



ASSESSMENT REPORT

Section 75W Modification Pasminco Remediation, Boolaroo (MP 06_0184 MOD 3)

1. BACKGROUND

Pasminco Cockle Creek Smelter Pty Ltd (PCCS) operated a lead and zinc smelter at Boolaroo, in the Lake Macquarie local government area (Figure 1) for over 100 years. PCCS was placed into voluntary administration on 19 September 2001 and Ferrier Hodgson (Ferrier) was appointed Deed Administrators in October 2002. The smelter subsequently closed on the 12 September 2003.

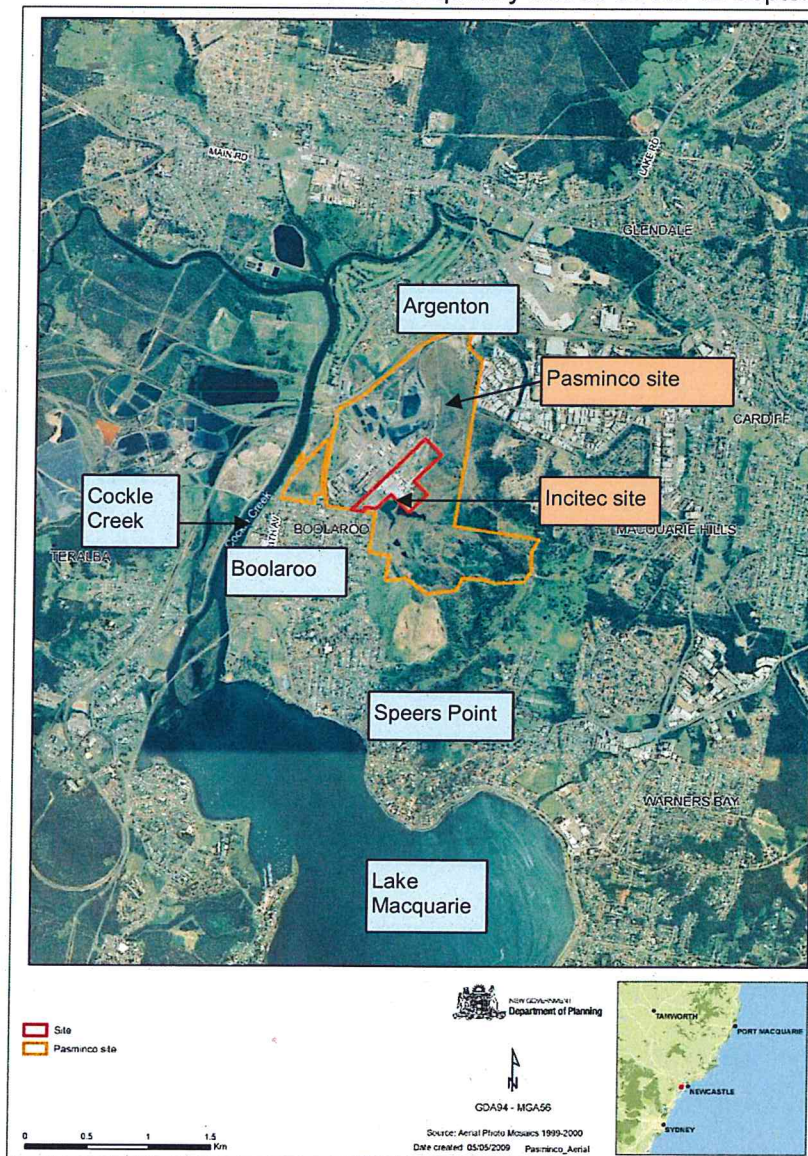


Figure 1: Site Location

Industrial operations at the site resulted in the contamination of soil, groundwater and surface water in the area. The main contaminants include heavy metals such as lead, cadmium and zinc.

On 10 September 2002, the Environment Protection Authority (EPA) declared the site, together with parts of the bed of Cockle Creek and Cockle Bay, a “remediation site” under section 21 of the *Contaminated Land Management Act 1997*. Figure 1 depicts the scale of the site (outlined in orange).

Surrounding land use

The PCCS site surrounds another remediation Project approved by the Department (under the Minister's then delegation) which is managed by Incitec Fertilizers Limited (Incitec) – see Figure 1. The Incitec site was previously part of the PCCS site and contains similar contaminants. Remediation on this site has not yet commenced.

Residential areas are located to the north at Argenton (~800m from the northern site boundary), Macquarie Hills (~550m from the eastern site boundary) and south at Boolaroo (located adjacent to the southern boundary of the site). The Cardiff Industrial Estate lies ~500m to the north-east of the site and is characterised by large light industrial allotments. Cockle Creek, which discharges to Lake Macquarie, is located ~600 to 800m to the west of the site.

When operational, PCCS also caused contamination of properties surrounding the site through stack and fugitive dust emissions and the use of waste slag as filling material.

Approved remediation works

On 24 February 2007, the then Minister for Planning approved the remediation activities at the site, including progressive excavation of contaminated soil with subsequent refilling, regrading and surface stabilisation works, and placement of contaminated material in two engineered containment cells on site. The final proposed land uses across the site include passive open space, residential and industrial uses.

The Minister's approval also included a 'Lead Abatement Strategy' (LAS) where residents within identified areas can voluntarily participate by having contaminated soils removed from their private properties and placed into the main “Containment Cell” on the Pasminco site. The LAS has commenced and approximately 1223 residents are currently participating in the scheme with varied remediation strategies being undertaken for these properties depending on the level of contamination.

Containment cells

The total volume of contaminated material on-site requiring containment is in the order of **1,143,280 cubic metres**. Under the current approval, 'Cell 1' is used to contain most of the contaminated soil from the remediation site. Figure 2 shows the location and general configuration of this containment cell which has an approximate rectangular footprint of 440 metres by 485 metres and covers an area of almost 20 hectares.

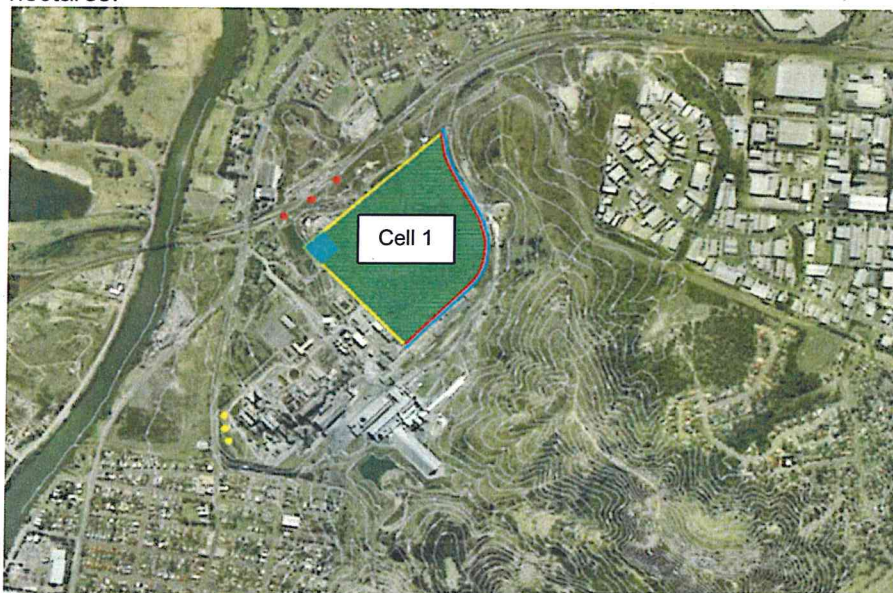


Figure 2: Cell 1

Contaminated materials are progressively placed in Cell 1, compacted in a controlled manner to a varied depth of up to 15 metres, and then sealed with an approved 'cap'. The cap is approximately 2.5 metres thick and its purpose is to minimise water infiltration into the cell (thereby reducing groundwater and leachate generation). The final land use of the cell surface is currently approved as 'passive' or no 'development'.

As of November 2011, 1,050,000 cubic metres of contaminated material had been placed in Cell 1.

PCCS has reported that better than anticipated compaction rates have been achieved for the material already placed in Cell 1, which means that the material is stronger and less compressible than originally expected.

A smaller cell, referred to as 'Cell 2', has been filled (to completion) with approximately 14,000 cubic metres of waste from the site which is more concentrated in contaminants, particularly lead. Some of the contaminants placed in Cell 2 have been treated (by immobilisation).

Since Cell 1 is a key component of the remediation strategy, its feasibility has been subject to ongoing detailed investigations. Following Project approval, PCCS was required to submit detailed design plans for the cell (in accordance with Conditions 3.2 and 3.3) which an EPA accredited Site Auditor and the EPA considered and approved (in 2008).

This approval from the Site Auditor was subject to a condition requiring the EPA's approval for any variations to the cell. In 2010, the EPA approved an extension of the cell footprint by 40m to the west to increase cell volume. This has been reflected in the Environment Protection Licence (EPL) for the site (number 5042).

Previous Modifications

The Pasminco Remediation Project has been modified once (MP 06_0184 MOD 1) on 24 June 2010. This approval amended a number of conditions relating to the construction and certification of the containment cell.

A second application (MP 06_0184 MOD 2) relating to the approved 'Lead Abatement Strategy 2007' (2007 LAS) was formally withdrawn after significant issues were raised by the Department, EPA and the community.

2. PROPOSED MODIFICATION

The existing capping system for Cell 1 includes a 600mm thick layer of 'Clay Liner Material'. The specification for this material is relatively strict, in particular requiring a low permeability and a limited amount and size range of gravel/rock particles.

Clay (of the required specification) is sourced locally, however it is in short supply. The total quantity required for the cell with its existing design is 133,000 cubic metres. A shortfall of approximately 48,000 cubic metres (m³) is currently expected.

Ferrier has identified and considered a number of options in relation to this shortfall and now intend to revise the cap design to reduce the required quantity of clay. Ferrier considers that geosynthetic material layers can be used as a substitute for clay without affecting the performance of the cap. This would have two additional benefits:

1. providing contingency 'airspace' for additional contaminated material, without the need to increase the cell footprint because the total cap thickness would be reduced; and
2. reduction of truck movements on local roads for the delivery of clay (48,000 m³).

On 16 January 2012, Ferrier submitted a modification application (MP 06_0184 MOD 3) on behalf of PCCS to:

1. amend the approved cap materials:

The proposed modification seeks to amend the cap barrier system from 600mm of clay material to a combination of 100mm clay with a 1mm Linear Low-density Polyethylene Liner (LLDPE) geomembrane (ie a Composite Liner). It also seeks to amend the drainage layer by incorporating a geocomposite drain to enhance the protection of the LLDPE liner below.

2. change the gradient slope:

The modification also seeks to amend the final cell landform from a gradient of 3% to 2% on the top area to enable playing fields to be constructed as part of the final land use. The application states that there is anecdotal evidence from local sporting clubs indicating a need for additional playing fields in the area and also that Council considers that this would provide a better outcome for the local community (compared to passive open-space).

The proposed changes would only apply to areas of the cell not completed (an area of approximately 7.5 hectares). The key changes between the approved and proposed capping systems are detailed below in Table 1.

Table 1: Proposed modifications to the approved capping design

Component of the cell cap (from top to bottom)	Approved design	Proposed modification
Topsoil layer	150mm thick topsoil	No change
Subsoil layer	600mm thick subsoil	No change
1. Drainage Layer	150mm thick subsoil gravel drainage	Geocomposite drain 10mm thick
	Drainage collection pipes	No changes to pipe material, however pipe spacing and layout changed
2. Barrier Layer	600mm thick clay liner	Linear low-density polyethylene (LLDPE) geomembrane (1mm thick) over top of 100mm clay liner
Sub base	1000 mm thick	No change
Total cap system thickness	2500mm	1860mm

Figure 3 below depicts the proposed geocomposite capping system.

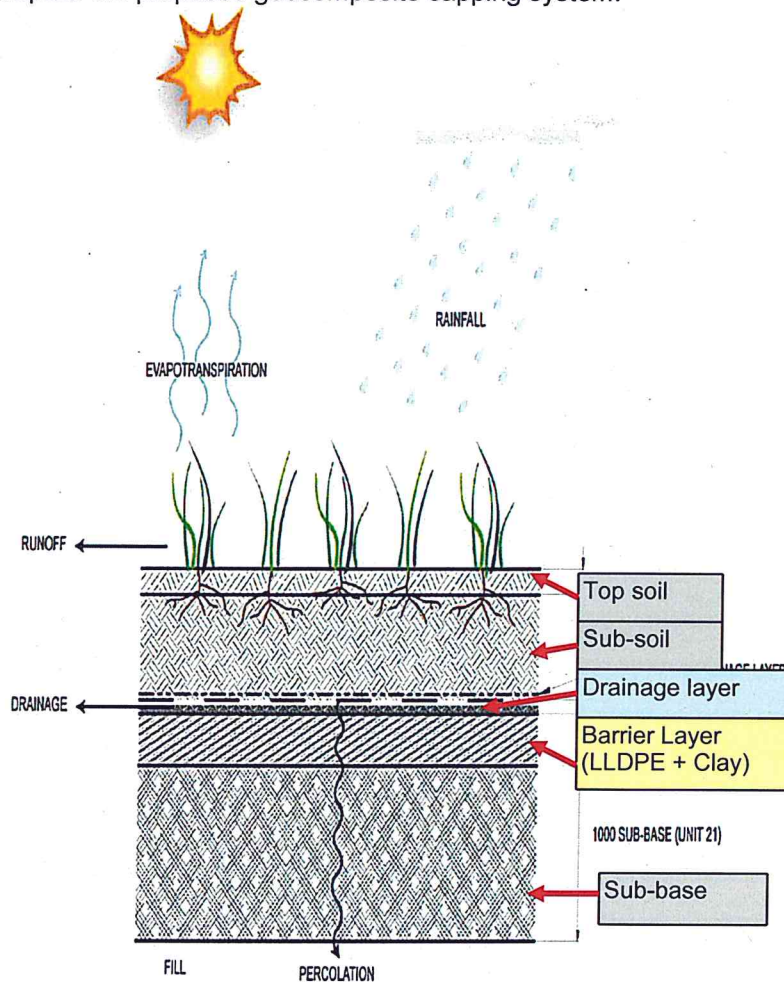


Figure 3: Concept of proposed cell capping system

It is expected that the new cap will require additional quality control during installation and may have long term maintenance issues which are discussed further in Section 5.

3. STATUTORY CONTEXT

Section 75W

In accordance with Clause 12 of Schedule 6A of the EP&A Act, section 75W of the Act as in force immediately before its repeal on 1 October 2011 and as modified by Schedule 6A, continues to apply to transitional Part 3A projects.

Under Section 75W of the EP&A Act, the Minister is obliged to be satisfied that what is proposed is indeed a modification of the original proposal, rather than being a new project in its own right.

The Department has reviewed the scale and nature of the proposed modification, and is satisfied that it can be characterised as a genuine modification of the original project as:

- it involves only minor changes to the approved cell cap to allow the project to continue due to local clay shortages;
- there are management measures already in place within the project approval and EPL to ensure compliance with existing remediation goals; and
- the project as modified could be carried out with some additional conditions requiring detailed design and quality control.

Approval Authority

The Minister for Planning and Infrastructure is the approval authority for the proposed modification. However, under the Minister's delegation of 14 September 2011, the Executive Director, Major Projects Assessment can determine the application, as Lake Macquarie City Council did not object to the modification application, there were no public submissions objecting to the proposal, and there has also been no political disclosure statement made for this application or for any previous related applications.

4. CONSULTATION

The Department made the EA of the proposal publicly available on its website and sought submissions from the Environment Protection Authority (EPA), Lake Macquarie City Council (Council) the NSW Office of Water and the EPA accredited Site Auditor. Consultation with other government agencies and neighbouring sites was considered to be unnecessary as the environmental impacts of the proposal would essentially remain unchanged.

The **EPA** raised no concerns with the proposal and considers the changes well justified considering the local shortages of clay and the need for increased contingency airspace for contaminated material. The EPA is satisfied that remediation goals will be met subject to PCCS making some technical adjustments to the cell design which would improve the stability and performance of the cell cap.

Council did not object to the proposal and recommended conditions of approval relating to cell certification and the final land use and its management.

The **Site Auditor** considered that the altered design would not alter the effectiveness of the cap or increase the amount of leachate generated.

The Department also sought comments from the **Office of Water** but as it is a remediation site it deferred to the EPA for comments.

Copies of these submissions can be found in **Appendix B**.

5. ASSESSMENT

During its assessment of the merits of the proposed modification, the Department has reviewed the:

- Environmental Assessment of the original proposal;
- existing conditions of approval;

- Environmental Assessment of the proposed modification;
- submissions on the proposed modification; and
- relevant policies and guidelines.

The Department has assessed the application on its merits and considers the key issues to be cell cap design and final land use above the cell cap.

5.1 CELL CAP DESIGN

As discussed in Section 2 of this report, a number of changes have been proposed for the cell cap, specifically:

- to the barrier and drainage materials; and
- to the gradient of the final land form and land use above the cap.

Drainage Layer

The approved cell cap drainage layer is 150mm of gravel placed over the top of a network of drainage pipes. Ferrier is proposing to replace the gravel layer with a 10mm geocomposite drain placed over a network of drainage pipes.

In its application, Ferrier provided details on the advantages and disadvantages of the proposed geocomposite drainage layer. These details are summarised in Table 2 below.

Table 2: Geocomposite drain advantages and disadvantages.

Advantages – Proposed Geocomposite Drain	Disadvantages - Proposed Geocomposite Drain
<ul style="list-style-type: none"> • The removal of the gravel layer increases airspace available for the placement of contaminated soils. • The proposed drain type would cushion and protect the underlying LLDPE liner from puncture. Conversely, a thick gravel layer is a puncture risk for the underlying liner. 	<ul style="list-style-type: none"> • It has a higher potential for clogging than gravel due to its thinness. • It requires a higher level of maintenance during its operation.

Barrier Layer

The approved cell cap barrier layer is 600mm of clay. Ferrier is now proposing a barrier layer which utilises a combination of a 1mm thick linear low-density polyethylene (LLDPE) liner on top of 100mm of clay. This is known as a Composite Liner and is considered by Ferrier as having the following advantages (and disadvantages) as detailed in Table 3 below.

Table 3: Composite liner advantages and disadvantages

Advantages – Proposed Composite Liner	Disadvantages - Proposed Composite Liner
<ul style="list-style-type: none"> • The reduction of total clay (600mm > 100 mm) will enable the project to proceed given the lack of local supplies. • The thin clay layer will serve to protect the LLDPE geomembrane. • The application predicts improved environmental performance due to less infiltration. • It would increase the airspace available (by 500mm in depth) for the placement of additional contaminated material. This space may be needed as a contingency. 	<ul style="list-style-type: none"> • It requires more stringent quality control at the time of installation due to the potential for tears and wrinkles rendering it ineffective. • Exposure to UV and temperature must be limited as it degrades the geomembrane. • Separation between the contaminated material and the final surface is reduced.

As the Site Auditor and the EPA had roles in approving the existing containment cell design, the Department sought their comments in relation to the amended design.

The Site Auditor reviewed the application and raised no concerns, stating that the revised barrier layer should be able to provide an equivalent performance to the clay only barrier, and the geocomposite drainage layer should be able to provide adequate drainage.

The EPA considers the cap changes are well justified and feasible, however it made a number of recommendations for material specifications and quality control during installation to mitigate the identified disadvantages of the revised cap (see Tables 2 and 3). Subsequent negotiations with

Ferrier ensued, and the following specifications have been agreed to by both parties. The EPA is satisfied that 'best practise' materials and systems can be guaranteed through the specifications detailed in Table 4 below.

Table 4: EPA's recommended specifications for the Cell 1 cap drainage and barrier layers

Cell drainage	Cell barrier layer
<ul style="list-style-type: none"> • Top soil and subsoil layers shall be a minimum of 750 mm deep above the drainage layer (equal to that which is already approved). • The drainage layer must contain a tri-planar and high density polyethylene geonet which is manufactured or covered with a geotextile fabric on the upper surface (or a product of equivalent performance). • The internal drainage core of the geonet (or equivalent product) must be at least 10mm thick. • The drainage pipe system shall maximise water collection. Pipes are required to be placed in inverts (or similar). • Prior to the commencement of construction Ferrier is to confirm that the hydraulic transmissivity of the modified system is equivalent to the transmissivity of the approved gravel drainage system. • A high visibility marker barrier no less than 250mm above the geocomposite drain and LLDPE barrier shall be installed which does not impede the functioning of the capping system (this is required to compensate for the overall reduction in the cap depth as a result of reducing the clay layer by 500mm). 	<ul style="list-style-type: none"> • The cell barrier layer shall contain an LLDPE liner with a thickness of at least 1mm.
<ul style="list-style-type: none"> • Prior to construction Ferrier is required to provide details of construction methodology, including construction quality assurance procedures, and timeframes. 	

The Department concurs with the EPA's position, and believes that the EPA's recommendations (as detailed in Table 4 above) and requirements for detailed engineered drawings, can be incorporated into a recommended condition for Ferrier to address as part of a 'Cap Plan'. The Department has recommended that this 'Cap Plan' be submitted to the EPA and Site Auditor for approval prior to the commencement of construction of the revised cap.

The EPA has also recommended that additional information should be provided by Ferrier in relation to installation methods, tests, inspections and other verifications to mitigate the identified disadvantages of the proposed cap including the potential for tearing and degradation of membranes from UV exposure. The Department considers that these construction quality assurance procedures in relation to the revised cell cap should also be included in the Cap Plan.

Finally, the Department considers that the Cap Plan should contain details of cap maintenance, especially in relation to the fact that the geocomposite drain has a higher potential for clogging. The Department is confident that with an approved Cap Plan in place, the environmental performance of the cell would not change.

It should be noted that there is also an existing condition which requires Ferrier to provide a report for the approval of the EPA which confirms that the cell's infrastructure has been installed in accordance with the approved design and construction specifications.

5.2 FINAL LANDUSE

PCCS is proposing a revised final surface gradient of 2% to allow for a recreational end land use – at this stage for playing fields. Ferrier states that a number of items requiring cap penetration i.e. goal posts, lighting and irrigation would require detailed design; and that a specific maintenance plan will be developed in relation to the playing fields.

The Department considers that the proposed playing fields above the cap would increase ownership of the site from within the local community, whilst also providing a more valuable community asset. The Site Auditor, EPA and Council all provided comments and recommendations in relation to this recreational land use above the cell cap. These comments are summarised in Table 5 below.

Table 5: Comments received on the revised land use above the cap

Consultation undertaken	Feed back received
Site Auditor	The Site Auditor considered that whilst the proposed gradient change could increase infiltration, if the capping and drainage system is properly designed there should be no increase in the amount of leachate generated.
EPA	The EPA supports the use of the cap for playing fields and recommended that power conduit for cabling of all anticipated electrical use including around all sports fields should be pre-installed during the cap construction (to reduce the need to breach the cap once constructed).
Council	Council did not comment on the use of the site for playing fields. Council did recommend, however, that a revised Environmental Management Plan (EMP) should be prepared for the cell. The EMP should consider the final land use as playing fields, paying particular attention to construction methods for amenity buildings, lighting and goal posts that may require breaching of the capping layer. Council also recommended that Ferrier provide a scaled site survey plan which delineates the existing and proposed cap layer on completion.

The key issue identified by submitters in relation to the proposed change in land use is the potential for breaching of the capping layer – following the completion of remediation. To address the identified concerns, the Department considers that Ferrier should be required to consider all potential foundation or footing work for the playing fields prior to completion of the cell cap, rather than relying on breaching the cap when remediation activities have ceased. The Department considers that this construction and maintenance detail in relation to the proposed playing fields, and scaled survey plans as recommended by Council and EPA can be also be provided through the Cap Plan.

It should be noted that there are existing conditions (specifically a Containment Cell Environmental Management Plan and associated sub-plans) which require Ferrier to provide information on the long term environmental management and maintenance of the cell (including the cap and other cell structures). Sub-plans required include cell integrity, water management and landscaping.

In summary, the Department has recommended that Ferrier prepare a Cap Plan for the approval of the EPA and Site Auditor prior to the commencement of construction, containing:

1. detailed design of the cell cap, including the proposed drainage and barrier layers in accordance with the EPA's recommendations (detailed in Table 4 above);
2. detailed plans of the final land use, including drainage and penetration points in connection with the proposed land use;
3. detailed construction quality assurance procedures; and
4. the proposed maintenance of the revised cap, in relation to both its environmental performance and its final land use.

The Department recommends that the Cap Plan be approved prior to construction (of the revised cap) by the EPA and Site Auditor (consistent with existing conditions of approval for the detailed design of the entire containment cell). The Department has also included a condition requiring Ferrier to obtain a Site Audit Statement and Site Audit Report from the Site Auditor stating that the revised cap is suitable for the proposed land use (playing fields). The reports would then be submitted to the Department for record keeping purposes prior to construction of the revised cap.

These recommendations and specifications have been incorporated into the recommended conditions of approval, which Ferrier has accepted. The Department is satisfied that the recommended new and existing conditions will ensure that the cell cap is constructed and maintained according to the best available methods.

6. CONCLUSION

The Department has assessed the merits of the proposal in accordance with the requirements of the EP&A Act.

This assessment has found that:

- the changes to the approved cap of Cell 1 would enable the project to proceed due to local clay shortages;
- the final revised land use of the cap as playing fields would be a community asset;

- the revised cap design has been considered by technical experts as feasible and would not alter the environmental impacts or remediation objectives of the approved design; and
- additional conditions would ensure that detailed design and quality control is undertaken, to the satisfaction of the appropriate authorities.

The Department considers that the proposal should be approved subject to some amendments and additions to the existing conditions of approval. The EPA and Ferrier were also consulted on and accept the draft recommended conditions.

7. RECOMMENDATION

It is RECOMMENDED that, as delegate for the Minister, the Executive Director, Major Projects Assessment:

- **consider** the findings and recommendations of this report;
- **determine** that the proposed modification is within the scope of section 75W of the EP&A Act;
- **approve** the application subject to conditions; and
- **sign** the attached notice of modification (**Appendix C**)


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10.8.12