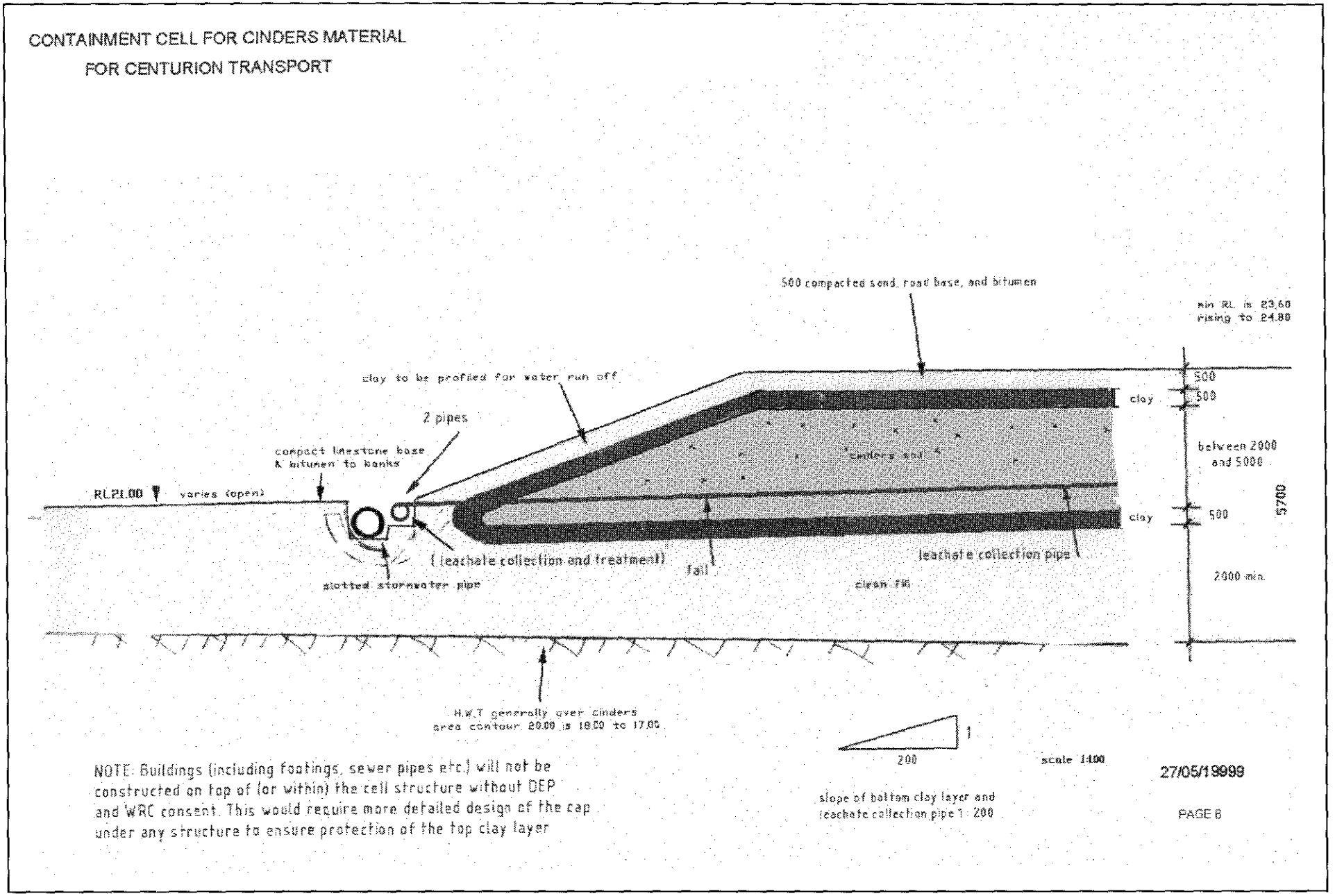


*Figure 5. Conceptual plan showing cross-section of on-site containment cell.*

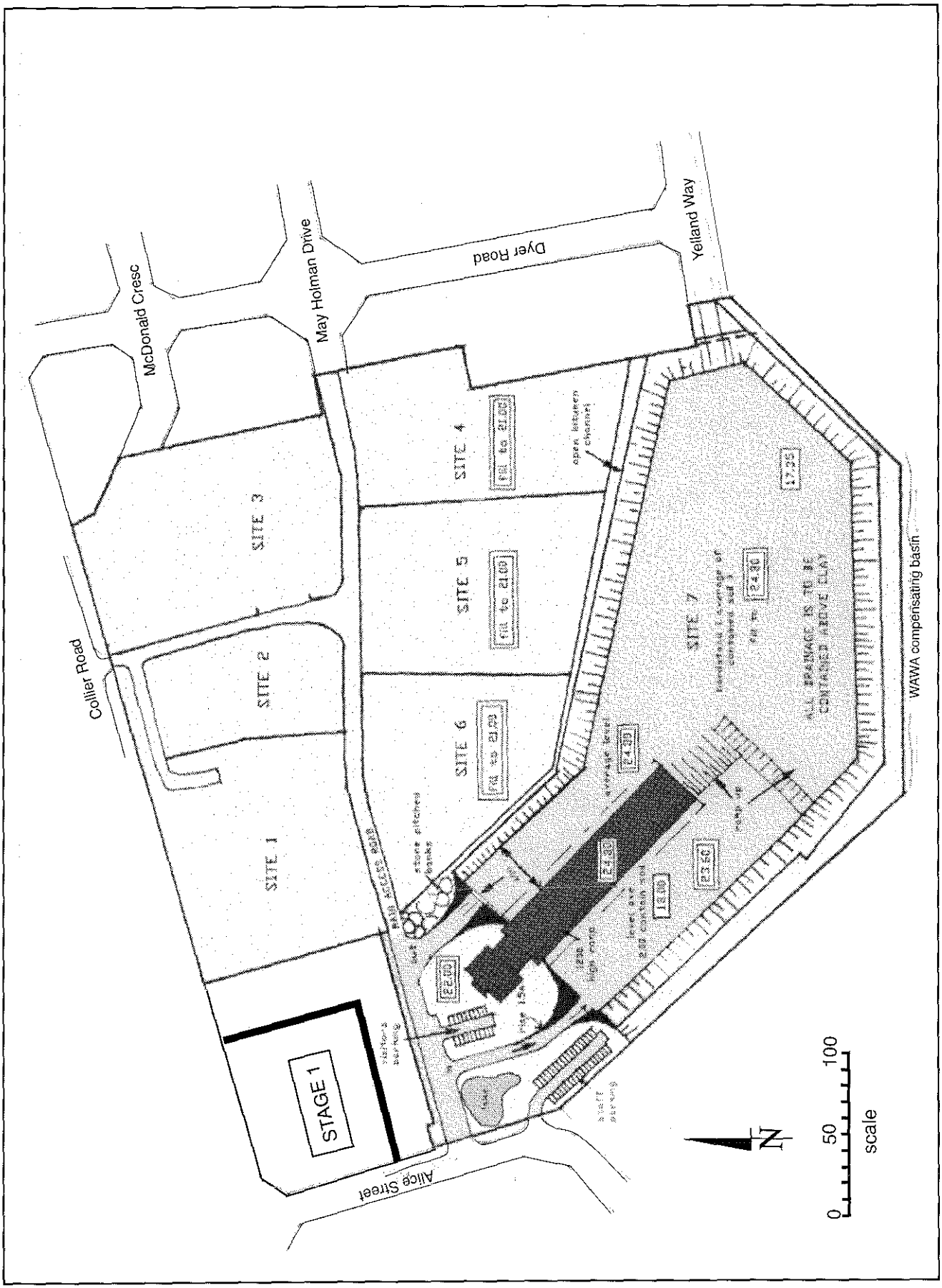


*Figure 6. Location of proposed truck loading terminal.*

**Table 1. Summary of key proposal characteristics**

| Element | Description |
|---|---|
| SITE IDENTIFICATION | The development site is Tonkin Park Stage II and is part of Tonkin Industrial Park site which has an area of 42 ha and is bounded by Collier Road to the north and east, Alice Street to the west, and a drain reserve and Railway Parade to the south. It also includes a 2.3ha wedge of land to the north of Collier Road bounded by Scadden and Iolanthe Streets.<br>Tonkin Park Stage I is 25ha in area and is located in the eastern half of the site, with the addition of Lots 107 and 108 in the north-west corner of the site. Stage I has been developed, including lots 107 and 108.<br>Tonkin Park Stage II is 17ha in area and is located in the remaining western portion. |
| QUANTITY OF WASTES ON SITE | 300 000 to 500 000 tonnes (or 150 000$m^3$ to 250 000$m^3$) |
| Proposed changes to conditions and procedures (Section 46 request) Stage II site<br>MODIFIED CELL DESIGN | • excavate wastes from the water table and relocate to high ground at least 2m above the seasonable high water table;<br>• backfill excavated area with 2m inert clean sand;<br>• store wastes on a 50cm compacted clay base liner;<br>• cell cap and side barriers to be 50cm compacted clay;<br>• grade cell base for leachate collection and treatment;<br>• construct leachate monitoring facility; and<br>• construct stormwater drainage system. |
| TRUCK TERMINAL FACILITY | • truck loading bays;<br>• warehousing;<br>• roadways; and<br>• bitumen-covered parking areas for road trains. |

The potential impacts of the proposal initially predicted by the proponent is detailed in the Section 46 document (ERS, 1998) and summarised in Appendix 3.

**Table 2. Comparison of original cell proposed in Section 46 report to modified cell**

| Design component | Original design | Modified design |
|---|---|---|
| separation distance between the base of cell and the seasonal high water table | 1 metre | 2 metre |
| cell base | 10cm limestone | 50 cm compacted clay |
| vertical barriers or sides of cell | nil | 50 cm compacted clay |
| cell cap | 10cm limestone | 50 cm compacted clay |
| leachate collection and treatment system | nil | yes |
| leachate monitoring facility | nil | yes |
| cap cover | mixture of bitumen, gravel, limestone | 50 cm compacted clay and 1m sand, road base and bitumen. |
| neutralising wastes | yes | no - not required as containment design now minimises water intrusion and hence leachate generation. |

## 3. Relevant environmental factors

Section 46 of the *Environmental Protection Act 1986* requires the EPA to report to the Minister for the Environment on whether or not the proposed changes to conditions or procedures should be allowed. In addition, the EPA may make recommendations as it sees fit.

The relevant environmental factors considered by the EPA in its previous (1989) assessment of the proposal were:

- noise and dust control;
- increased traffic flows; and
- site decontamination.

As a result of the proponent's request for a change to Environmental condition 4 to allow the proponent to manage the wastes in an on-site containment cell or in conjunction with off-site disposal to landfill, the EPA has considered that the key environmental factors are now:

- soil contamination - containment and prevention of groundwater contamination; and
- water quality - groundwater quality flowing to the Swan River.

and that factors relating to noise, dust and traffic flows can be adequately managed via proponent commitments (Commitments 19 to 23: Appendix 7). Those factors therefore do not require further detailed consideration in this report.

The EPA sought comments and advice from the Water and Rivers Commission, the Department of Environmental Protection and the Health Department of Western Australia on whether on-site containment of waste at the Tonkin Park site in a cell, as proposed in the conceptual plan (Figure 5), could be considered environmentally acceptable, and any new environmental issues which should be considered if the request for a change to the conditions were granted. The EPA also sought independent advice on whether on-site or off-site treatment of the wastes at the Tonkin Park site was practical.

The EPA notes that the issues raised in advice received from government agencies relate to long term monitoring of cell integrity and land use above the cell cap. These issues have been addressed in the updated conditions and through additional commitments made by the proponent.

The identification process for the relevant factors is summarised in Appendix 3.

Detail on the relevant environmental factors and their assessment is contained in Sections 3.1 and 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.

A summary of the assessment of the environmental factors is presented in Appendix 4.

## 3.1 Soil contamination

### Description

Up to 250,000 $m^3$ of contaminated material consisting of pyritic cinders, raw pyritic material and other building wastes are located within a low-lying southern portion of the Stage II site. This material becomes immersed in groundwater during winter due to the rise in the water table. It is estimated that the volume of contaminated material on the stage II site could be between 150,000$m^3$ and 250,000 $m^3$, which is approximately 300,000 and 500,000 tonnes respectively, based on a bulk density of 2 tonnes/$m^3$ (ERS, 1988). The remaining northern portion of the site (identified as lots 8494, 1041, 1057, 700 and 6869) (Figure 4) has been investigated and is suitable for light industrial and/or commercial development without encumbrances (DEP letter, 1996).

The pyritic wastes are compounds of quartz and haematite (an iron oxide mineral), together with small amounts of sulphur, gypsum (calcium sulphate), lime (calcium carbonate) and jarosite (iron sulphate mineral).

Soils have been contaminated with heavy metals arsenic, copper, lead and zinc which exceed the Dutch 'C' environmental investigational levels (Schedule 3 of Appendix 7) used for industrial land use (Granherne, 1995). Arsenic and copper, in particular, would pose a risk to the Swan River, if contaminated groundwater was to enter the ecosystem. Due to the non-homogeneity of the pyritic waste material, the concentration of heavy metals varies between sampling sites.

The main risk of soil contamination at the Tonkin Park Stage II 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 manage the impact of soil contamination on groundwater and the environment, the proponent has investigated a number of remediation options including:

(a) on-site and/or off-site treatment;

(b) disposal to landfill; and

(c) on-site containment in a cell.

Of these options, the proponent has proposed to manage the wastes in an on-site containment cell or in conjunction with off-site disposal of some contaminated material to landfill, if practical.

During the EPA assessment, an external consultant, Central Chemical Consulting (Central Consulting, 1999) was engaged to provide independent expert advice to the EPA on on-site/off-site treatment technology. The EPA provides the following discussion based on the advice of Central Chemical Consulting.

On-site/off-site treatment methods available for soils contaminated with heavy metals are generally based on:

(a) separation of a metal concentrate;

(b) immobilisation;

(c) containment of all or a portion of the contaminated soil.

Often a combination of two or more of these remediation options are used at a single contaminated site. The separation techniques commercially available to isolate metal-contaminated soil include soil flushing, electro-osmosis, soil washing/particle separation and pyrometallurgy. Immobilisation techniques available for the treatment of metal-contaminated soils are solidification/stabilisation, or in extreme cases vitrification. Containment technologies include capping and the use of vertical and/or horizontal barriers.

On-site/off-site treatment of wastes at the Tonkin Park Stage II site appears to be technically feasible with the most likely treatment option involving size classification, either by itself or in conjunction with magnetic separation. However, this technique may not be practical to treat the wastes at Tonkin Park due to the lack of uniformity of the stockpile in relation to contaminant levels and the size distribution of particles.

The proponent has considered treatment options such as heavy metal separation techniques including sizing followed by either gravity and/or magnetic separation, soil washing, and/or flotation. The proponent considers that the heavy metal separation techniques are more effective and feasible to use on soil contaminated with either a single metal or a few metals. In the case of the Tonkin Park material, where the contaminated material contains a range of heavy metals with variable concentration levels, the use of these separation techniques is limited and not practical.

The proponent has also considered on-site containment as a waste management option and has subsequently upgraded the cell design, following the release of the S46 report. A conceptual plan of the cell design is given in Figure 5.

The on-site containment option involves:

- excavating the pyritic material from the water table and relocating to high ground;
- backfilling the excavated area with 2m of clean fill;
- constructing an on-site containment cell from clay, with a leachate collection system, to ensure complete encapsulation of pyritic cinders.

The proposed cell will consist of a 50cm compacted clay liner placed at least 2m above the seasonal high water table on clean compacted sand-fill. The excavated pyritic material will be stored on this liner.

The cell cap will consist of a 50cm impervious clay layer and will be constructed to engineering specifications to meet a hydraulic conductivity (k) of $1x10^{-9}$ m/s or better. A minimum cover of 1m of compacted sand, road base and bitumen will be placed on top of the cell cap to protect the cap integrity. The cap will be further protected by restricting incompatible land uses over the cap. It is currently proposed that this area be used as a warehouse, parking area and hardstand.

The proposed design of the cap and the protection layer of 1m of sand and bitumen above the cap will significantly reduce the risk of water intrusion into the cell and contact of water with the wastes.

The final design and construction of the cell will be based on the conceptual design to meet the requirements of the Environmental Protection Authority as set out in Schedule 4 of the draft Environmental Statement attached to this report (Appendix 7).

On completion of the site remediation, the proponent will carry out site validation tests to demonstrate that the site has been remediated to the appropriate level for industrial land use.

### *Submissions*

Submissions from government agencies and the public expressed concern regarding the inadequacy of the original design of the containment cell as proposed in the S46 report and the lack of information on the nature of the wastes and the extent of contamination on the site.

Some public submissions indicated that on-site containment was not opposed providing the cell was constructed to an appropriate design standard and appropriate management practices were established to monitor the integrity of the structure.

In response to submissions, the proponent has modified the cell design. Further submissions from government agencies support, in principle, the modified conceptual cell design. Submissions on the original and modified cell are summarised in Appendix 3.

Additional comments were made regarding the contaminated sediments in the compensation basins adjoining the Tonkin Park Stage II site (Figure 7). It was suggested that the two compensation basins located in the south-east corner and external to the site boundary should be remediated to reduce impact on the Swan River. These basins are external to the Tonkin Park Stage II site and are not considered to be part of the project area. Therefore, the proponent is not required to remediate land outside the project area.

### Assessment

The area considered for assessment of this factor of soil contamination is the Tonkin Park Stage II site in Bassendean bounded by Collier Road to the north and located between Alice Street to the west and Dyer Road to the east.

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.

According to EPA Guidance Statement No.17, the preferred hierarchy approach for site remediation 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. In practical terms, remediation methods usually involve disposal to an approved landfill and 'cap and contain' measures.

Waste characterisation

The EPA recognises that it is not possible at this stage, for the proponent, to accurately determine the amount of waste likely to be contained on-site in the proposed cell and/or removed off-site to a landfill site.

The EPA considers that the proponent would need to carry out further investigations on the southern portion of the site to determine the extent of contamination and the volume of waste to be remediated. This additional information would provide better knowledge of the quantity of the contaminated stockpile to be contained, prior to finalising the design capacity of the cell.

Disposal to landfill option

The EPA recognises that disposal of all contaminated material to landfill, as required under the existing conditions, may not be practical due to the quantity of wastes involved.

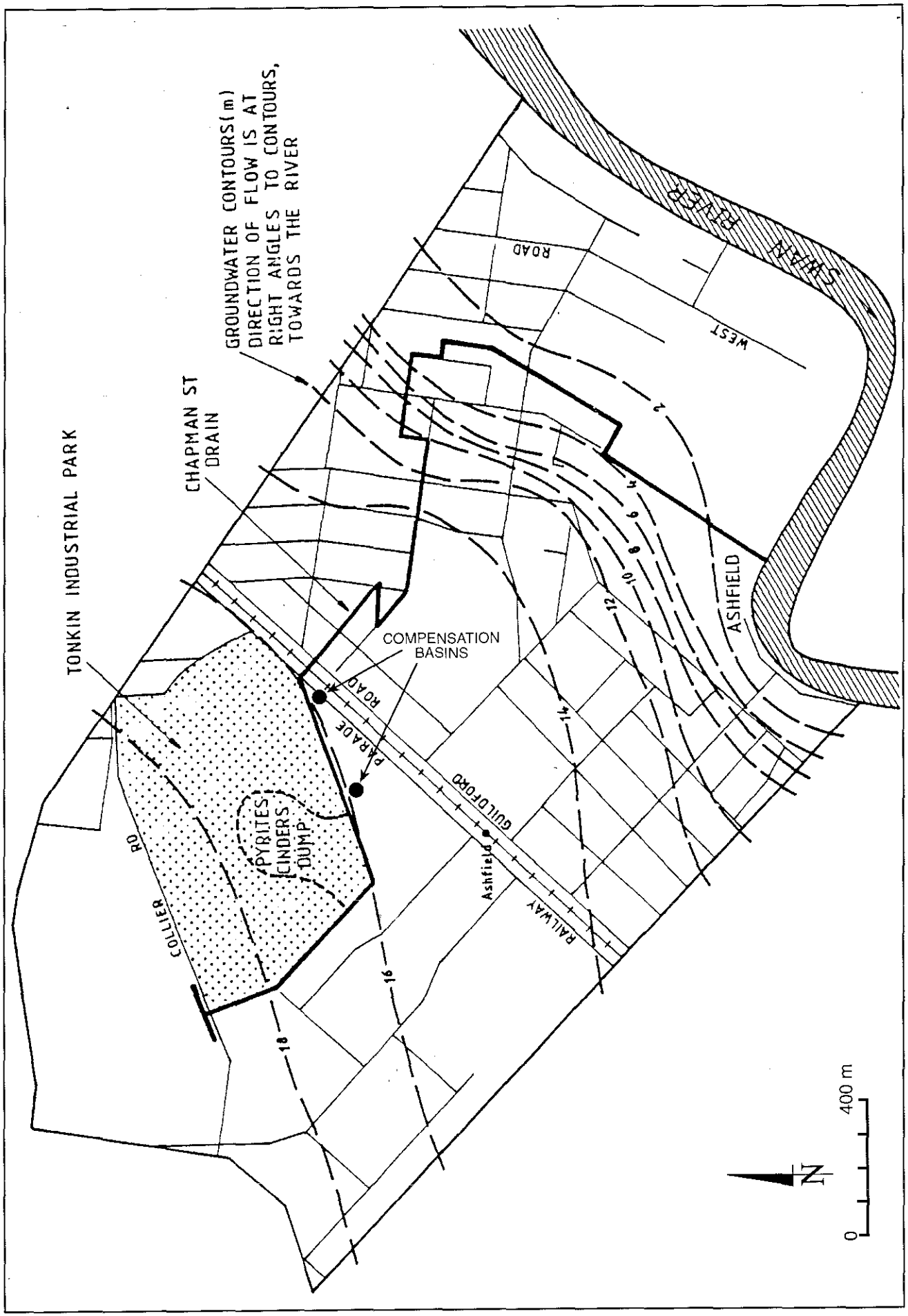


*Figure 7. Direction of drainage flow to Swan River from Tonkin Park site.*

On-site containment

The EPA considers, on advice of the Water and Rivers Commission, the Department of Environmental Protection and the Health Department of Western Australia, that the proposed on-site containment cell, as modified to the criteria as set out in Schedule 4 in the recommended Environmental Conditions (Appendix 7), is acceptable.

The EPA understands that although the on-site treatment technology is theoretically feasible, it has not been practically applied to the type and volume of wastes present on the site. The EPA recognises that disposal of wastes to landfill would be cost prohibitive to the proponent and would result in problems with transport of the wastes off-site. Given that there is an existing groundwater contamination plume, as a result of the waste being unmanaged for many years, and given the nature and quantity of the wastes, the EPA considers that on-site containment of the waste would be the most practical means of managing the waste.

The EPA recognises that excavation of contaminated material from the water table and relocating to high ground will reduce the contact of the material with groundwater and will reduce leaching of metals to the environment.

The EPA considers that a clay cap and a 1 m cover of inert sand and bitumen over the cell cap will reduce the potential risk of damage to the cell cap.

Following remediation of the site by on-site containment of the wastes and/or disposal of some wastes to landfill, the EPA considers that validation of the site to Dutch 'C' criteria will be acceptable for industrial use. This Section 46 change to proposal is to allow 'cap and contain', however this does not prevent some material being taken off-site as previously approved.

In summary, the EPA considers that containment of wastes within the modified cell design (Figure 5) is an acceptable option to manage the wastes on site and that approval of the final cell structure is subject to the proponent complying with recommended Environmental conditions 3, 4, 5 , 6 and 8 (Appendix 7). Condition 3 relates to the remediation of the Stage II site, condition 4 requires the proponent to prepare a water quality management plan, condition 5 requires an Environmental Management Programme, condition 6 requires that the cell be designed and constructed to the requirements of the EPA as set out in schedule 5 of the draft Ministerial statement and condition 8 requires the proponent to commence the construction of the cell within 3 years of the date of the Ministerial statement.

The EPA considers that the existing Environmental condition 4 (Appendix 6) can be replaced with Environmental conditions 3, 4, 5, 6 and 8 (Appendix 7) and that the proposal to contain the wastes in an on-site cell can be managed under the amended Environmental conditions to meet the EPA's objective provided that the proponent:

- prepares an Environmental Management Programme (EMP) (recommended Environmental Condition 5, Appendix 7) to the satisfaction of the Environmental Protection Authority, and which addresses the following issues:
  - extent of contamination;
  - waste management;
  - cell design;
  - cell construction;
  - dust and noise management;
  - contingency plan/leachate management;
  - transport management; and
  - site remediation validation tests.

- places memorial on title with as built construction plans of cell (recommended Environmental Condition 6, Appendix 7);
- prepares and implements a plan for the ongoing maintenance of the cover over the cell (recommended Environmental Condition 6, Appendix 7);
- complies with restriction on development of infrastructure and services over cell area (recommended Environmental Condition 6, Appendix 7);
- undertakes site validation tests, prior to development of site (recommended Environmental Condition 3, Appendix 7).

The EMP would be required to be released for public review for a minimum period of 2 weeks.

In response to public submissions, the proponent has made commitments to carry out further site investigations to estimate the quantity of waste to be stored on-site in a containment cell and/or be removed to landfill (Commitment 1), to prepare a cell construction plan (Commitment 2) and to construct the containment cell (Commitment 9) to the requirements of the EPA.

The proponent has also made commitments to contract qualified and reputable professionals in the engineering and environmental fields to carry out the clean-up works (Commitment 5) and to assess the long term performance of the cell by preparing and implementing a leachate management plan and to monitor the quantity and quality of leachate derived from the cell (Commitments 13 and 14)

In addition, the proponent has made further commitments to monitor water quality to determine the potential short term and long term impact of the contained waste material (Commitments 15, 16 and 17).

Development of a truck terminal facility

The EPA considers that the proposed use of the site, particularly above the cell structure, as a truck terminal facility is acceptable subject to the proponent preparing a final detailed plan of the truck terminal facility to the requirements of the EPA and recommended Environmental conditions 6-6 to 6-9 being imposed on the proponent.

***Summary***

Having particular regard to the:

(a) upgraded design of the cell;

(b) proponent's commitments to carry out additional site investigations, prepare an environmental management plan, monitor quantity and quality of leachate in the cell, monitor groundwater and surface water quality, prepare a contingency and leachate management plan, if monitoring of the containment cell indicates that cell performance is not acceptable to the EPA, maintain cover over the cell on an ongoing basis, protect cell integrity and comply with restriction on development of infrastructure and services over cell area;

(c) advice from the WRC, Health Department and the independent expert advice on treatment options; and

it is the EPA's opinion that the containment of wastes on-site can be managed to meet the EPA's environmental objective for soil contamination which is to ensure the rehabilitation of the site to an acceptable standard that is compatible with the intended land use, consistent with appropriate criteria.

## 3.2 Water quality

### Description

Groundwater under and downgradient of the site is contaminated by heavy metals. Contaminated groundwater has moved towards the Swan River, has contaminated bore water in the Ashfield Flats area and therefore poses a risk to the Swan River. Groundwater discharge to the Swan River is via the Chapman Street Main drain (Figure 7).

In 1988, groundwater studies at Tonkin Industrial Park site in Bassendean showed that groundwater within the shallow aquifer has low pH values and is contaminated with heavy metals at concentrations above those typically found in Bassendean sands (Maunsell and Partners, 1988).

Further studies (ERS, 1998) of groundwater collected from three monitoring bores located within the shallow aquifer at Tonkin Park also showed that groundwater quality was affected. The main cause of groundwater contamination is due to leaching of the pyritic material. Leaching is greater in winter when the pyrites become immersed in the groundwater due to a high water table. Leaching also occurs when rainwater infiltrates through the waste stockpile. Groundwater contamination will continue at Tonkin Park, unless steps are taken to reduce the rate of oxidation of the pyrites, and/or to reduce the rate of water movement through them. Studies also show that groundwater leaving the site has higher levels of heavy metals than that entering and upgradient of the site.

Water quality monitoring of the Chapman Main drain downstream of the pyritic waste dump from 1971 to 1987 showed elevated concentrations of heavy metals compared to water quality up gradient of the pyritic waste stockpile on the Stage II site (ERS, 1998).

The primary concern with the Chapman Street drainage system is that it is subject to recharge by the local groundwater and contaminated groundwater can discharge directly to the Swan River. Regional groundwater flow is in a south-east direction towards the Swan River. The rate of groundwater flow (or the hydraulic conductivity of the aquifer) is about 5m per day (Maunsell and Partners, 1988). Groundwater discharge to the Chapman Street Main drain is greater in winter.

Local groundwater use is mainly for irrigation purposes. Groundwater is drawn either from the Bassendean sands or from sand beds within the Guildford Formation. The Bassendean sands are the near surface sediments and consist of leached quartz sands which overlie clays, sands and gravels of the Guildford Formation. The sands are porous and have low attenuation capacity to retain heavy metals.

Given the above characteristics of the soil type and waste stockpile at the site, it is evident that leaching is the main factor leading to groundwater contamination. Contamination can be reduced significantly by isolating the waste pyritic cinders from the groundwater and minimising or preventing water intrusion into the stockpile.

### *Submissions*

A number of submissions raised concerns regarding the lack of detail on the proposed groundwater monitoring. However, these concerns have been addressed as a result of the upgraded design of the proposed cell. It was suggested by the Water and Rivers Commission that there was no need to monitor groundwater in the vicinity of the site. Monitoring cell leachate quality in the cell toe drain would be a more effective means of assessing the efficiency of the cell and the potential for waste material to be released before it reaches the groundwater.

Concerns were also raised about the potential impact of contaminated groundwater reaching the Swan River via the Chapman Street main drain. It was suggested that monitoring surface water quality in the Chapman Street main drain would be a more effective means of assessing the potential impact of off-site export of contaminants via subsurface groundwater flows to the Swan River.

## Assessment

The area considered for assessment of this factor is the Tonkin Park Stage II site in Bassendean bounded by Collier Road to the north and located between Alice Street to the west and Dyer Road to the east and the contaminated groundwater downgradient 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 consistent with the draft WA Guidelines for Fresh and Marine Waters (EPA, 1993).

The EPA notes that the waste at the Tonkin Park Stage II site has affected the quality of groundwater downgradient of the site and is causing ongoing contamination. The EPA also notes that groundwater contamination has affected the beneficial use of groundwater near the Tonkin Park site and in the Ashfield Flats area.

However, contaminant release to the groundwater will be reduced once the pyritic material has been secured in an appropriate containment cell.

The EPA considers that excavating the pyritic material from the water table and relocating it to high ground, at least 2 metres above the seasonal high water table level, will **reduce** contact with the groundwater and, in turn, reduce leaching.

The containment of the pyrites within a clay cell structure as proposed in the conceptual plan (Figure 5), will prevent any significant contact of water with the pyritic wastes. In addition, a leachate collection system will be incorporated into the cell design construction. This will allow on-going monitoring of the cell performance, early detection of cell leakage, and treatment and disposal of the leachate collected. The EPA notes the advice provided by the Water and Rivers Commission that "the contained waste is not considered likely to generate significant quantities of leachate once encapsulated" and "that monitoring the quality and quantity of water in the toe drain will indicate whether the containment cell is working effectively" (WRC letter, 1999).

The EPA also notes the advice provided by the Swan River Trust that surface water be monitored in the Chapman Street main drain to ensure that drainage from the area is not having an adverse impact on the Swan River.

In response to public submissions, the proponent has made commitments to monitor cell performance (commitments 13 and 14) by measuring the volume and quality of leachate produced in the cell. The proponent has also made a commitment to monitor groundwater adjacent to the site to identify and monitor any changes in groundwater quality resulting from the on-site containment cell (commitment 17) and to monitor surface water in the Chapman Street main drain (commitment 16) to identify the potential risk to the Swan River. The proponent will ensure that appropriate design and treatment measures are implemented by using professional consultants (commitment 18).

Given the proponent's commitments and the proposed design of the upgraded on-site cell, the EPA considers that contaminant release will be reduced and groundwater quality at the Tonkin Park site will ultimately improve so that the long term risk to the Swan River will be managed to acceptable levels.

### *Summary*

Having particular regard to the:

(a) modified design of the cell;

it is the EPA's opinion that the proposal can be managed to meet the EPA's environmental objective for protection of water quality, which is to improve the quality of groundwater to ensure that existing and potential uses, including ecosystem maintenance are protected, consistent with the draft WA Guidelines for Fresh and Marine Waters.

# 4. Conditions and commitments

Section 46 of the *Environmental Protection Act 1986* requires the EPA to report to the Minister for the Environment on whether or not the proposed changes to conditions and procedures should be allowed. 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 recommended draft Environmental conditions in this report and consolidated proponent commitments (Appendix 7) supersede the original commitments included in Appendix 6.

## 4.1 Proponent's commitments

The proponent's commitments set out in the Section 46 request and subsequently modified, as shown below (Appendix 7), should be made enforceable conditions. It should be noted that some of the original commitments have been superseded as indicated in Appendix 5.

## 4.2 Recommended conditions

Having considered the proponent's commitments and the information provided in this report, the EPA has developed a set of conditions which the EPA recommends should be imposed if the proposal by Centurion North West Pty Ltd to remediate the Tonkin Park Stage II site by on-site containment of waste in a cell, is approved for implementation. These conditions are presented in Appendix 7. Matters addressed in the conditions include:

(a) the proponent shall fulfil the commitments in the Consolidated Commitments statement set out as an attachment to the recommended conditions;

(b) deletion of Ministerial Condition 4 and inclusion of additional project specific conditions set out in Appendix 7 which require:

- remediation of Stage II site (Condition 3);
- a Water Quality Management Plan (Condition 4);
- an Environmental Management Programme (Condition 5);
- containment cell management (Condition 6); and
- commencement of remediation of Stage II site (Condition 8).

(c) in order to manage the relevant environmental factors and the EPA's environmental objectives contained in this bulletin and subsequent conditions and procedures authorised by the Minister for the Environment, the proponent shall demonstrate that there is in place an Environmental Management Programme (EMP) which includes the following elements:

1. An environmental policy and corporate commitment to it;

2. Mechanisms and processes to ensure:
   - planning to meet environmental requirements
   - implementation and operation of actions to meet environmental requirements
   - measurement and evaluation of environmental performance; and
3. A mechanism for continuous review and improvement of environmental outcomes.

The EMP will be released for a two week public review.

## 5. Conclusions

The EPA has considered the request by Centurion North West Pty Ltd for a change to the Ministerial conditions to allow Centurion North West Pty Ltd to manage the waste by on-site containment of the waste in a cell, and has concluded that on-site containment of wastes in a cell at the Tonkin Park Stage II site is considered an environmentally acceptable management option for the waste subject to satisfactory implementation of Ministerial Conditions including proponent commitments.

## 6. Recommendations

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

1. That the Minister notes that this report is pursuant to Section 46(1) of the *Environmental Protection Act 1986* and thus is limited to consideration of proposed changes to the original conditions.
2. That the Minister notes the proposed changes are to allow the proponent to contain the waste on-site in an approved cell (as modified to meet the specifications developed during the assessment process) as opposed to the previous requirement that all wastes are removed from the site to an approved landfill site. However, the option for removal of some waste material will remain in place.
3. That the Minister notes that the EPA has concluded that:
    - the request for a change to the Ministerial Condition relating to the remediation option is acceptable subject to satisfactory implementation of Ministerial Conditions;
    - the on-site containment of the wastes at the Tonkin Park Stage II site is considered an environmentally acceptable management option for the waste; and
    - the Environmental Conditions should also be updated into a consolidated list to reflect current environmental standards and practice.
4. That the Minister imposes the conditions and procedures set out in Appendix 7 of this report, noting that this new set of conditions and procedures would replace the original conditions and procedures set out in Appendix 6.

# Appendix 1

## References

Central Chemical Consulting (1999) *Evaluation of remediation choices for pyritic cinders on the Tonkin Park Stage II site*. Report to the DEP, April 1999.

DEP (1996a) *Landfill Waste Classification and Waste Definition.* Department of Environmental Protection, Government of Western Australia, September, 1996.

DEP (1996b). *Land Development Sites and Impacts on Air Quality, A Guideline for the Prevention of Dust and Smoke Pollution from Land Development Sites in Western Australia*, Department of Environmental Protection, November 1996.

DEP (1996c) *Assessment of Soil Quality for Proposed Land development:* Letter from DEP to Environmental Risk Solutions.

DEP (1997a) *Contaminated Sites, A Public Position Paper - Assessment and Management of Contaminated Land and Groundwater in Western Australia*, May 1997.

DEP (1997b) *Policies, Guidelines and Criteria for Environmental Impact Assessment, A Site Remediation Hierarchy for Contaminated Sites*, No. 17, Interim Policy, Environmental Protection Authority, July 1997.

DEP (1997c). *Environmental Protection (Noise) Regulations*, Department of Environmental Protection, 1997.

EPA (1993). *Draft Western Australian Water Quality Guidelines for Fresh and Marine Waters.* Environmental Protection Authority Bulletin 711, October 1993.

EPA (1998). *Guidelines for Section 46 Change to Environmental Conditions, Tonkin Industrial Park Stage II, Bassendean (Assessment No. 1201),* Environmental Protection Authority, May 1998.

Environmental Risk Solutions (1996). *Soil Investigation and Assessment Report, Tonkin Park Stage II, Lots 8494, 1041, 1057, 700 and 6869.*

Environmental Risk Solutions (1998). *Tonkin Park Stage II, Bassendean- Request for Section 46, Changes to Minister's Conditions and Proponent Commitments.*

Granherne Pty Ltd (1995). *Evaluation of Management Options for Pyrites-containing Soils*, Centurion North West Pty Ltd - Tonkin Park Stage II, November 1995.

Maunsell and Partners Pty Ltd (1988). *Northcorp Ltd, Tonkin Industrial Park Bassendean.* Public Environmental Review, December 1988.

WRC (1999). *Proposed Containment Structure for Pyritic Wastes, Tonkin Industrial Park.* Letter dated 31 May 1999.

# Appendix 2

## List or organisations and individuals who made submissions

## List of organisations who made submissions

**Public:**

Town of Bassendean

Bassendean Preservation Group

Eastern Metropolitan Regional Council

Minim Cove Protection Group

Conservation Council of Western Australia

**Government:**

Water and Rivers Commission and Swan River Trust

Health Department of Western Australia

Department of Environmental Protection

**Individuals:**

Ruth Ireland

Gregory Peterson

# Appendix 3

## Summary of Identification of Relevant Environmental Factors

## Appendix 3. Summary of Identification of Relevant Environmental Factors

| Preliminary Environmental Factor | Characteristics related to Changes | Government Agency and Public Comments | Identification of Relevant Environmental Factors |
|---|---|---|---|
| **Pollution Management** | | | |
| **Soil contaminants** | **Original proposal in S46 report:**<br>**Cell Construction**<br>The proponent proposed to construct an on-site containment cell to store up to 250, 000 cubic metre of waste by:<br>• excavating the waste from the water table and relocating to high ground at least 1 m above the seasonal high water table;<br>• neutralising the waste;<br>• placing waste on a 10cm thick limestone liner or barrier layer used to isolate groundwater from waste stockpile;<br>• covering the waste with a 10cm thick limestone liner;<br>• capping with a permanent bitumen or concrete layer; and<br>• diverting stormwater from bitumen-covered area; | **Government Agencies:**<br>**Health Department**<br>• The upgraded proposal appears to provide a means of effective contamination control at the site;<br>• The Health Department would not object to the on-site containment if the contaminants present were maintained within a sealed enclosure with a monitoring programme and appropriate safeguards to confirm integrity of the structure;<br>• There would be little or no risk to public health, if the upgraded cell structure was impermeable.<br>**Water and Rivers Commission**<br>• The proponent has addressed the hierarchy of remediation options by discussing the on-site treatment option to reduce the contaminants to acceptable levels;<br>• The upgraded cell design is considered appropriate and addresses the issues raised earlier regarding;<br>• Waste contained in the upgraded cell is not considered likely to generate significant quantities of leachate;<br>• The leachate monitoring system will provide data on the cell performance and removes the need for groundwater monitoring; | **Considered to be a relevant environmental factor** |
| | **Modified/Upgraded on-site containment cell (see Figure 5, Attachment 1)**<br>• excavating wastes at the water table;<br>• relocating waste to high ground to a minimum distance | **Swan River Trust**<br>• Supports the upgraded cell design;<br>• Surface water quality monitoring program should be included;<br>**Department of Environmental Protection**<br>• The upgraded cell design is acceptable; | |

| Preliminary Environmental Factor | Characteristics related to Changes | Government Agency and Public Comments | Identification of Relevant Environmental Factors |
|---|---|---|---|
| | of 2 m above the seasonal high water table level;<br>• placing wastes on a 50cm compacted clay liner or suitable barrier layer to isolate groundwater from the waste stockpile;<br>• capping cell with a 50cm compacted clay liner used as a water exclusion barrier;<br>• profiling clay cap to allow drainage water away from the cell;<br>• placing a 1m thick layer of sand and bitumen over the cell cap as a protective layer;<br>• installing a cell leachate collection drain for collection, treatment and monitoring;<br><br>**Development of truck loading facility**<br>Proposal consists of new warehousing, truck loading bays, roadways and large bitumen-covered parking areas for road trains. | • Extent of contamination not fully known;<br>• Insufficient data on the characterisation and extent of wastes on site;<br>**Town of Bassendean**<br>• The Town of Bassendean is opposed to proposal for a change to Ministerial conditions;<br>• Recommends that the level of containment provided for Class IV landfill cells should also apply to the Tonkin Park Stage II development;<br>• Recognises that the removal of the waste material to landfill is likely to be the most expensive remediation option;<br>• Extent of soil contamination needs to be further investigated;<br>**Eastern Metropolitan Regional Council**<br>• The original containment structure is inadequate;<br>• Clean-up of the site should also include remediation of the compensation basin;<br>• Recognises that the off-site removal of waste to landfill is likely to be the most expensive option;<br>• Discussion on the on-site treatment options is reasonable;<br>**Public:**<br>**Bassendean Preservation Group**<br>• Waste material should be exported off-site to Red Hill or contained on-site in a proper clay lined disposal area;<br>**Conservation Council**<br>• The original containment structure is inadequate; and<br>• More data is required on the nature and extent of contamination; | |

| Preliminary Environmental Factor | Characteristics related to Changes | Government Agency and Public Comments | Identification of Relevant Environmental Factors |
|---|---|---|---|
| | | **Other Public:**<br>• Should create a properly built and monitored clay lined disposal area, if wastes are to be stored on-site;<br>• Proponent should be made to comply with original conditions of removing wastes to landfill;<br>• Proponent should be made to either move all contaminants to Red Hill or build an appropriate on-site containment cell; | |
| **Water quality** | Groundwater quality beneath the cinders storage area is contaminated with heavy metals. In particular, arsenic, lead, copper and zinc have leached into groundwater and have affected water supply used for domestic and irrigation purposes.<br><br>Preliminary investigation by the Water and Rivers Commission indicates that off-site contamination of groundwater has occurred. | **Government Agencies:**<br>**Health Department:**<br>• The proponent should clarify rationale used in selecting monitoring parameters;<br>• Concerned that the downstream bores are not located appropriately to monitor the potential impact to groundwater;<br>**Water and Rivers Commission:**<br>• There is no longer the need to monitor groundwater with the upgraded cell structure, monitoring the quality and quantity of leachate in the toe drain will indicate whether the containment cell is working effectively;<br>**Town of Bassendean:**<br>• Surface water quality in compensation basins should be monitored;<br>**Eastern Metropolitan regional Council:**<br>• Concerned that the stockpile on the site was having an impact on local drainage system through sub-surface flows;<br>Concerned about subsequent impact to Swan River via Chapman Street main drain; | **Considered to be a relevant environmental factor** |

| Preliminary Environmental Factor | Characteristics related to Changes | Government Agency and Public Comments | Identification of Relevant Environmental Factors |
|---|---|---|---|
| **Air Quality** | | | |
| Dust control | The nearest residence is located more than 0.5km away to the north-east.<br><br>The proposal may generate dust during:<br>• excavation and relocation of cinders;<br>• movement of sand used for backfill; | • The issue of dust control was not raised in the public and government submissions; | Dust management for both off-site disposal and on-site containment of wastes is the same.<br><br>**Proponent commitments**<br>• prepare Dust Control Plan;<br>• approved dust control measures to be used;<br>• dust monitoring;<br>• all vehicles and other equipment used in the excavation works to be washed down before leaving site;<br>• excavation to be carried out in winter and spring when ground is moist;<br>• dust suppression with water sprays to be used if earthworks carried out in warm and dry weather;<br>• all vehicles used to excavate and relocate wastes on-site will be refuelled on-site to minimise the risks of spreading cinders dust off-site;<br><br>Therefore, this factor can be adequately managed via proponent commitments.<br><br>**Not considered to be a relevant environmental factor.** |

| Preliminary Environmental Factor | Characteristics related to Changes | Government Agency and Public Comments | Identification of Relevant Environmental Factors |
|---|---|---|---|
| **Non Chemical Emissions** | | | |
| Noise | The nearest residence is located more than 0.5km away to the north-east.<br><br>The proposal may generate noise during:<br>• excavation and relocation of cinders;<br>• vehicle movement; | • The issue of noise control was not raised in the public and government submissions; | **Proponent commitments:**<br>• excavation and relocation of wastes to be carried out between 7am and 7pm Monday to Saturday;<br>• comply with Environmental Protection (Noise) Regulations 1997;<br><br>**This factor can be managed through regulations and does not require further evaluation by the EPA.** |
| Vibration | The nearest residence is located more than 0.5km away to the north-east.<br><br>The proposal may generate vibration during:<br>• compaction of clay liner and road base;<br>• movement of trucks; | • The issue of vibration generation was not raised in the public and government submissions; | **Proponent commitments:**<br>• excavation and relocation of waste activities to be conducted between 7am and 7pm Monday to Saturday;<br>• commitment to comply with AS2670.2 1990 to assess the level and impact of vibration;<br><br>This factor can be adequately managed via proponent commitment.<br><br>**Not considered to be a relevant environmental factor.** |

| Preliminary Environmental Factor | Characteristics related to Changes | Government Agency and Public Comments | Identification of Relevant Environmental Factors |
|---|---|---|---|
| **Social Surroundings** | | | |
| Public Health and Safety | The nearest residence is located more than 0.5km away to the north-east.<br><br>The main risks to public health are:<br>• generation of dust during remediation;<br>• using contaminated groundwater for drinking purposes; | **Government Agencies:**<br><br>**Town of Bassendean:**<br>• Concerned about the health hazards of the contaminated material particularly in relation to the handling, treatment and placement of wastes; | On the basis of advice from the Health Department and WRC that if the waste is stored well above the water table, and covered using an impermeable cap, risks to public health from contaminated soil and water is low, as the site is located within an industrial land use area.<br>**Proponent commitments**<br>• prepare Dust Control Plan<br>• prepare plan to advise community regarding risks associated with drinking untreated groundwater in consultation with government agencies.<br>This factor can be adequately managed via proponent commitments.<br><br>**Not considered to be a relevant environmental factor.** |

| Preliminary Environmental Factor | Characteristics related to Changes | Government Agency and Public Comments | Identification of Relevant Environmental Factors |
|---|---|---|---|
| Transport | The proposal will involve movement of trucks and other vehicles to and from the site during remediation and also when the site has been developed as a truck loading facility. | **Government Agencies:**<br><br>**Town of Bassendean:**<br>• Concerned that removal of material from the site will cause traffic problems;<br>• Concerned that transport of wastes will lead to the consumption of large quantities of fossil fuel; | On the basis that the site is located within an industrial area adjacent to busy main roads, Collier Road located to the north , Tonkin Highway to the west and established industry to the south and that the wastes will be contained on site, transport movement off-site will be low. Any transport of wastes would be via the main roads.<br><br>**Proponent commitments:**<br>• ensure that trucks use agreed access routes<br>• cover requirements for trucks carting contaminated material<br>• implement spill recovery plan<br>• ensure traffic operates between 7am and 7pm Monday to Saturday.<br>This factor can be adequately managed via proponent commitments.<br><br>**Not considered to be a relevant environmental factor.** |
| Risk communication | The proposal will require liaison with the Town of Bassendean and the community to ensure that the public are informed of the remediation progress through meetings and discussion. | • The issue of risk communication was not raised in the public and government submissions; | **Proponent commitments:**<br>• risk communication will continue to be addressed through meetings/discussions with the Town of Bassendean and the community.<br><br>This factor can be adequately managed via proponent commitments.<br><br>**Not considered to be a relevant environmental factor.** |

# Appendix 4

## Summary of assessment of relevant environmental factors

## Appendix 4. Summary of Evaluation of Relevant Environmental Factors

| Relevant Factor | Environmental Objectives | Assessment | Advice |
|---|---|---|---|
| Soil contamination | • ensure that the rehabilitation of the site is to an acceptable standard compatible with the intended land use and consistent with appropriate criteria<br>• contaminated material be treated on-site or off-site and returned for reuse after treatment- Where<br>• this is not feasible, contaminated material be disposed of at an approved landfill or managed on-site to prevent further groundwater contamination or risk to public health (EIA Interim Policy No17). | **On-site containment cell**<br>• Independent expert advice in a report to the DEP indicates that on-site or off-site treatment is not practical;<br>• The on-site containment cell has been upgraded to meet the DEP's and WRC's requirements;<br>• Excavating the wastes from the water table and relocating to high ground will reduce contact of wastes with groundwater and therefore reduce leaching and further impact to groundwater;<br>• A clay cap to the cell will reduce water intrusion into the cell, minimise contact of water with the wastes and leaching of metals to the environment;<br>• The sand-bitumen hardstand over the cap will further minimise contact of water with the wastes and therefore also reduce risk to public health;<br>• Based on the modified design (see below) to the on-site containment cell and advice from the Water and Rivers Commission and Health Department of WA, on-site containment of the wastes at the Tonkin Park Stage II site is considered an acceptable management option for the waste. | Having particular regard to:<br>(a) the proposed design details of the upgraded on-site containment cell;<br>(b) the WRC, SRT, DEP and Health Department advice;<br>(c) the independent expert advice provided to the EPA; and<br>(d) the proponent's commitments;<br>it is the EPA's opinion that containment of the wastes on-site and/or removal of all or part of the waste to landfill can be managed to meet the EPA objective, and therefore the existing Ministerial condition 4 (Statement 082) can be replaced with:<br>• recommended Environmental Condition 3 (Appendix 7) which relates to the remediation of Stage II site including site validation;<br>• recommended Environmental condition 5 (Appendix 7) requiring the proponent to prepare, prior to commencement of remediation of the site, an Environmental Management Programme which provides details of:<br>(a) extent of contamination, volume and quantity of waste material to be contained on-site and/or to be disposed to landfill;<br>(b) cell design plan;<br>(c) cell construction and maintenance;<br>(d) cell leachate monitoring;<br>(e) transport management plan; and<br>(f) contingency plans;<br>• recommended Environmental Condition 6 (Appendix 7) requiring the proponent to construct, monitor and maintain the performance of the cell and cell cover, placing memorial on title, comply with restrictions on infrastructure and services over cell area; and<br>• recommended Environmental Condition 8 (Appendix 7) requiring the proponent to commence the construction of the cell within 3 years. |

| Relevant Factor | Environmental Objectives | Assessment | Advice |
|---|---|---|---|
| | | **Modified/Upgraded on-site containment cell (see Figure 5, Attachment 1)**<br>• excavating wastes at the water table;<br>• relocating waste to high ground to a minimum distance of 2 m above the seasonal high water table level;<br>• placing wastes on a 50cm compacted clay liner or suitable barrier layer to isolate groundwater from the waste stockpile;<br>• capping cell with a 50cm compacted clay liner used as a water exclusion barrier;<br>• profiling clay cap to allow drainage water away from the cell;<br>• placing a 1m thick layer of sand and bitumen over the cell cap as a protective layer;<br>• installing a cell leachate collection drain for collection, treatment and monitoring; | |
| | | **Proponent Commitments**<br>• Estimate quantity of waste to be stored on-site in a containment cell or removed from site to landfill;<br>• Prepare cell design and construction plan;<br>• Construct on-site cell in accordance with the DEP site-specific guidelines for on-site containment;<br>• Contract professionals in the engineering and environmental fields to design and construct the cell;<br>• prepare and implement leachate management plan; | |

| Relevant Factor | Environmental Objectives | Assessment | Advice |
|---|---|---|---|
| | | • carry out site validation during remediation and prior to development of site; | |
| water quality | • maintain or improve the quality of groundwater to ensure that existing and potential uses, including ecosystem maintenance are protected, consistent with the draft WA Guidelines for Fresh and Marine Waters (EPA, 1993) | • Groundwater under and downgradient of the site has been affected, but the contamination level in groundwater will be reduced once the wastes material has been relocated to a more secure and long term design containment cell;<br>• The potential impact to the ecosystem is via groundwater discharge and therefore monitoring of the Chapman Main Drain should be carried out at the point where the drain discharges to the ecosystem;<br>• Excavating wastes from the water table and relocating to high ground will minimise the leaching of heavy metals to groundwater and in the long term minimise potential impact to the ecosystem;<br><br>**Proponent Commitments**<br><br>• monitor cell performance;<br>• treat surface and groundwater discharge from the site to meet water quality objective;<br>• monitor surface and groundwater quality leaving the site;<br>• report water quality data on six monthly basis to the DEP. | Having particular regard to:<br>(a) the proposed design details of the upgraded on-site containment cell;<br>(b) the advice of WRC, Health Department of WA and SRT ;<br>(c) the proponent's commitments;<br>it is the EPA's opinion that the proposal can be managed to meet the EPA's objective provided that recommended Environmental Condition 6 (Appendix 7) requiring the proponent to prepare and implement a water quality management plan is adopted. |

# Appendix 5

## Changes to Environmental Conditions and Proponent's Commitments

# Appendix 5. Changes to environmental conditions and proponent's commitments

## Environmental Conditions

| Original Condition | Requirements (summarised) | Evaluation | New Condition | New Condition or Commitment Text |
|---|---|---|---|---|
| **Environmental Conditions** | | | | |
| 1A | Fulfil commitments | Wording changed to recast condition into contemporary format. | 2 | **2 Proponent Commitments**<br>2-1 The proponent shall implement the consolidated environmental management commitments documented in schedule 2 of this statement. |
| 1B | Implement the proposal as described | Wording changed to recast condition into contemporary format. | 1 | **1 Implementation**<br>1-1 Subject to these conditions and procedures, the proponent shall implement the proposal as documented in schedule 1 of this statement.<br>1-2 Where the proponent seeks to change any aspect of the proposal as documented in schedule 1 of this statement in any way that the Minister for the Environment determines, on advice of the Environmental Protection Authority, is substantial, the proponent shall refer the matter to the Environmental Protection Authority.<br>1-3 Where the proponent seeks to change any aspect of the proposal as documented in schedule 1 of this statement in any way that the Minister for the Environment determines, on advice of the Environmental Protection Authority, is not substantial, those changes may be effected. |
| 2 | Carry out appropriate site testing after remediation to ensure there is no significant contamination remaining | Wording changed to recast condition into contemporary format. | 3 | **3 Remediation of Stage II Site**<br>3-2 Prior to the commencement of any development of the Stage II site, the proponent shall carry out site validation tests to demonstrate that contaminants at the Stage II site do not exceed the Dutch 'C' criteria recommended for industrial land use and specified in Schedule 3, to the requirements of the Environmental Protection Authority on advice of the Department of Environmental Protection. |
| 3 | Manage relocation of wastes from Stage I site to the Stage II site to the satisfaction of the Environmental Protection Authority. | Not applicable. Relocation of wastes from Stage I to Stage II has occurred to allow North Corp to develop Stage I to the satisfaction of the Environmental Protection Authority. | | |

| Original Condition | Requirements (summarised) | Evaluation | New Condition | New Condition or Commitment Text |
|---|---|---|---|---|
| 4 | Project not to proceed until wastes located in the south-west corner of the Stage II site together with other wastes are disposed of to landfill. | Requested change to disposal option recommended.<br><br>Proposal allowed to manage wastes by either treating on-site or off-site and the wastes returned to site, disposed of at a landfill site or contained in on-site cell to the satisfaction of the Environmental Protection Authority. | 3 | **3** **Remediation of Stage II Site**<br><br>3-1 Prior to the commencement of any development of the Stage II site, the proponent shall complete remediation of the Stage II site by employing one or a combination of the following remediation methods to manage the pyritic cinders wastes and other wastes (including rubble) located on the Stage II site:<br><br>• containment on-site;<br>• disposal at a landfill site,<br><br>to the requirements of the Minister for the Environment on advice of the Environmental Protection Authority. |
| 5 | No change of proponent without approval by the Minister for the Environment. | Wording changed to recast condition into contemporary format. | 7 | **7** **Proponent**<br><br>7-1 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 in respect of the proposal.<br><br>7-2 Any request for the exercise of that power of the Minister referred to in condition 7-1 shall be accompanied by a copy of this statement endorsed with an undertaking by the proposed replacement proponent to carry out the proposal in accordance with the conditions and procedures set out in the statement.<br><br>7-3 The proponent shall notify the Department of Environmental Protection of any change of proponent contact name and address within 30 days of such change. |

| Original Condition | Requirements (summarised) | Evaluation | New Condition | New Condition or Commitment Text |
|---|---|---|---|---|
| New | Groundwater Management Plan | New condition - reflects current expectation that all major developments should have a Groundwater Management Plan | 4 | **4 Water Quality Management Plan**<br><br>4-1 Within three months following the date of publication of this statement, or within such further period as the Environmental Protection Authority may by notice in writing to the proponent specify, the proponent shall prepare a Water Quality Management Plan to achieve the following objectives:<br>• to maintain and improve groundwater quality for existing and future beneficial uses, and<br>• to ensure that the water quality of groundwater discharging to the Swan River via open drains meets the Australian and New Zealand Environment and Conservation Council water quality guidelines established for the protection of aquatic ecosystems.<br><br>The Water Quality Management Plan shall be prepared to the requirements of the Environmental Protection Authority, on advice of the Department of Environmental Protection, the Water and Rivers Commission and the Swan River Trust.<br><br>The Water Quality Management Plan shall address sample type, details of bore construction, sample locations, monitoring frequency, analytical protocols, parameters and reporting of monitoring results.<br><br>4-2 Within 14 days of approval of the Water Quality Management Plan, or within such further period as the Environmental Protection Authority may by notice in writing to the proponent specify, the proponent shall ensure that the water quality of surface and ground water is monitored to the requirements of the Environmental Protection Authority on advice of the Department of Environmental Protection, the Water and Rivers Commission and the Swan River Trust.<br><br>4-3 The proponent shall monitor water quality every three months for the first two years, and thereafter at a frequency of monitoring determined by the Environmental Protection Authority on advice of the Department of Environmental Protection, the Water and Rivers Commission and the Swan River Trust.<br><br>Note: Water samples to be analysed by a laboratory registered by the National Association of Testing Authorities and to include the following parameters:<br>• pH, fluoride, iron, total phosphorus, mercury, zinc, copper, arsenic, lead, cadmium and chromium<br><br>and, for the heavy metals, to be reported as "total metal (unfiltered)" concentrations.<br><br>4-4 The proponent shall report to the Environmental Protection Authority all water quality monitoring data collected on a three monthly basis, with significant results and trends clearly indicated during the initial two year monitoring period.<br><br>4-5 The proponent shall implement the Water Quality Management Plan required by condition 4-1 to the requirements of the Environmental Protection Authority on advice of the Department of Environmental Protection, the Water and Rivers Commission and the Swan River Trust. |

| Original Condition | Requirements (summarised) | Evaluation | New Condition | New Condition or Commitment Text |
|---|---|---|---|---|
| **New** | Environmental Management Programme | New condition - reflects current expectation that all major developments should have an Environmental Management Plan.<br><br>This new condition addresses the need for cell structure to be designed and constructed for long term security to the satisfaction of the Environmental Protection Authority on advice from the Water and Rivers Commission and the Health Department. | 5 | **5 Environmental Management Programme**<br><br>5-1 Prior to commencement of remediation of the Stage II site, the proponent shall prepare an Environmental Management Programme to achieve the following objectives:<br><br>• to protect the groundwater, the ecosystem and the amenity of the public during and after clean-up operations,<br><br>to the requirements of the Environmental Protection Authority on advice of the Department of Environmental Protection, the Water and Rivers Commission and the Health Department of Western Australia.<br><br>This Programme shall address the following:<br><br>*Waste Management*<br><br>1 extent of contamination, volume and quantity of waste material to be contained in the cell and/or removed to landfill;<br>2 details of on-site and/or off-site treatment methods;<br>3 contingency plan in the event of additional contaminated material being located on the site which may require off-site disposal;<br><br>*Cell Design*<br><br>4 final design details of cell, including base and vertical barriers;<br>5 capping material selection and placement;<br>6 separation distance between seasonal high water table and base of cell;<br>7 separation distance between cap and hardstand;<br>8 leachate collection and treatment system;<br>9 leachate monitoring and treatment facility; and<br>10 stormwater drainage; |

| Original Condition | Requirements (summarised) | Evaluation | New Condition | New Condition or Commitment Text |
|---|---|---|---|---|
| | Environmental Management Programme (cont'd) | New condition - reflects current expectation that all major developments should have an Environmental Management Plan.<br><br>This new condition addresses the need for cell structure to be designed and constructed for long term security to the satisfaction of the Environmental Protection Authority on advice from the Water and Rivers Commission and the Health Department. | 5 | *Cell Construction*<br><br>11 construction timeframes;<br>12 procedures to protect the integrity of the cell cap during and after construction;<br>13 independent auditing of construction of cell and capping;<br><br>*Dust and Noise Management*<br><br>14 dust management and monitoring procedures to minimise dust generation during site remediation operations; and<br>15 noise and vibration management and monitoring during site remediation operations;<br><br>*Contingency Plan /Leachate Management*<br><br>16 leachate management and monitoring procedures to ensure that any leachate generated from the waste does not adversely affect groundwater, addressing:<br>- sample collection frequency, analytical protocol, parameters<br>- estimation of leachate generation<br>- reporting of monitoring results, and<br>- contingency plans in the event of unacceptable generation of leachate;<br><br>*Transport Management*<br><br>17 transport management plan for off-site disposal addressing:<br>- types of waste material<br>- excavation and loading methods<br>- dust control<br>- types of vehicles<br>- haul routes<br>- disposal sites<br>- documentation and records of wastes departure and destination, and<br>- emergency response plan.<br><br>5-2 The proponent shall make the Environmental Management Programme available for comment by local catchment groups and the local government authority for a period of 2 weeks.<br><br>5-3 Prior to the commencement of any remediation of the Stage II site, the proponent shall implement the Environmental Management Programme required by condition 5-1, to the requirements of the Environmental Protection Authority on advice of the Department of Environmental Protection and the Water and Rivers Commission. |

| Original Condition | Requirements (summarised) | Evaluation | New Condition | New Condition or Commitment Text |
|---|---|---|---|---|
| New | Cell Construction and Management | New condition - reflects current expectation that all major developments should have an Environmental Management Plan.<br><br>This new condition addresses the need for cell structure to be designed and constructed for long term security to the satisfaction of the Environmental Protection Authority on advice from the Water and Rivers Commission and the Health Department. | 6 | **6 Containment Cell Management**<br><br>6-1 In the event that the proponent remediates Stage II of the site wholly or partly by containment on site (see condition 3-1), the proponent shall ensure that any waste is stored in a containment cell designed to the requirements of the Environmental Protection Authority on advice of the Department of Environmental Protection, the Water and Rivers Commission and the Swan River Trust.<br><br>Note: The Department of Environmental Protection will have regard to "Guidelines for Cell Design and Construction" in schedule 4 (attached) when considering the acceptability of the design of the containment cell.<br><br>6-2 The proponent shall monitor the performance of the containment cell to the requirements of the Environmental Protection Authority on advice of the Department of Environmental Protection, the Water and Rivers Commission and the Swan River Trust.<br><br>6-3 The proponent shall monitor the quality of any leachate derived from the cell to the requirements of the Environmental Protection Authority on advice of the Department of Environmental Protection, the Water and Rivers Commission and the Swan River Trust.<br><br>6-4 The proponent shall ensure that there is no unacceptable release of contaminants to the requirements of the Environmental Protection Authority on advice of the Department of Environmental Protection, the Water and Rivers Commission and the Swan River Trust.<br><br>6-5 Within two years following the commencement of filling of the cell, the proponent shall complete the construction of a cell cap to the requirements of the Environmental Protection Authority on advice of the Department of Environmental Protection, the Water and Rivers Commission and the Swan River Trust.<br><br>6-6 Following completion of the construction of the cell cap, the proponent shall ensure that the integrity of the cell cap is not disturbed, and shall develop a protocol for site disturbance and a contingency plan for cap restoration following disturbance.<br><br>6-7 The proponent shall maintain, at all times, the integrity of the surface area above the containment cell, to the requirements of the Department of Environmental Protection.<br><br>6-8 Unless the proponent obtains the prior written permission of the Environmental Protection Authority, the proponent shall ensure that where development or the installation of services occurs above any containment cell, there is a minimum vertical clearance distance of one metre between the top of the cell cap and the lowest point of any service, drain, road or other infrastructure.<br><br>6-9 Prior to any development, the proponent shall make provision for the placement of memorials in conjunction with the Minister for Lands and the Department of Environmental Protection on the titles of lots over the containment cell, advising of the presence and details of the cell and its contents. Such memorials shall be to the requirements of the Minister for the Environment. |

| Original Condition | Requirements (summarised) | Evaluation | New Condition | New Condition or Commitment Text |
|---|---|---|---|---|
| New | Commencement | New condition - reflects current expectation that commencement of remediation should occur within 3 years following the date of the statement. | 8 | **8 Commencement of Stage II Site Remediation**<br><br>8-1 If the proponent does not substantially commence remediation of the Stage II site within three years of the date of this statement, or within such further period as the Environmental Protection Authority may by notice in writing to the proponent specify, then the approval as granted in statement no. 82 published on 25 October 1989 shall lapse and no further implementation of the proposal shall be authorised.<br><br>The Minister for the Environment will determine any question as to whether the Stage II site remediation has been substantially commenced.<br><br>8-2 The proponent shall make application to the Minister for the Environment for any extension of approval for the substantial commencement of the Stage II site remediation beyond three years at least six months prior to the expiration of the three year period referred to in condition 8-1. |
| New | Compliance Auditing | New condition - reflects contemporary standards. | 9 | **9 Compliance Auditing**<br><br>9-1 The proponent shall submit periodic Compliance Reports, in accordance with an audit program prepared in consultation between the proponent and the Department of Environmental Protection.<br><br>9-2 Unless otherwise specified, the Chief Executive Officer of the Department of Environmental Protection is responsible for assessing compliance with the conditions, procedures and commitments contained in this statement and for issuing formal, written advice that the requirements have been met.<br><br>9-3 Where compliance with any condition, procedure or commitment is in dispute, the matter will be determined by the Minister for the Environment. |

# Proponent Commitments

| | Requirements | Evaluation | New Commit-ment No. | New Commitment Text |
|---|---|---|---|---|
| 1 | **Completion of Stage I**<br>Northcorp Limited will take responsibility for ensuring that all works carried out as part of the site cleanup will be completed to the satisfaction of the Environmental Protection Authority and other relevant statutory authorities. | This commitment is redundant and has been deleted as Stage I has already been remediated and developed. | N/A | N/A |
| 2 | All works associated with the cleanup operation will be carried out to the direction and under the supervision of qualified and reputable professionals in the engineering and environmental fields acting as consultants to Northcorp Limited. Confirmation of the selected consultants will be subject to the approval of the Environmental Protection Authority. | This commitment is redundant and has been deleted as Stage I has already been remediated and developed. | N/A | N/A |
| 3 | Shallow deposits of waste materials to be cleaned up in Stage I of the proposal will be collected and placed over the deeper parts of the pyrites dump. These wastes will be collected during the initial stages of the site preparation phase of the Stage I development. The work will be carried out by a reputable earthmoving contractor under the supervision of Northcorp's consultants. | This commitment is redundant and has been deleted as Stage I has already been remediated and developed. | N/A | N/A |
| 4 | Subdivision and sale of land from Stage I will not occur until all wastes on these lands have been relocated to the satisfaction of the Environmental Protection Authority and other relevant authorities. | This commitment is redundant and has been deleted as Stage I has already been remediated and developed. | N/A | N/A |
| 5 | Dust control will form a key requirement in cleanup operations. During surface stripping of wastes before Stage I of the development there will be an extensive use of water sprays and vehicle movements will be minimised over contaminated areas of the site. Direction on and supervision of these activities will be provided by the consultants to Northcorp Limited. The work will be carried out by the selected contractor. | This commitment is redundant and has been deleted as Stage I has already been remediated and developed. | N/A | N/A |
| 6 | Northcorp Limited's consultants will confer with the Department of Occupational Health, Safety and Welfare with respect to working conditions on the site. In particular, precautions will be implemented to ensure that workers on the site are not subjected to undue risk as a result of the contaminated nature of the site. Procedures to ensure this commitment is met will be incorporated into contract conditions for the work and supervised by Northcorp Limited's consultants. Ongoing liaison with DOSHWA will be maintained for the duration of the work. | This commitment is redundant and has been deleted as Stage I has already been remediated and developed. | N/A | N/A |
| 7 | **Completion Stage II**<br>Northcorp Limited will take responsibility for ensuring that all works carried out as part of the site cleanup will be completed to the satisfaction of the Environmental Protection Authority and other relevant statutory authorities. | This commitment has been made the new Commitment No. 1 and 3 as a result of the deletion of original Commitments 1 to 6, as detailed above.<br><br>Wording changed to reflect change in proponent from Northcorp Limited to Centurion North West Pty Ltd. | 1 and 3 | See new Commitment No. 1 and 3. |
| 8 | All works associated with the cleanup operation will be carried out to the direction and under the supervision of qualified and reputable professionals in the engineering and environmental fields acting as consultants to Northcorp Limited. Confirmation of the selected consultants will be subject to the approval of the Environmental Protection Authority. | This commitment has been made the new Commitment No. 5 as a result of the deletion of original Commitments 1 to 6, as detailed above.<br>Wording changed to reflect change in proponent from Northcorp Limited to Centurion North West Pty Ltd. | 5 | See new Commitment No. 5 |
| 9 | Cleanup of the site within Stage II of the development will be achieved by removal of all wastes from the site to an approved disposal facility. The location and nature of the disposal facility is yet to be determined and will be nominated by others. The cleanup work will be undertaken by an experienced and reputable earthmoving contractor to be selected by | This commitment has been made the new Commitment No. 2, 6, 7, 8, 9, 13 and 14 as a result of the deletion of original Commitments 1 to 6, as detailed above. Section 46 recommendation is for Centurion North West Pty Ltd to manage wastes by either treating on-site or off site (and the wastes returned to site), disposing of at a landfill or containing in an on-site cell to the satisfaction of the | 2, 6,7, 8, 9, 13 and 14. | See new Commitment No. 2, 6, 7, 8, 9, 13 and 14. |

| | Requirements | Evaluation | New Commit-ment No. | New Commitment Text |
|---|---|---|---|---|
| | Northcorp Limited. All works will be to the direction and under the supervision of Northcorp Limited's consultants. | the Environmental Protection Authority. | | |
| 10 | The cleanup will be undertaken as far as practicable during winter months, consistent with the need to avoid handling wastes when groundwater levels are high (ie at the end of winter). Water sprays will also be used to spray dust. This work will be carried out by the selected contractor to the direction and under the supervision of Northcorp Limited consultants. | This commitment has been made the new Commitment No. 5 as a result of the deletion of original Commitments 1 to 6, as detailed above.<br>Wording changed to reflect change in proponent from Northcorp Limited to Centurion North West Pty Ltd. | 5 | See new Commitment No. 5. |
| 11 | Subdivision and sale of land in Stage II (as shown in Figure 1.3 of the Public Environmental Review Report) will not occur before remedial action is completed to the satisfaction of the Environmental Protection Authority and other relevant statutory authorities. | This commitment has been made the new Commitment No. 4 as a result of the deletion of original Commitments 1 to 6, as detailed above.<br>No change in wording. | 4 | See new Commitment No. 4. |
| 12 | Dust control will form a key requirement in cleanup operations. Trucks will be covered after loading and during transport of the wastes and stringent hygiene standards will be maintained at all times. This work will be carried out by the selected contractor to the direction and under the supervision of Northcorp Limited's consultants. | This commitment has been made the new Commitment No. 19, 20 and 21 as a result of the deletion of original Commitments 1 to 6, as detailed above.<br>Wording changed to reflect change in proponent from Northcorp Limited to Centurion North West Pty Ltd. | 19, 20 and 21 | See new Commitment No. 19, 20 and 21. |
| 13 | Northcorp Limited's consultant will confer with the Department of Occupational Health, Safety and Welfare with respect to working conditions on the site. In particular, precautions will be implemented to ensure that workers on the site are not subjected to undue risk as result of the contaminated nature of the site. Procedures to ensure this commitment is met will be incorporated into contract conditions for the work and supervised by Northcorp Limited's consultants. Ongoing liaison with DOSHWA will be maintained for the duration of the work. | This commitment has been made the new Commitment No. 24, 25 and 26 as a result of the deletion of original Commitments 1 to 6, as detailed above.<br>Wording changed to recast commitment into contemporary format with updated references to relevant decision making authorities and involved agencies and to reflect change in proponent from Northcorp Limited to Centurion North West Pty Ltd. | 24, 25 and 26 | See new Commitment No. 24, 25 and 26. |
| 14 | Materials will be removed from the site until visual inspection by the consultants show that all wastes have been removed. Soils will then be tested by an independent laboratory to ensure that there is no remaining significant contamination. Northcorp Limited's consultants will direct the contractor on the limits of excavation. All test results will be presented to the Environmental Protection Authority for inspection so that they are satisfied with the extent of waste removal prior to further treatment or development of the site. | This commitment has been made the new Commitment No. 11 as a result of the deletion of original Commitments 1 to 6, as detailed above.<br><br>Wording changed to recast commitment into contemporary format and to reflect change in proponent from Northcorp Ltd to Centurion North West Pty Ltd. | 11 | See new Commitment No. 11. |
| 15 | Following completion of the removal of contaminated materials and subject to the Environmental Protection Authority's approval the resulting excavation will be backfilled with clean filling from a source approved by the Environmental Protection Authority. This work will be directed and supervised by Northcorp Limited's consultants. | This commitment has been made the new Commitment No. 2, 7 and 8 as a result of the deletion of original Commitments 1 to 6, as detailed above.<br><br>Wording changed to recast commitment into contemporary format and to reflect change in proponent from Northcorp Ltd to Centurion North West Pty Ltd.<br><br>Requirements on excavation and backfilling will be included in the details of the construction of the cell. | 2, 7 and 8 | See new Commitment No. 2, 7 and 8. |
| 16 | Water discharged from the site into the Chapman Street drain during construction and remediation will, if necessary, be treated to ensure no deterioration of water quality occurs in the drain or the Swan River. The Swan River Management Authority and the Water Authority of Western Australia will be consulted to establish appropriate quality criteria. Northcorp Limited's consultants will design and ensure implementation of appropriate treatment measures. Monitoring of outflows at the point of discharge will be carried out to ensure compliance. | This commitment has been made the new Commitment No.15, 16, 17 and 18 as a result of the deletion of original Commitments 1 to 6, as detailed above.<br><br>Wording changed to recast commitment into contemporary format and to reflect change in proponent from Northcorp Ltd to Centurion North West Pty Ltd. | 15, 16, 17 and 18 | See new Commitment No. 15, 16, 17 and 18. |
| 17 | In all phases of the cleanup work for the Tonkin Park site Northcorp Limited commits itself to liaise with the relevant government departments including the Environmental Protection Authority, Water Authority of | This commitment has been made the new Commitment No. 27 and 28 as a result of the deletion of original Commitments 1 to 6, as detailed above. | 27 and 28 | See new Commitment No. 27 and 28. |

| | Requirements | Evaluation | New Commit-ment No. | New Commitment Text |
|---|---|---|---|---|
| | Western Australia, Geological Survey Department of Western Australia, State Planning Commission, Department of Occupational Health, Safety and Welfare, Health Department of Western Australia and the Bassendean Town Council. | Wording changed to recast commitment into contemporary format with updated references to relevant decision making authorities and involved agencies and to reflect change in proponent from Northcorp Ltd to Centurion North West Pty Ltd. | | |

# Appendix 6

## Statement of Environmental Conditions of Approval (1989)

Ass # 126

Bull # 397

State # 082

WESTERN AUSTRALIA
MINISTER FOR ENVIRONMENT

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

PROPOSED INDUSTRIAL DEVELOPMENT, TONKIN INDUSTRIAL PARK, BASSENDEAN (STAGES 1 & 2)

This proposal may be implemented subject to the following conditions:

1. The proponent shall adhere to the proposal as assessed by the Environmental Protection Authority and shall fulfil the commitments made in the Public Environmental Report (copy of commitments attached).

2. For each stage, immediately after visible contaminants have been removed from the site, the proponent shall carry out appropriate soil testing to ensure that there is no significant contamination remaining. Parameters to be measured shall include but shall not be limited to the following:

   . pH
   . mercury
   . lead
   . zinc
   . copper
   . arsenic
   . fluoride, and
   . total phosphorus (as $P_2O_5$).

   The tests shall be carried out and reported to the satisfaction of the Environmental Protection Authority. If these tests indicate that significant contamination remains, the proponent shall remove additional contaminated soil, to the satisfaction of the Environmental Protection Authority.

3. The proponent shall manage the first stage relocation of wastes, to the proposed temporary waste stockpile in the south-west corner of the site, to prevent leaching of contaminants, to the satisfaction of the Environmental Protection Authority.

Published on

25 OCT 1989

4. The proponent shall not proceed with the second stage of the development until wastes at the old pyrites cinders dump (in the south-west corner of the site) together with all other wastes including building rubble are disposed of at a landfill site, to the satisfaction of the Environmental Protection Authority.

5. 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 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.

Bob Pearce, MLA
MINISTER FOR ENVIRONMENT

25 OCT 1989

# TONKIN INDUSTRIAL PARK

## PROPONENT'S COMMITMENTS

The objectives of remedial treatment of Tonkin Industrial Park will be that:

- The quality of groundwater flowing beneath the site will, in the long term, be returned to a state typical of groundwater in the Bassendean area.
- Health of either workers or residents will not be jeopardised.
- The intended land use of the site or its environs will not be compromised.
- No financial or environmental burden in the long term will result to any party.

The cleanup and development of the site will be undertaken in two stages as outlined in the Public Environmental Report.

The first stage of the cleanup and development involves the area of land that has been shown by site investigations to be contaminated with a thin surface veneer of pyritic material and other wastes.

The second stage of the cleanup and development involves the remainder of the land area which is known to have buried stockpiles of wastes that are in contact with, and contaminating groundwater beneath the site.

Northcorp Limited, as proponent, has entered into an agreement with the Town of Bassendean to undertake the cleanup and development in accordance with the following timetable.

Stage 1: Completion of stage 1 cleanup and development works within six months of obtaining Environmental Protection Authority, the Town of Bassendean, and all other Statutory Authority approvals to both the cleanup and development proposals. Failure to meet this commitment will result in the Town of Bassendean completing the necessary works.

Stage 2: Completion of stage 2 cleanup and development works by 31 December 1992 provided a suitable site is found to accept wastes from the Tonkin Park site and that satisfactory arrangements have been made for the ongoing management of the wastes at the disposal site. Failure of Northcorp Limited to meet this commitment will result in the Town of Bassendean completing the work provided a suitable disposal site can be found.

Northcorp Limited commits itself to the following for completion of Stage 1 of the development:

1. Northcorp Limited will take responsibility for ensuring that all works carried out as part of the site cleanup will be completed to the satisfaction of the Environmental Protection Authority and other relevant statutory authorities.

2. All works associated with the cleanup operation will be carried out to the direction and under the supervision of qualified and reputable professionals in the engineering and environmental fields acting as consultants to Northcorp Limited. Confirmation of the selected consultants will be subject to the approval of the Environmental Protection Authority.

3. Shallow deposits of waste materials to be cleaned up in Stage 1 of the proposal will be collected and placed over the deeper parts of the pyrites dump. These wastes will be collected during the initial stages of the site preparation phase of the Stage 1 development. The work will be carried out by a reputable earthmoving contractor under the supervision of Northcorp's consultants.

4. Subdivision and sale of land from Stage 1 will not occur until all wastes on these lands have been relocated to the satisfaction of the Environmental Protection Authority and other relevant authorities.

5. Dust control will form a key requirement in cleanup operations. During surface stripping of wastes before Stage 1 of the development there will be an extensive use of water sprays and vehicle movements will be minimised over contaminated areas of the site. Direction on and supervision of these activities will be provided by the consultants to Northcorp Limited. The work will be carried out by the selected contractor.

6. Northcorp Limited's consultants will confer with the Department of Occupational Health, Safety and Welfare with respect to working conditions on the site. In particular, precautions will be implemented to ensure that workers on the site are not subjected to undue risk as a result of the contaminated nature of the site. Procedures to ensure this commitment is met will be incorporated into contract conditions for the work and supervised by Northcorp Limited's consultants. Ongoing liaison with DOSHWA will be maintained for the duration of the work.

Northcorp Limited commits itself to the following for completion of Stage 2 of the development provided a satisfactory site can be nominated by others that will accept the wastes to be removed from the site.

7. Northcorp Limited will take responsibility for ensuring that all works carried out as part of the site cleanup will be completed to the satisfaction of the Environmental Protection Authority and other relevant statutory authorities.

8. All works associated with the cleanup operation will be carried out to the direction and under the supervision of qualified and reputable professionals in the engineering and environmental fields acting as consultants to Northcorp Limited. Confirmation of the selected consultants will be subject to the approval of the Environmental Protection Authority.

9. Cleanup of the site within Stage 2 of the development will be achieved by removal of all wastes from the site to an approved disposal facility. The location and nature of the disposal facility is yet to be determined and will be nominated by others. The cleanup work will be undertaken by an experienced and reputable earthmoving contractor to be selected by Northcorp Limited. All works will be to the direction and under the supervision of Northcorp Limited's consultants.

10. The cleanup work will be undertaken as far as practicable during winter months, consistent with the need to avoid handling wastes when groundwater levels are high (ie. at the end of winter). Water sprays will also be used to spray dust. This work will be carried out by the selected contractor to the direction and under the supervision of Northcorp Limited consultants.

11. Subdivision and sale of land in Stage 2 (as shown in Figure 1.3 of the Public Environmental Report) will not occur before remedial action is completed to the satisfaction of the Environmental Protection Authority and other relevant statutory authorities.

12. Dust control will form a key requirement in cleanup operations. Trucks will be covered after loading and during transport of the wastes and stringent hygiene standards will be maintained at all times. This work will be carried out by the selected contractor to the direction and under the supervision of Northcorp Limited's consultants.

13. Northcorp Limited's consultants will confer with the Department of Occupational Health, Safety and Welfare with respect to working conditions on the site. In particular, precautions will be implemented to ensure that workers on the site are not subjected to undue risk as a result of the contaminated nature of the site. Procedures to ensure this commitment is met will be incorporated into contract conditions for the work and supervised by Northcorp Limited's consultants. Ongoing liaison with DOSHWA will be maintained for the duration of the work.

14. Materials will be removed from the site until visual inspection by the consultants shows that all wastes have been removed. Soils will then be tested by an independent laboratory to ensure that there is no remaining significant contamination. Northcorp Limited's consultants will direct the contractor on the limits of excavation. All test results will be presented to the Environmental Protection Authority for inspection so that they are satisfied with the extent of waste removal prior to further treatment or development of the site.

15. Following completion of the removal of contaminated materials and subject to the Environmental Protection Authority's approval the resulting excavation will be backfilled with clean filling from a source approved by the Environmental Protection Authority. This work will be directed and supervised by Northcorp Limited's consultants.

16. Water discharged from the site into the Chapman Street drain during construction will, if necessary, be treated to ensure no deterioration of water quality occurs in the drain or the Swan River. The Swan River Management Authority and the Water Authority of Western Australia will be consulted to establish appropriate quality criteria. Northcorp Limited's consultants will design and ensure implementation of appropriate treatment measures. Monitoring of outflows at the point of discharge will be carried out to ensure compliance.

In all phases of the cleanup work for the Tonkin Park site Northcorp Limited commits itself to:

17. Liaise with the relevant government departments including the Environmental Protection Authority; Water Authority of Western Australia; Geological Survey Department of Western Australia; State Planning Commission; Department of Occupational Health, Safety and Welfare; Health Department of Western Australia; and the Bassendean Town Council.

# Appendix 7

## Recommended Environmental Conditions and proponent's consolidated commitments

*RECOMMENDED ENVIRONMENTAL CONDITIONS*

# STATEMENT TO AMEND CONDITIONS APPLYING TO A PROPOSAL (PURSUANT TO THE PROVISIONS OF SECTION 46 OF THE ENVIRONMENTAL PROTECTION ACT 1986)

INDUSTRIAL DEVELOPMENT,
TONKIN INDUSTRIAL PARK, BASSENDEAN (STAGES 1 & 2)

**Proposal:** Remediation of wastes, as documented in schedule 1 of this statement to allow redevelopment of 42 hectares of land adjacent to Collier Road, Bassendean for industrial purposes.

**Proponent:** Centurion North West Pty Ltd

**Proponent Address:** 245 Collier Road, Bayswater, Western Australia 6053

**Assessment Number:** 1201

**Previous Assessment Numbers:** 126, 126-1

**Previous Statement Numbers:** Statement No. 82 (published on 25 October 1989)
Statement No. 224 (published on 27 February 1992)

**Report of the Environmental Protection Authority:** Bulletin 960

**Previous Reports of the Environmental Protection Authority:** Bulletin 397
Bulletin 588

The implementation of the proposal to which the above reports of the Environmental Protection Authority relate to the following conditions and procedures which replace all previous conditions and procedures.

## 1 Implementation

1-1 Subject to these conditions and procedures, the proponent shall implement the proposal as documented in schedule 1 of this statement.

1-2 Where the proponent seeks to change any aspect of the proposal as documented in schedule 1 of this statement in any way that the Minister for the Environment determines, on advice of the Environmental Protection Authority, is substantial, the proponent shall refer the matter to the Environmental Protection Authority.

1-3 Where the proponent seeks to change any aspect of the proposal as documented in schedule 1 of this statement in any way that the Minister for the Environment determines, on advice of the Environmental Protection Authority, is not substantial, those changes may be effected.

## 2 Proponent Commitments

2-1 The proponent shall implement the consolidated environmental management commitments documented in schedule 2 of this statement.

## 3 Remediation of Stage II Site

3-1 Prior to the commencement of any development of the Stage II site (see figure 1), the proponent shall complete remediation of the Stage II site by employing one or a combination of the following remediation methods to manage the pyritic cinders wastes and other wastes (including rubble) located on the Stage II site:

- containment on-site;
- disposal at a landfill site,

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

3-2 Prior to the commencement of any development of the Stage II site, the proponent shall carry out site validation tests to demonstrate that contaminants at the Stage II site do not exceed the Dutch 'C' criteria recommended for industrial land use and specified in Schedule 3, to the requirements of the Environmental Protection Authority on advice of the Department of Environmental Protection.

## 4 Water Quality Management Plan

4-1 Within three months following the date of publication of this statement, or within such further period as the Environmental Protection Authority may by notice in writing to the proponent specify, the proponent shall prepare a Water Quality Management Plan to achieve the following objectives:

- to maintain and improve groundwater quality for existing and future beneficial uses, and

- to ensure that the water quality of groundwater discharging to the Swan River via open drains meets the Australian and New Zealand Environment and Conservation Council water quality guidelines established for the protection of aquatic ecosystems.

The Water Quality Management Plan shall be prepared to the requirements of the Environmental Protection Authority, on advice of the Department of Environmental Protection, the Water and Rivers Commission and the Swan River Trust.

The Water Quality Management Plan shall address sample type, details of bore construction, sample locations, monitoring frequency, analytical protocols, parameters and reporting of monitoring results.

4-2 Within 14 days of approval of the Water Quality Management Plan, or within such further period as the Environmental Protection Authority may by notice in writing to the proponent specify, the proponent shall ensure that the water quality of surface and ground water is monitored to the requirements of the Environmental Protection Authority on advice of the Department of Environmental Protection, the Water and Rivers Commission and the Swan River Trust.

4-3 The proponent shall monitor water quality every three months for the first two years, and thereafter at a frequency of monitoring determined by the Environmental Protection Authority on advice of the Department of Environmental Protection, the Water and Rivers Commission and the Swan River Trust.

Note: Water samples to be analysed by a laboratory registered by the National Association of Testing Authorities and to include the following parameters:

- pH, fluoride, iron, total phosphorus, mercury, zinc, copper, arsenic, lead, cadmium and chromium

and, for the heavy metals, to be reported as "total metal (unfiltered)" concentrations.

4-4 The proponent shall report to the Environmental Protection Authority all water quality monitoring data collected on a three monthly basis, with significant results and trends clearly indicated during the initial two year monitoring period.

4-5 The proponent shall implement the Water Quality Management Plan required by condition 4-1 to the requirements of the Environmental Protection Authority on advice of the Department of Environmental Protection, the Water and Rivers Commission and the Swan River Trust.

## 5 Environmental Management Programme

5-1 Prior to commencement of remediation of the Stage II site, the proponent shall prepare an Environmental Management Programme to achieve the following objectives:

- to protect the groundwater, the ecosystem and the amenity of the public during and after clean-up operations,

to the requirements of the Environmental Protection Authority on advice of the Department of Environmental Protection, the Water and Rivers Commission and the Health Department of Western Australia.

This Programme shall address the following:

*Waste Management*

1. extent of contamination, volume and quantity of waste material to be contained in the cell and/or removed to landfill;
2. details of on-site and/or off-site treatment methods;
3. contingency plan in the event of additional contaminated material being located on the site which may require off-site disposal;

*Cell Design*

4. final design details of cell, including base and vertical barriers;
5. capping material selection and placement;
6. separation distance between seasonal high water table and base of cell;
7. separation distance between cap and hardstand;
8. leachate collection and treatment system;
9. leachate monitoring and treatment facility; and
10. stormwater drainage;

*Cell Construction*

11. construction timeframes;
12. procedures to protect the integrity of the cell cap during and after construction;
13. independent auditing of construction of cell and capping;

*Dust and Noise Management*

14. dust management and monitoring procedures to minimise dust generation during site remediation operations; and
15. noise and vibration management and monitoring during site remediation operations;

*Contingency Plan /Leachate Management*

16. leachate management and monitoring procedures to ensure that any leachate generated from the waste does not adversely affect groundwater, addressing:
    - sample collection frequency, analytical protocol, parameters
    - estimation of leachate generation
    - reporting of monitoring results, and
    - contingency plans in the event of unacceptable generation of leachate;

*Transport Management*

17. transport management plan for off-site disposal addressing:
    - types of waste material
    - excavation and loading methods
    - dust control
    - types of vehicles
    - haul routes
    - disposal sites
    - documentation and records of wastes departure and destination, and
    - emergency response plan.

5-2 The proponent shall make the Environmental Management Programme available for comment by local catchment groups and the local government authority for a period of 2 weeks.

5-3 Prior to the commencement of any remediation of the Stage II site, the proponent shall implement the Environmental Management Programme required by condition 5-1, to the requirements of the Environmental Protection Authority on advice of the Department of Environmental Protection and the Water and Rivers Commission.

## 6 Containment Cell Management

6-1 In the event that the proponent remediates Stage II of the site wholly or partly by containment on site (see condition 3-1), the proponent shall ensure that any waste is stored in a containment cell designed to the requirements of the Environmental Protection Authority on advice of the Department of Environmental Protection, the Water and Rivers Commission and the Swan River Trust.

Note: The Department of Environmental Protection will have regard to "Guidelines for Cell Design and Construction" in schedule 4 (attached) when considering the acceptability of the design of the containment cell.

6-2 The proponent shall monitor the performance of the containment cell to the requirements of the Environmental Protection Authority on advice of the Department of Environmental Protection, the Water and Rivers Commission and the Swan River Trust.

6-3 The proponent shall monitor the quality of any leachate derived from the cell to the requirements of the Environmental Protection Authority on advice of the Department of Environmental Protection, the Water and Rivers Commission and the Swan River Trust.

6-4 The proponent shall ensure that there is no unacceptable release of contaminants to the requirements of the Environmental Protection Authority on advice of the Department of Environmental Protection, the Water and Rivers Commission and the Swan River Trust.

6-5 Within two years following the commencement of filling of the cell, the proponent shall complete the construction of a cell cap to the requirements of the Environmental Protection Authority on advice of the Department of Environmental Protection, the Water and Rivers Commission and the Swan River Trust.

6-6 Following completion of the construction of the cell cap, the proponent shall ensure that the integrity of the cell cap is not disturbed, and shall develop a protocol for site disturbance and a contingency plan for cap restoration following disturbance.

6-7 The proponent shall maintain, at all times, the integrity of the surface area above the containment cell, to the requirements of the Department of Environmental Protection.

6-8 Unless the proponent obtains the prior written permission of the Environmental Protection Authority, the proponent shall ensure that where development or the installation of services occurs above any containment cell, there is a minimum vertical clearance distance of one metre between the top of the cell cap and the lowest point of any service, drain, road or other infrastructure.

6-9 Prior to any development, the proponent shall make provision for the placement of memorials in conjunction with the Minister for Lands and the Department of Environmental Protection on the titles of lots over the containment cell, advising of the presence and details of the cell and its contents. Such memorials shall be to the requirements of the Minister for the Environment.

## 7 Proponent

7-1 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 in respect of the proposal.

7-2 Any request for the exercise of that power of the Minister referred to in condition 7-1 shall be accompanied by a copy of this statement endorsed with an undertaking by the proposed replacement proponent to carry out the proposal in accordance with the conditions and procedures set out in the statement.

7-3 The proponent shall notify the Department of Environmental Protection of any change of proponent contact name and address within 30 days of such change.

## 8 Commencement of Stage II Site Remediation

8-1 If the proponent does not substantially commence remediation of the Stage II site within three years of the date of this statement, or within such further period as the Environmental Protection Authority may by notice in writing to the proponent specify, then the approval as granted in statement no. 82 published on 25 October 1989 shall lapse and no further implementation of the proposal shall be authorised.

The Minister for the Environment will determine any question as to whether the Stage II site remediation has been substantially commenced.

8-2 The proponent shall make application to the Minister for the Environment for any extension of approval for the substantial commencement of the Stage II site remediation beyond three years at least six months prior to the expiration of the three year period referred to in condition 8-1.

## 9 Compliance Auditing

9-1 The proponent shall submit periodic Compliance Reports, in accordance with an audit program prepared in consultation between the proponent and the Department of Environmental Protection.

9-2 Unless otherwise specified, the Chief Executive Officer of the Department of Environmental Protection is responsible for assessing compliance with the conditions, procedures and commitments contained in this statement and for issuing formal, written advice that the requirements have been met.

9-3 Where compliance with any condition, procedure or commitment is in dispute, the matter will be determined by the Minister for the Environment.

# Schedule 1

## The proposal

Redevelopment of 42 hectare of land adjacent to Collier Road, Bassendean for industrial purposes and remediation of surface wastes in two stages. The site is bounded by Collier Road to the north and east, Alice Street to the west, and a drain reserve and Railway Parade to the south. It also includes a 2.3 hectare wedge of land to the north of Collier Road bounded by Scadden and Iolanthe Streets.

The key characteristics of the proposal are described in the table below.

### Key Characteristics Table

| Element | Description |
|---|---|
| SITE IDENTIFICATION | The development site has an area of 42 hectare and is bounded by Collier Road to the north and east, Alice Street to the west, and a drain reserve and Railway Parade to the south. It also includes a 2.3 hectare wedge of land to the north of Collier Road bounded by Scadden and Iolanthe Streets.<br><br>Tonkin Park Stage 1 is located in the eastern half of the site, with the addition of Lots 107 and 108 in the north-west corner of the site.<br><br>Tonkin Park Stage II is located in the remaining western portion. |
| PROPERTY AREA | Stage I - 25 hectares<br><br>Stage II - 17 hectares |
| QUANTITY OF WASTES ON SITE | 300 000 to 500 000 tonnes (or 150 000 to 250 000 cubic metres) |

### Note 1

Figure 1 Location of Tonkin Park Industrial Park
Figure 2 Location of Tonkin Park Stage I and II development sites, including lots 107 and 108.

**Schedule 2**

# Supplement to Proponent's Consolidated Environmental Management Commitments

20 November 1999

Note: This list of commitments consolidates, updates and replaces the 1989 commitments which appear in Appendix 6.

# INDUSTRIAL DEVELOPMENT, TONKIN INDUSTRIAL PARK, BASSENDEAN (STAGES 1 & 2)

CENTURION NORTH WEST PTY LTD

# 1. Proponent's Environmental Management Commitments (1201)

| Topic | No. | Action | Timing | Objective | Advice | Satisfy |
|---|---|---|---|---|---|---|
| Environmental Management Plan | 1 | The proponent will carry out additional site investigation and assessment through grid sampling | before construction commences | to accurately estimate the quantity of waste to be stored on-site in a containment cell and/or be removed from site, and thus assure government departments that the cell size and design, and the proposed split between on- and off-site waste management, is reasonable. | WRC, DEP, Health Dept | EPA |
| Environmental Management Plan | 2 | The proponent will prepare a cell construction plan | before construction commences | to ensure that the on-site cell is constructed for the long term containment of waste. | WRC, DEP, Health Dept. | EPA |
| Rehabilitation | 3 | The proponent will ensure that any activity pertaining to the clean-up undertaken on site will comply with legislation requirements | during clean-up and construction of the cell | to ensure the site is rehabilitated to the Dutch 'C' criteria and to a standard compatible with the intended land use. | WRC, Health Dept | EPA |
| Rehabilitation | 4 | The proponent will complete remediation of the site | within 3 years of the publication of the EPA bulletin | to ensure the site is rehabilitated to the Dutch 'C' criteria and to a standard compatible with the intended land use. | WRC, Health Dept, DEP | EPA, Health Dept |
| Rehabilitation | 5 | The proponent will ensure that the site clean-up will be supervised by professionals in the environmental and engineering fields using quality control and quality assurance procedures | during clean-up and construction of the cell | to ensure the site is rehabilitated to an acceptable standard that is compatible with the intended land use, consistent with appropriate criteria. | WRC, Health Dept, DEP | EPA, Health Dept. |

**Proponent's Environmental Management Commitments, cont**

| Topic | No. | Action | Timing | Objective | Advice | Satisfy |
|---|---|---|---|---|---|---|
| Rehabilitation | 6 | The proponent will remediate the site using one or a combination of remediation options; including, but not necessarily limited to, on-site containment, on-site and/or off-site treatment, disposal to an off-site landfill, or relocation to a suitable off-site minerals processing facility | within 3 years of the publication of the EPA bulletin | to ensure the site is rehabilitated to an acceptable standard that is compatible with the intended land use, consistent with appropriate criteria. | WRC, Health Dept, DEP | EPA, Health Dept. |
| Cell construction | 7 | The proponent will construct the containment cell in the southern portion of the Tonkin Park Stage II site | within 3 years of the publication of the EPA bulletin | to ensure the site is rehabilitated to an acceptable standard that is compatible with the intended land use, consistent with appropriate criteria. | WRC, DEP | EPA, Health Dept. |
| Cell construction | 8 | The proponent will construct the containment cell so as to ensure that all excavated waste is separated by a minimum of 2 metres vertical distance from the seasonal high water table | within 3 years of the publication of the EPA bulletin. | to minimise the possible risk of groundwater quality impacts. | WRC, SRT | EPA |
| Cell construction | 9 | The proponent will construct the containment cell | during clean-up and construction of the cell | to ensure that the cell is constructed to the requirements of the EPA. | WRC, DEP, SRT, Health Dept | EPA, Health Dept |
| Development | 10 | The proponent will use 100% of the proceeds from any sale of Stage II land exclusively to help pay for site remediation costs on a progress payment basis | prior to project completion and final government signoff | to ensure that the site is rehabilitated to an acceptable standard that is compatible with the intended land use, consistent with appropriate criteria. | WRC, Health Dept, DEP | EPA, Health Dept |
| Development | 11 | The proponent will carry out a site validation | throughout the course of the project and prior to development | to ensure that the site is rehabilitated to an acceptable standard that is compatible with the intended land use, consistent with appropriate criteria. | Health Dept, WRC, DEP | EPA, Health Dept. |

**Proponent's Environmental Management Commitments, cont**

| Topic | No. | Action | Timing | Objective | Advice | Satisfy |
|---|---|---|---|---|---|---|
| Development | 12 | The proponent agrees to place memorials on the titles of any lots sub-divided over the containment cell | in the future, if (before) development of the surface above the containment cell was to occur | to ensure that the site is maintained at an acceptable standard that is compatible with the intended land use, consistent with appropriate criteria. | Health Dept, WRC, DEP | EPA, Health Dept. |
| Monitoring<br><br>Cell performance | 13 | The proponent will monitor the quality of leachate flowing from the cell | during and after cell construction | to ensure that cell performance is acceptable and that any leachate generated is managed. | WRC, DEP | EPA, WRC |
| Monitoring<br><br>Cell performance | 14 | The proponent will prepare and implement a leachate management plan | during operation and maintenance | to ensure that loss of leachate from the cell does not adversely affect groundwater and the environment. | WRC, DEP | EPA |
| Monitoring<br><br>Water Quality | 15 | The proponent will monitor the quality of rain water flowing from the containment cell's bitumen surface to the Chapman Street drain | during and after clean-up | to ensure that surface water discharged to the Swan River meets the water quality criteria established for maintenance of the fresh water ecosystem. | WRC, SRT | EPA |
| Monitoring<br><br>Water Quality | 16 | Surface and groundwater discharged from the site into the Chapman Street drain during construction will, if necessary, be treated | during and after clean-up | to ensure that all surface water directed to the Swan River meets the water quality criteria established for maintenance of the fresh water ecosystem. | WRC, SRT | EPA |
| Monitoring<br><br>Water Quality | 17 | The proponent will monitor the quality of groundwater leaving the site on the south side (in the direction of top aquifer groundwater flow) | during and after clean-up | to monitor and verify gradual improvements in the groundwater quality leaving the site, and flowing towards the Swan river, though other properties. | WRC, SRT | EPA |

**Proponent's Environmental Management Commitments, cont**

| Topic | No. | Action | Timing | Objective | Advice | Satisfy |
|---|---|---|---|---|---|---|
| Monitoring<br><br>Water Quality | 18 | The proponent will ensure that appropriate design and treatment measures are implemented by using professional consultants | before, during and after clean-up | to ensure that drainage water to the Swan River meets the water quality criteria established for maintenance of the fresh water ecosystem. | WRC, SRT | EPA |
| Dust control | 19 | (a) The proponent will prepare a dust control plan | before clean-up commences | to minimise the impact of dust on workers and the community. | DEP, Health Dept. | EPA |
| Dust control | 20 | (a) The proponent will ensure that trucks are covered after loading before any off-site transport of wastes. All off-site transport will comply with all relevant health and transport regulations. All off-site transport will be carried out by under the supervision of a professional consultant, appointed by the proponent<br>(b) The proponent will monitor dust levels | prior to and during off-site transport<br><br>during remediation | to minimise dust emission.<br><br>to ensure that dust discharges during implementation of the project do not pose a risk to human health or cause loss of amenity. | DEP, Health Dept | DEP |

**Proponent's Environmental Management Commitments, cont**

| Topic | No. | Action | Timing | Objective | Advice | Satisfy |
|---|---|---|---|---|---|---|
| Dust control | 21 | The site cleanup work will be undertaken as far as practicable during winter months, consistent with the need to avoid handling wastes when groundwater levels are high (ie at the end of winter). Water sprays will also be used to spray dust, unless the soil is moist. Excavation and dust control will be carried out by the selected contractor to the direction, and under the supervision, of Centurion North West Pty Ltd's consultants | during on-site excavation and construction work | to minimise dust emission. | DEP, Health Dept | EPA |
| Noise & vibration | 22 | The proponent will ensure that noise and vibration from the site will be controlled | during on-site excavation and construction work | to meet regulations and standards. | DEP, Health WA | EPA |
| Noise & dust | 23 | The proponent will conduct a survey if the DEP receives ongoing complaints relating to noise or dust emissions from the site | following complaints, in the event of complaints | to determine management options to reduce the impact. | DEP, Health WA | EPA |
| Public health & safety | 24 | The proponent will ensure that 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 | before, during and after remediation | to ensure that that workers on the site are not subjected to undue risk as result of the contaminated nature of the site. | DEP, Health Dept, Worksafe | EPA |

**Proponent's Environmental Management Commitments, cont**

| Topic | No. | Action | Timing | Objective | Advice | Satisfy |
|---|---|---|---|---|---|---|
| Public health & safety | 25 | The proponent will liaise with Worksafe and implement safe working conditions on the site. Procedures to ensure this commitment is met will be incorporated into contract conditions for the work and supervised by the proponent's consultants | during site remediation | to ensure that that workers on the site are not subjected to undue risk as result of the contaminated nature of the site. | DEP, Health Dept, Worksafe | EPA |
| Public health & safety | 26 | The proponent will liaise with Worksafe | during site remediation | to ensure that that workers on the site are not subjected to undue risk as result of the contaminated nature of the site. | Worksafe | EPA |
| Risk Communi-cation | 27 | The proponent will brief Town of Bassendean representatives and members of the public at Town of Bassendean Council meetings, to the extent that Council members desire such updates from the proponent | before, during and after remediation | to ensure that Town of Bassendean representatives and members of the public are kept informed of the remediation and development project's status. | Town of Bassendean, DEP | EPA |
| Risk Communi-cation | 28 | The proponent will also prepare 1-page monthly project progress updates, to the extent that Council members desire such updates from the proponent | before, during and after remediation | to ensure that Town of Bassendean representatives and members of the public are kept informed of the remediation and development project's status. | Town of Bassendean, DEP | EPA |

## Schedule 3

# Dutch Criteria for Soil contamination

A Reference value
B Indicative value for further investigation
C Indicative value for cleaning-up

| Soil mg/kg dry weight | | | |
|---|---|---|---|
| | **A** | **B** | **C** |
| **Metals** | | | |
| Lead (Pb) | 50 | 150 | 600 |
| Arsenic (As) | 20 | 30 | 50 |
| Copper (Cu) | 50 | 100 | 500 |
| Zinc (Zn) | 200 | 500 | 3000 |
| Mercury (Hg) | 0.5 | 2 | 10 |

Source: Assink, JW and Van den Brink, WM (1986), "Dutch Criteria" *from Contaminated Soils, First International TNO Conference on Contaminated Soil*, 11-15 November 1985.

## Schedule 4

# Requirements for Cell Design and Construction

14 July 1999

- minimum distance of two metres between the cell base and the seasonal high water table;
- backfill to be clean sand;
- cell base to be low permeability material and have a hydraulic conductivity (k) of $1 \times 10^{-9}$ m/s or better;
- clay when used as a cell base to have a minimum thickness of 50 cm;
- cell cap to be of low permeability material and have a hydraulic conductivity (k) of $1 \times 10^{-9}$ m/s or better;
- vertical or side barriers of cell to be a minimum thickness of 50cm;
- cell to include a graded base for leachate collection, treatment and monitoring facility; and
- final surface above cell cap to be graded for adequate drainage away from cell.

# Appendix 8

## Summary of submissions and proponent responses

**RESPONSES TO QUESTIONS ARISING FROM PUBLIC SUBMISSIONS**

**CHANGE TO ENVIRONMENTAL CONDITIONS;**
**TONKIN PARK STAGE II, BASSENDEAN (ASSESSMENT 1201)**

## *A. REMEDIATION OPTIONS*

1. *The Department of Environmental Protection (DEP) is aware of another proposal which plans on-site treatment of pyritic wastes using magnetic separation techniques. The separated metals could then be on sold, thus removing the costs associated with landfill disposal and provide a useful resource to another party. Has the proponent fully investigated this type of option, which may include (depending on metallurgy) blending with iron ore exports such as Koolyanobbing?*

ERS and others working on behalf of Centurion have investigated magnetic separation techniques, along with numerous other treatment technologies. The former owner, Northcorp, and their consultants also performed bench tests to investigate a large range of technologies.

We are aware of CSBP's research into the possibility of successfully applying magnetic separation to cinders and have discussed the approach with them. However, there are several reasons why Centurion stands by the on-site management solution proposed in the Section 46 report, namely:

- Centurion's proposed on-site solution will sufficiently block all the environmental exposure pathways. For this reason, separation treatment is not necessary.
- Our understanding is that magnetic and other separation processes have not been proven on a commercial scale for this application. As a result, much time would be spent fine-tuning the technology. We believe the on-site storage proposal would stop the current leaching much sooner.
- Bench test work carried out for Centurion has shown that to clean part of the cinders to ANZECC or Dutch C levels, roughly half the cinders (on a weight basis) would end up in the 'rich' stream. The 'rich' stream would still need to be shipped off-site or stored within a lined area on-site. This reduces the reason to pursue separation.
- Centurion and Northcorp have searched extensively for industries that would accept the cinders 'as is', treated, enriched, or cleaned (eg. metals removed to a certain standard). Though preliminary discussions have often been positive and encouraging, no party other than the EMRC has been willing to sign a contract to accept them. Nonetheless, Centurion commits to continuing the search for industries that might be willing to accept some of the cinders.

There are other reasons why it might make sense for CSBP to approach their Bayswater site differently than Centurion proposed to manage Tonkin Park Stage II. These reasons could include that:

- CSBP continues to operate its site in the superphosphates business. CSBP may also consider themselves a 'polluter' in a historical sense, as defined in DEP's Contaminated Sites position paper. CSBP may therefore wish, for public relations or legal reasons, to clean the site (eg. lower levels of heavy metals of concern on-site to below ANZECC levels), even if this costs more than the land is worth. This could be seen to be in line with the 'polluter pays' principle advocated in the DEP's position paper. In contrast, Centurion never used pyrites ore, deposited cinders on-site, or derived any profit from such an operation. Centurion purchased the property believing an environmentally and economically reasonable compromise could be reached by all stakeholders. Centurion is not willing to pay millions more than the land is worth in order to clean up the site.
- CSBP may wish to subdivide and sell the 'cleaned' land. This could significantly increase the land's value. In contrast, Centurion wishes to use most of Tonkin Park Stage II for its own purposes, and build a road train loading and parking facility
- Centurion would pay for the bitumen needed to cover a large area even if Tonkin Park Stage II didn't have cinders on it. The plan to bitumen-cover large areas fits well with the storage of low-risk cinders under it. CSBP or the possible new owner(s) of the Bayswater property may not want to be forced to bitumen cover a large part of the property.

2. *The Water and Rivers Commission (WRC) notes that the site is classified "Contaminated – Remediation required" which is based on the DEP's position paper on Contaminated Sites (May 97). The proponent's approach for on-site treatment to acceptable levels is consistent with this Position Paper. However, the criteria should be consistent with ANZECC/NHMRC guidelines for the assessment and management of contaminated sites. Could the proponent comment on this?*

Centurion proposes to remediate the site to what it believes the DEP has defined as a 'Contaminated – Restricted Use' level, not a completely 'Decontaminated' level. This is an important point and relates to proposed land use. The Minister's Conditions, as they currently stand, assume the owner will want to sub-divide and sell encumbrance- and memorial-free titles to numerous small buyers; ie. follow Northcorp's development plan. CSBP's pursuit of on-site treatment using magnetic separation, etc. to remediate on-site soils to lower-metals standards also seems aimed at ending up with a 'Decontaminated', encumbrance-free property that can be sold for any use, without restrictions.

Centurion views the ANZECC/NHMRC Guidelines for the Assessment and Management of Contaminated Sites as guidelines and not as hard and fast criteria or laws that should be rigidly imposed at all times. The spirit and intent of guidelines issued by the ANZECC/NHMRC, the DEP, and others is to benefit the environment by encouraging land owners to consider land-use specific, practical, and cost-effective solutions. These solutions should aim to effectively block exposure pathways of materials that could be considered 'contaminants' if mismanaged (eg. heavy metals such as copper or zinc that could be contained on high ground under a liner, but should not be acidified and released into ground or surface waters).

The on-site management plan proposed by Centurion follows the risk assessment-based approach advocated by ANZECC/NHMRC. It also considers the guideline investigation levels for various metals in soils. Further, Centurion proposes excavation, relocation, and capping, combined with a 'Contaminated – Restricted Use' land use classification, because metal concentrations in soils on-site in many cases exceed guidelines such as ANZECC/NHMRC and Dutch B and C.

3. *The WRC notes that previous investigation by the Bassendean Town Council has identified that the sediment within the two compensating basins in Tonkin Park contains elevated metal concentrations identical to the stockpile. These basins are connected to the Chapman Street main drain, which discharges to the Swan River. As the regional groundwater in the area is fairly acidic, dissolution of metal ions in the basins is possible and will continue to pose a threat to the river system. The remediation strategy should include cleanup of the two stormwater basins. The Town of Bassendean and the EMRC both supported this view in their submissions. How does the proponent respond to this?*

   If the on-site management proposal outlined in the Section 46 request is approved, Centurion may agree to include some compensating basin solids in an on-site cinders storage area. The feasibility of this will relate to the amount of material in question.

   It should, however, be born in mind that when Centurion purchased Tonkin Park Stage II, the Minister's Conditions and associated cleanup costs did not extend to neighbouring properties or other places where the former owners may have relocated cinders or other wastes. For example, Centurion understands that many of the cinders from Tonkin Park not only flowed into the downstream compensation basin before Centurion purchase Stage II, but many were also deposited in Ashfield Flats, and in various landfills around Perth. Cinders were also used routinely as road base within the metro area.

   Perhaps a compromise would be for the Town of Bassendean (or whomever owns the compensation basin) to pay Centurion 'at-cost' to include impacted soil in the on-site storage arrangement within Tonkin Park.

4. *The WRC notes that the issue of identification of existing groundwater quality and defining the extent of current off site impacts and remediation for the contaminated groundwater plume needs to be addressed. Could the proponent address this issue?*

   Centurion agrees completely. However, the cost of this work should not be born by Centurion alone. The Minister's Conditions do not require the carrying out of groundwater investigations or remediation, on or off-site. Presumably this is because Tonkin Park lies in an industrial area with numerous other industries potentially contributing to groundwater impacts, including at least one Town-operated landfill that may well itself have been used to dispose of Tonkin Park cinders. Another issue is that several previous owners of Tonkin Park, not Centurion, caused the groundwater contamination plume.

   Since 1995, ERS and Centurion have discussed groundwater concerns with DEP, WRC, and many other authorities. The consistent feedback through to late 1997 was that it was sufficient for Centurion to help eliminate the *source* of possible further contamination. No suggestions were made that Centurion should fund an off-site groundwater research project. On this basis, if a comprehensive groundwater study is to be carried out, not only Centurion, but also all former Tonkin Park owners, all surrounding industrial property and landfill owners, and the Town of Bassendean should participate and provide funding. It might also be reasonable for state government (DEP and WRC) to lead the effort.

5. *The Town of Bassendean notes that it is questionable whether sites which contain contaminated material should be developed for other than passive purposes. Could the proponent comment on this?*

Centurion agrees. The proposed on-site storage arrangement under bitumen, above groundwater, offers a perfect compromise. The arrangement will be 'passive' in that no one will dig in or disturb the stored material. On the other hand, Centurion can put the bitumen cover to good use without dedicating an undeveloped and environmentally encumbrance-free property for this purpose.

6. *The Conservation Council of Western Australia (CCWA) notes that the material may not be suitable for covering with bitumen and then using for road train parking. Experience at Minim Cove where a similar base was used for roads and bike paths was not successful. The material cracked and the roads had to be redone. Another submission notes that this is probably due to the combination of narrow pore space of the pyrites and subsequent high water retention capacity, making a very mobile expanding and shrinking base with moisture changes. Could the proponent comment on this?*

Centurion would appreciate any specific information that CCWA or others have on why the material may not be suitable. Centurion believes that construction details such as the depths of clay and clean fill between the cinders and the concrete/bitumen cap are key factors. Cases in point are that cinders (and in some cases even unoxidised pyrites ore) have been used under roads and freeways without problems.

Centurion will adhere to the commitment to maintain the integrity of the bitumen cap. Since Centurion wants to use the bitumen-capped area, it would be in Centurion's own interest to use sufficient amounts of materials between the clay cap over and to the sides of the cinders and the concrete/bitumen. If roads crack or otherwise need to be re-done in the future, Centurion will pay for this.

Centurion believes the proposed >2.5 metre separation distance between the bottom of the cinders and the top of the maximum annual groundwater level is sufficient to avoid wetting of the cinders, and any possible expansion and shrinking problems. Similarly, the bitumen and clay cap will minimise rainwater infiltration.

7. *A submission noted that if this proposal was acceptable, then presumably it would be acceptable for Class IV waste sites to be established all over the metropolitan area at any place where a business can be found to use a large car park and give an assurance that it would attempt to manage it in a responsible manner for as long as the company might exist. The submitter believes most people would find this proposition ludicrous. How does the proponent respond to this?*

Centurion considers the proposed on-site solution of significant benefit to the environment, as all parties involved with the site since 1910 have been content with a 'watch and do nothing' approach.

Centurion does not consider the proposed on-site storage arrangement a Class IV waste site. Centurion considers it a purpose-build storage arrangement for wastes of a specific type that are inert and harmless if managed and contained properly (eg., kept out of the naturally acidic groundwater under the site, between layers of clay).

Landfills, Class IV or otherwise, lend themselves to disposal of relatively small, and hence affordable, amounts of mixed waste that shouldn't be buried without sufficient risk assessment/exposure pathway controls. The problem is that when there are huge amounts of waste, such as at Tonkin Park, the cost to someone to "send it to a tip" becomes many millions of dollars, and far more than the land value. To avoid ending up with orphan sites (sites that no-one wants to own), those sites that have large amounts of easy-to-control wastes such as Tonkin Park should definitely consider on-site management – not necessarily to 'Class IV' standards, but to the standards needed to control environmental exposure.

## *B. SAMPLING AND WASTE CHARACTERISATION*

1. *The Contaminated Sites Branch of the DEP notes that the information presented on waste characterisation is less than would be expected when an assessment of remedial options is being put forward. As there is no characterisation of the waste presented, the homogeneity of the waste within the stockpile is also indeterminate. This leads to the question of how representative the Net Acid Generation and Heavy Metal Concentration/Water Extraction tests are of the whole stockpile material. It seems that 38 samples are supposed to represent the chemical properties of up to 250 000 cubic meters of contaminated material. The DEP believes that to adequately characterise the nature of the waste, sampling on a 15 metre grid basis would be necessary, with a sample taken every metre of depth. This would equate to approximately 1000 samples, with each sample representing around 250 cubic metres of material.*

   To date Centurion has spent five years and a significant amount of money on consultants, analytical labs, and surveyors. This effort has characterised the site, and the waste within it, to the extent Centurion and ERS believe it necessary to reach informed decisions; ie. to propose a practical and economically achievable solution that greatly benefits the environment. Centurion commits to carrying out additional site assessment and characterisation, in consultation with the DEP, to more-accurately determine the amount of wastes to be managed.

2. *The Eastern Metropolitan Regional Council (EMRC) notes that the leaching test using rainwater may not provide an accurate indication of the leaching potential of the stockpile as movement of rainwater through the stockpile may result in cumulative reduction in pH as the water is exposed to acidic material. This could be verified by taking an extract of water from the stockpile just above the seasonal groundwater and measuring its pH. Can the proponent provide this information?*

   Currently the site is not covered. (This has been the case since 1910.) Rainwater is therefore now (and has historically been) free to percolate through the material. Such water may well increase in acidity as is trickles down.

   However, acidity changes resulting from percolation will become a moot issue once (if) Centurion's on-site management solution is approved, as the material will be moved to well above the groundwater and will be covered by clay and bitumen. Percolation through the soil will then stop, and information on the degree to which rainwater might acidify throughout infiltration, and the methods to try to measure the effect, becomes irrelevant.

3. *The EMRC notes that the NAG test to determine the amount and depth of crushed limestone to neutralise the acidic stockpile is only one factor in the consideration of a suitable lining material. Other crucial factors are the permeability of the material, which is required to be extremely low, and the leachate collection/monitoring system required to assess the environmental performance of the cell. Could the proponent comment on this?*

   Agreed. Contrary to the suggestion in the Section 46 report, Centurion will no longer attempt to mix high pH lime slurry material or metallurgical lime into the cinders during the excavation and relocation exercise. After excavation, however, Centurion will relocate the cinders to more than 2.5 m above the maximum annual groundwater level, and place cinders on a 50 cm clay base, cap it on top and sides with 50 cm of clay, then bitumen cap it on top. The clay and bitumen on the top and side of the cinders will be profiled so that water run off occurs into a slotted stormwater pipe. The fundamentals of the approach is to provide sufficient lining and covering of the cinders to ensure that no rainwater leaches through the underlying fill. The cinders are relocated to more than 2.5 m above the maximum annual groundwater level to prevent contact with water from below.

4. *The CCWA states the information provided is inadequate and there needs to be more complete information on nature and extent of the wastes. The analysis of the stockpile is superficial and the proponent has no real idea of the extent of the problem they are facing. Could the proponent comment on this?*

   Centurion commits to carrying out additional site investigation and assessment, including grid sampling, in consultation with DEP.

5. *The CCWA believes that there is no basis for the proponent's assumption that older material will have less potential to leach metals, as the older material to be found at the lowest levels are quite possibly more likely to leach metals as this material would have been poorly and less completely roasted, due to earlier technology. Could the proponent comment on this?*

   Centurion commits to carrying out additional site investigation and assessment, including grid sampling, in consultation with DEP.

6. *A member of the public asks how are the lime and excavated material to be mixed together? What degree of contact between the lime and the material is required to guarantee that the lime will prevent leaching? Has the proposed mixed material been subject to a leach test to confirm that it would not leach if water is passing through it? If not, why not?*

   Per agreement with the DEP, Centurion no longer proposes to mix high-pH lime slurry material or metallurgical lime into the cinders during the excavation and relocation exercise. Instead, Centurion will place the cinders higher above the groundwater than previously proposed, and will place a 50 cm thick clay liner under the fill. Centurion will also provide a 50 cm thick clay cap under the road base and bitumen cap.

7. *A member of the public asks how many samples and from what locations were the samples taken on which the Graeme Campbell & Associates' opinion is based? Are these samples statistically representative of the material in the stockpile and in the deeper dump? And on what basis is this concluded?*

Graeme Campbell & Associate's opinion is based on the figures and tables in the Section 46 Request report which show number of samples, sample locations, and analytical results. Graeme Campbell & Associates have also reviewed the PER and other documents prepared by and for Northcorp in the late 1980's. These reports contain a significant amount of additional data on the deeper dump (ie., Tonkin Park Stage II, before the Stage I stockpile was placed on Stage II's former cinders dump).

8. *A member of the public who had past involvement with the site notes that blue asbestos lagging is present in the stockpile. Does the proponent know how much asbestos is present in the stockpile and its location?*

We do not have data on or knowledge about blue asbestos lagging in the pile. In our opinion, asbestos would not create a problem if kept in the proposed on-site storage arrangement. The Health Department can advise if extra precautions are required during on-site excavation and relocation. (NB. This would also be necessary even if wastes were to be excavated for relocation off-site.)

9. *A member of the public who had past involvement with the site notes that there is a vast amount of rubbish in the material, particularly at depth, which includes large concrete blocks, wood, empty drums and wire cables. Has the proponent determined the amount and locations of this rubbish?*

Centurion has not determined the amount of rubbish. The proposal is to relocate such rubbish along with the cinders and any other wastes to above the groundwater, under the clay and bitumen cap. The definition, amount, type, and location of rubbish will not change the on-site storage proposal put forward by Centurion.

## C. *WASTE REMOVAL PROCEDURES*

1. *The DEP and other submitters question why the proponent proposes not to remove material below the water table given that it could be easily extracted using dewatering and excavation techniques?*

Centurion has estimated the cost of dewatering to be hundreds of thousands of dollars. Centurion believes the lion's share of environmental benefit will come from relocating and covering the waste materials that can be reached without dewatering. To maximise removal of any waste found in the groundwater, Centurion will excavate such waste during the summer when the groundwater elevation is at its lowest, and will also attempt to remove wastes from below the groundwater interface.

2. *The DEP and WRC note that details of infrastructure associated with excavation, dewatering and truck washdown are required. Could the proponent provide these details?*

Centurion makes the commitment to develop, write up, and provide such details once the Minister's Conditions and Proponent Commitments have been reworded to allow the proposed on-site management approach.

3. *A public submission suggested that the former developer had discovered that dewatering was expensive due to the corrosive effect the acidic water has on dewatering plant. Could the proponent comment on this?*

Agreed. The groundwater is naturally acidic upstream of (flowing into) Tonkin Park. In their current uncovered condition, the cinders and stockpile may be further lowering the pH of the already acidic water. Dewatering efforts would most likely need to include neutralisation to protect equipment and (perhaps) personnel. This is one of the reasons Centurion wishes not to dewater.

4. *A member of the public asks how does the presence of asbestos affect how the proposal would be implemented, given that it involves handling and mixing of material using bulk earth moving equipment?*

Earthmoving and dust control in compliance with Health Department recommendations will be used to control the possible effects of asbestos and other materials. Centurion will also provide personnel protective equipment in line with Health Department advice. (NB. this issue would also need to be addressed if the site's wastes were to be relocated off-site.)

5. *A member of the public asks how dust will be managed during the mixing process, especially given the possible presence of asbestos?*

See response to Question C4 above in light of response to Question B6.

6. *A member of the public who had past involvement with the site notes that there is a vast amount of rubbish in the material, particularly at depth which includes large concrete block, wood, empty drums and wire cables. This rubbish could easily puncture the thin limestone base. How does the proponent intend to manage this rubbish? Where will it be disposed of to? Is any of it hazardous?*

Centurion will place the rubbish along with the cinders between 50 cm top and bottom layers of clay. Centurion will make sure to not puncture the clay liners and believes the proposed clay thickness will be sufficient to accomplish this objective.

## D. CELL STRUCTURE

1. *The Contaminated Sites Branch of the DEP notes that the use if a 10 cm limestone layer appears to assume that there would be no lateral movement of leachate within the cell. If there were impermeable/low permeability zones within the cell, leachate could follow a preferred seepage path leading to neutralisation of the limestone barrier in certain locations, allowing contaminants to escape into the groundwater. The DEP notes that if on-site containment is to be accepted, then a geomembrane barrier such as HDPE is likely to be required. Could the proponent comment on this?*

   Centurion will no longer place the cinders between limestone layers, but between two 50 cm thick clay layers. Centurion believes the proposed clay thickness, along with profiling, a bitumen cap, and leachate collection, will be sufficient to contain wastes. Centurion believes the proposed arrangement, coupled with relocation of waste above the groundwater interface is far superior to the historical situation where the waste isn't even covered at all.

2. *The WRC notes that the results of Toxic Characteristic Leaching Procedure (TCLP) indicate that metal dissolution occurs under mild acidic condition. It is evident that groundwater transecting the site has been impacted by the stockpile and other buried contaminants. The proposed limestone barrier of 100 mm may be considered inadequate when compared to the containment cell in McCabe Street, Minim Cove. The McCabe Street containment cell has 500 mm on the sides and bottom of the cell with a capping layer of 300 mm limestone, 600 mm compacted clay and finally 650 mm of loamy sand for shallow rooted vegetation. In order to minimise the likelihood of groundwater contamination, the limestone barrier around the stockpile should be increased to the required thickness consistent with the McCabe street containment strategy and coupled with compacted clay to maintain cell integrity. The use of approved synthetic (HDPE) liners should be considered as an alternative. How does the proponent respond to this?*

   For the new cinders containment arrangement, see Response to Question 3, Sampling and Waste Characterisation, above. The bottom barrier under the cinders will consist of 50 cm of clay. The barrier on top of the cinders will consist of 50 cm of clay, plus 50 cm of clean fill, road base and bitumen.

   In contrast to Tonkin Park, the Minim Cove site has been redeveloped for high-cost, high-density, residential purposes. It therefore seems reasonable that the Minim Cove storage arrangement should be more robust. In addition, the location and massive upgrading of land values at Minim Cove (through the upgraded land use) makes more financial resources available.

3. *The Health Department notes that the proposed method of containment may result in a structure extending over an area of nearly 8.4 hectares and standing some 3 to 4 metres in height. It would be beneficial to have an indication of how the overall structure of the containment area would be incorporated into the site as this may have a bearing on the hazard. Could the proponent provide further details of the shape and location of the containment cell?*

   Centurion has drawings of the proposed layout in the form of a report named "Containment Arrangement For Cinders at Tonkin Park, Bassendean, Centurion North West", and can forward this to interested parties. Centurion also makes the commitment to carry out additional site investigation work to more-accurately estimate the size of the on-site cell. Centurion will also consider removal of some waste from site, to a landfill or minerals processing facility, to keep the cell area and height reasonable.

4. *The Health Department notes that the CER does not provide the information on the overall structure of the containment system, and given its height above the surrounding terrain, how would the sides of the structure be enclosed and stabilised to prevent exposure of contaminants. Can the proponent provide further details?*

   Agreed that such details will be required. Centurion plans to detail the storage layout once the on-site storage approach has been approved. Conceptually, the edges of the storage areas will be overlapped by up to 1-5 metres; ie., bitumen cap will extend past the edges of where wastes will be stored.

5. *The Town of Bassendean, the EMRC and several submitters were of the view that if the material was to be left on-site, then given the proximity (and drainage connection) to the Swan River, the level of containment for secure Class IV cells should also apply. This would include clay and HDPE liners and a leachate collection system. How does the proponent respond to this?*

   Centurion and ERS maintain that cinders containment to a Class IV standard is not called for as the proposed storage arrangement above groundwater, between clay layers, and under bitumen effectively blocks all exposure pathways. True; the cinders often contain total heavy metals concentrations (on a dry basis) that exceed Class III landfill acceptance criteria. However, if kept away from acidic water, the cinders do not pose a threat and do not need a Class IV type cell. The proximity to a drain does not matter; the degree of control on potential contact between acidic water and the waste material does.

   The proposed storage arrangement clearly minimises leaching potential dramatically compared to the current 'no controls' scenario that has been allowed to exist since 1910.

6. *The CCWA states that the proposed 10 cm limestone base and 10 cm limestone capping are completely inadequate in view of the nature of the stockpile and the natural acidity of the groundwater. From an engineering perspective it would take careful control to guarantee the actual thickness of such a layer. How does the proponent respond to this?*

   For the new cinders containment arrangement, see response to Question 3, Sampling and Waste Characterisation, above. The bottom barrier will consist of 50 cm of clay; the top barrier will be 50 cm of clay plus 50 cm of clean fill, road base and bitumen.

7. *A member of the public notes that bitumen is susceptible to petroleum based products. Use as a transport depot would mean that spills are likely, how would the integrity of the bitumen seal be guaranteed?*

   Centurion does not typically experience spills at its terminals. If there was a spill, Centurion would clean up the spill, and inspect the bitumen to ensure integrity. Centurion would do this to allow continued truck movement on the surfaces.

8. *Members of the public question on what basis is the 10 cm layer of limestone proposed? Is this sufficient and if so, on what technical grounds?*

   Refer to response to Question D2, Cell Structure.

## *E. LEVEL ABOVE GROUND WATER*

1. *The DEP notes that the proposed separation from groundwater is one metre. Since the proposal is to contain the material in perpetuity, the contaminated material should be located above the highest groundwater level that could be expected in the long term. Can the proponent provide further details of groundwater variations that may occur over a 100 to 1000 year time frame?*

   After consultation with DEP, WRC and interested parties (and contrary to the suggestion in the Section 46 report), Centurion will place the cinders at least 2.5 m above the maximum annual groundwater level. Maximum annual groundwater levels for all locations within the site were obtained from the WRC "Perth Groundwater Atlas", backed up by verbal consultations. WRC levels were used in lieu of field measurements to ensure consistency.

   Another point to keep in mind is that the >2.5 m separation distance is far better than a 'no action' scenario to the extent that (in the event that) groundwater elevations increase in the coming years.

2. *The WRC notes that the vertical separation of 1 metre between the base of the containment cell and the seasonal groundwater may be insufficient when compared to the McCabe Street containment cell which has groundwater separation of 5 metres. The proponent should demonstrate that this buffer is adequate. Can the proponent provide this data and modelling?*

   The McCabe Street site storage cell is several metres above groundwater because this was practical for a site located on a bluff, well above groundwater levels. At Tonkin Park, most of the site is 1-3 metres above groundwater. Based on advice from the DEP and WRC, Centurion now proposes an elevation above maximum annual groundwater of >2.5 m. This is a reasonable distance for this site, to not have to raise the entire site above the surrounding properties or cause the need to import huge amounts (eg., >100,000 cubic metres) of clean fill.

3. *The Health Department notes that no indication is provided of the sub-surface depth of the high water level, although schematic diagrams indicate it to be less than one metre. If groundwater levels were to rise they may compromise a one metre barrier and this may result in further leaching of contaminants. To safeguard against the intrusion from rising groundwater, an impermeable (clay) barrier, as suggested in a previous report would be required. Could the proponent comment on this?*

Centurion has agreed to this. Elevation above maximum annual groundwater level has been altered to >2.5 m. For details of the clay barriers refer to Response to Question D6, Cell Structure.

4. *The Town of Bassendean and the EMRC note that the last 20 years have been the driest on record and it would be reasonable to expect that the current water table is also at its lowest. The CER provides no details of the actual level of the water table (relative to Australian Height Datum). Without accurate data in this area, the adequacy of the proposed separation distance between the containment cell and the water table cannot be assured. Can the proponent provide these details?*

   Agreed. See responses to Question E1-3 above.

5. *A submission notes that to place waste within one metre of the highest measured water table is definitely not adequate as the pyrites in particular are hygroscopic with the potential to lift water over considerable distance. Could the proponent comment on this possibility?*

   Centurion has agreed to alter elevation above maximum annual groundwater level to >2.5 m. The 50 cm clay layer under the waste will further serve to minimise the risk of potential water lift.

## *F. MONITORING*

1. *The DEP and the WRC note that the proposed monitoring program is for 2 years on a quarterly basis and then annually for another 2 years. The DEP and WRC note that to be acceptable, the monitoring program would need to continue on an ongoing basis.*

   Agreed. Perhaps the constituents to be monitored can be reduced through time if concentrations are trending downwards.

2. *The WRC notes the proposal to install groundwater monitoring bores to check cell integrity. The WRC recommends an additional bore, located in the center of the cell to allow water level and quality changes to be monitored immediately beneath the cell cover and possibly include some form of moisture level monitoring to test the integrity of the cover. Could the proponent comment on this?*

   Centurion agrees to install an additional bore in the centre of the cell if WRC wants one there. Realistically, the exact number of bores and the locations should be agreed to once the waste storage and truck terminal layouts have been finalised. Centurion would also be willing to consider a moisture measuring device.

3. *The WRC notes that the issue of treatment of existing groundwater bores and future groundwater abstraction needs to be addressed. Could the proponent address this issue?*

   The remnants of the 3 bores left behind from Northcorp's consultants will not be of value once the site has been excavated. It is Centurion's understanding that the Town of Bassendean currently prevents or discourages use of top aquifer groundwater in the general area around Tonkin Park.

4. *The Health Department notes that two monitoring bores downstream of the waste storage area are proposed. However, the size and plan of the containment area will dictate the number of monitoring bores necessary to effectively monitor groundwater condition. It is notable that the proposed location would miss the zone currently displaying the highest level of contamination. Could the proponent comment on this?*

   As noted in the response to Question F2, the exact number of bores and the locations should be agreed to once the waste storage and truck terminal layouts have been finalised. The locations should not and will not miss zones currently displaying the highest level of contamination. Centurion will discuss exact bore placement with DEP and the Health Department to ensure that nothing is missed. If requested to, Centurion will position bores where DEP and the Health Department want them.

5. *The Health Department notes that to prevent surface waters infiltrating and leaching the redeposited contaminants the integrity of any impervious membrane cover is of considerable importance. For this reason there should be as requirement for both current and future owners of the site to monitor and maintain the integrity of any water resistant cover. Could the proponent comment on this?*

   Agreed. Centurion commits to maintaining and ensuring the integrity of the bitumen cap. Centurion will also place a memorial on the bitumen-covered areas above the cap to the satisfaction of the EPA and DEP.

6. *The Health Department would like clarification as to why the pH and only five metals are included in the suite of contaminants for testing. Why aren't fluoride and total phosphorous included?*

   Most of the government and public interest related to leaching from Tonkin Park have revolved around metals, not fluoride, phosphate or other materials. For example, when ERS tested the northern ~60% of Tonkin Park Stage II to verify it as encumbrance free for development, DEP only asked for analysis for the 5 heavy metals listed in the Minister's Conditions.

   With regards to phosphate, there are few international investigation or cleanup levels listed, and home owners and farmers are permitted to spread large amounts on surface soils. For this reason, we are not sure why we should analyse for this substance, or what we should do with the results. If showing a downward trend is the goal, then measurement of the metals will accomplish this.

   Fluoride is similar. Centurion would be willing to monitor for fluoride, but downward trending from metals should be sufficient. In a practical sense, nothing would be done differently if fluoride levels were to be monitored.

   Nonetheless, Centurion agrees to monitor for phosphate and fluoride if requested to by the DEP.

7. *A member of the public questions why the proponent does not propose to analyse wastes, soils and water for all the analytical parameters mentioned in the existing Ministerial Conditions for the project, given the history of the site.*

   Refer to response to Question F6 above.

## G. CONTINGENCY PLAN

1. *The WRC is concerned that a trucking company would be responsible for the management and maintenance of the containment cell. What form of assurance can the proponent provide to ensure that the integrity of the cell would not be impacted by their on-site operation?*

   Centurion has experience in maintaining bitumen covers and will have an ongoing interest in maintaining the surface that Centurion trucks will park and drive on. The underlying 50 cm clay layer will provide additional protection. Centurion invites the WRC and other interested stakeholders to inspect the cover whenever they wish and report any suggestions or concerns to Centurion and DEP.

2. *The WRC states that contingency measures would need to be developed to address the potential for continual degradation and crack with time and there should be a commitment to monitoring the integrity of the cover and that investigation of additional covering strategies of the bitumen cover is inadequate. How does the proponent respond to this?*

   See 1 (above) for Centurion experience in bitumen cover management and the Response to Question F5, Monitoring, for commitment to cap maintenance.

3. *A member of the public asks what contingency plan is proposed if monitoring does not identify an improvements in water quality leaving the site? Will the proponent commit to remove the material from the site if the remediation is unsuccessful?*

   Centurion is confident that the proposed on-site management plan is far better than no action; it will begin to improve water quality under and downstream of the site, even if it may take a while to notice big improvement.

   The proposed on-site management plan will cost Centurion a significant amount of money. Centurion will therefore not commit to removing material from site once the on-site management plan has gone ahead.

## H. CAVEATS

1. *The WRC notes that to ensure environmental compliance, quality assurance such as security bonds or caveats on land titles should be considered to minimise unwarranted development. Furthermore, a commitment should be made to annual auditing by competent consultants. Will the proponent make this commitment?*

   Centurion will agree to a caveat on the land title for the portions (only) of the site used to permanently store wastes. This will eliminate the risk of "unwarranted" development.

   Centurion will not provide a security bond.

   Centurion will consider annual auditing by competent consultants, but wishes further clarification before committing to this.

2. *The Health Department notes that as there is potential for future rezoning of the land, albeit in an unknown time frame, a memorial on the title would ensure that future purchasers of the site were informed of the location of the waste and the restriction this would place on development. How does the proponent intend to address this matter?*

   Agreed. However, the caveat on the title for the land portions that will contain waste must be worded so as to allow Centurion to secure bank funding.

3. *A number of submissions suggested that there was no guarantee that the cell could be managed indefinitely by a private company. Could the proponent address this issue?*

   All Centurion can possibly offer is its commitment and promise, combined with contracts with government (title caveats, agreements for cap inspections, monitoring, etc.) An upfront commitment to invest a large sum of money to benefit the environment where no controls have been in place since 1910 should also be seen as a major commitment.

## *I. ECONOMICS*

1. *Several of the submissions suggested that the cost of removal off-site to an appropriate landfill had been greatly exaggerated by the use of incorrect disposal fees and transport costs. The Red Hill Class IV landfill operators themselves noted that the disposal costs used in the CER were not correct for large quantities of waste. Other submissions noted that another Class IV disposal site (with potentially millions of cubic metres capacity) was presently being assessed by the EPA and competition could result in cheaper prices. It was suggested these inaccuracies were to distort the economic justification and provide support to the proponents view that removal off-site as required under the present Ministerial Conditions was not practical. Can the proponent provide a more accurate costing of the various options?*

   Centurion maintains its view that disposal fees listed in the report are relatively accurate. EMRC might or might not give some economies of scale. Either way, according to EMRC, such cost reductions are likely to be minor, say 5-10%. The result is that, as far as Centurion is concerned, the disposal cost alone would still be millions of dollars more than the land value.

   Centurion stands by its assessments of land values for Tonkin Park. Perhaps the differences of opinion stem from the fact that a large industrial block is not nearly as valuable as the same block subdivided, and that land with a negative environmental history is less valuable than it otherwise would be. Since Centurion does not plan to subdivide Stage II the way Northcorp subdivided Stage I, the full uplift potential will not be realised or available to fund waste relocation costs, even if Tonkin Park's history weren't a factor.

   We understand that a CER has been submitted to open a second Class IV landfill at Bakers Hill. However, this site is 65-70 kms from Perth, hence, the cost of waste relocation would exceed the value of the land once cleared. Even if landfill space at Bakers Hill was free, this would not be worth pursuing.

   Centurion believes costing of the off-site alternatives in a number of reports leading up to the Section 46 Request show that off-site relocation is not a viable option.