Redhill waste management facility extension

Eastern Metropolitan Regional Council

Report and recommendations
of the Environmental Protection Authority

Environmental Protection Authority
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Summary and recommendations

The proposal by the Eastern Metropolitan Regional Council (EMRC) incorporates various desirable elements. Expansion of the Redhill landfill would enable the closure of numerous smaller inappropriately located coastal plain landfills. The large size of the proposed landfill would also facilitate the cost effective use of modern technology to minimize any adverse environmental impacts.

While a number of environmental issues have been considered by the Authority, the main area of concern is associated with the leakage of landfill leachates. This is of particular importance considering the proximity of the landfill site to private domestic groundwater supplies, tributaries of the Swan River, John Forrest National Park (Jane Brook) and divertable potable surface water resources (Susannah Brook). The Authority is confident that, with appropriate advice, management and monitoring, adverse impacts can be minimized.

The landfill extension will require pollution control licences for emissions of dust, noise, odour, surface water and groundwater. The outstanding technical issues with regard to these aspects, which mainly require detailed design, will be resolved through that approval process.

The Authority is satisfied that this proposal can proceed without causing unacceptable environmental impacts and has recommended accordingly.

Recommendation 1

The Environmental Protection Authority concludes that the proposal to extend the Redhill Waste Disposal Facility, as described in the CER and subsequently modified in the proponent's response to submissions, is environmentally acceptable.

In reaching this conclusion, the Authority identified the main environmental factors requiring detailed consideration as:

- **leachate control and groundwater protection;**
- **surface water protection;**
- **transport; and**
- **visual impact.**

The Environmental Protection Authority notes that these environmental factors have been addressed adequately by environmental management commitments given by the proponent, or by the Environmental Protection Authority's recommendations given in this report.

The Environmental Protection Authority therefore recommends the proposal may proceed subject to the undertakings and commitments provided by the proponent, (Appendix 1) and subject to the recommendations of this report.

Recommendation 2

The Environmental Protection Authority recommends that the effluent disposal design, monitoring, management and contingency strategies to be prepared and implemented by the proponent should ensure that potential on-site and off-site impacts arising from the operation of the landfill, including:

- **contamination of groundwater and surface water resources;**
- **dieback disease spread; and**
- **odour, dust and noise generation**

do not arise or are mitigated, to the satisfaction of the Environmental Protection Authority on the advice of the Water Authority of Western Australia and the Health Department of Western Australia.

Recommendation 3

The Environmental Protection Authority recommends that the proponent conduct and maintain screen planting in the vicinity of the site of the landfill extension, to the satisfaction of the Main Roads Department and the Environmental Protection Authority, with particular attention to the exposure from Toodyay Road and the Swan Coastal Plain.

Recommendation 4

The Environmental Protection Authority recommends that industrial waste disposal be restricted to burial within specialized landfill cells and that the collection and recirculation of leachates from these cells be maintained separately from the remainder of the landfill, to the satisfaction of the Health Department of Western Australia and the Environmental Protection Authority.

Recommendation 5

The Environmental Protection Authority recommends that the Eastern Metropolitan Regional Council be responsible for construction, operation, decommissioning and post-closure management of the site until such time as the waste has fully degraded as determined by the Environmental Protection Authority.

Recommendation 6

The Environmental Protection Authority recommends that prior to closure of the site the Eastern Metropolitan Regional Council should prepare and subsequently implement an Environmental Management Programme for decommissioning and post-closure management to the satisfaction of the Environmental Protection Authority.

1. Introduction

The Environmental Protection Authority has assessed the proposal by the Eastern Metropolitan Regional Council to extend the Redhill landfill operation. This site is to service the waste disposal requirements of the councils of Bassendean, Bayswater, Belmont and Swan for the foreseeable future. By the end of 1991 it is envisaged that the councils of Peppermint Grove, Mosman Park, Cottesloe, Claremont and Subiaco will also wish to dispose of waste at this site.

The proposal was referred to the Environmental Protection Authority in June 1990. The level of assessment was set at Consultative Environmental Review (CER) and the CER was released for public comment for four weeks, closing on the 27th May 1991.

2. The proposal

The proposal entails the disposal by landfill of metropolitan domestic waste and residual industrial sludge from the Forrestdale Industrial Liquid Waste Treatment Plant.

Three design options for the landfill were outlined in the CER. These were:

Option 1 - the site is unaffected by Main Roads Department "Orange Route",

Option 2 - the site is affected by Main Roads Department "Orange Route" only, and

Option 3 - the site is affected by Main Roads Department "Orange Route" and spine road.

No design option preference was adopted by the EMRC in the CER.

Subsequent to the release of the CER, the Environmental Protection Authority and the proponent have been notified by the Main Roads Department that a portion of the site of the proposed landfill will be affected by the future construction of a national highway ("Orange Route") and spine road in the area (Appendix 4). As a consequence of this notification the proponent now considers the only potentially viable design option is design option 3 - "The portion of the site which is affected (by the Orange Route and spine road), which is located within the Susannah Brook catchment, is therefore not available for waste deposition and all waste will be deposited within Strelly Brook or Jane Brook catchments" (Appendix 3).

This report addresses the likely impacts of developing the landfill extension in accordance with design option 3 only.

2.1 Context

The Eastern Metropolitan Regional Council (EMRC) member councils currently operate a number of small landfill sites which are inappropriately located (some are located in close proximity to the Swan River) or are close to reaching their capacity. Accordingly, the EMRCs wish to rationalize regional waste disposal and provide a more appropriate long term means of waste disposal.

2.2 Landfill site

The existing Redhill Landfill site has been operating since 1981. In January 1986 the EMRC acquired land adjoining the existing landfill operation to permit future expansion of the landfill facility.

The Redhill site is ideally suited for landfill from a hydrological view point because the site is located near the crest of a hill. Because the source area for groundwater (land located uphill of the landfill) is small there is only a minimal volume of groundwater that could potentially pass through the landfill site. This fresh groundwater flow could be simply and inexpensively diverted around the landfill using interception drains therefore minimizing groundwater transportation of contaminants contained within the waste pile.

The soils of the area exhibit a typical laterite/granite weathering profile, consisting of impermeable kaolinitic clays at depth. These impermeable clays provide a physical barrier to the movement of water both into and out of the individual cells within the landfill.

The landfill site extends into three subcatchments of the Swan River - one of which may be used as a water supply in the future. The landfill is also located in the vicinity of the popular John Forrest National Park and numerous private water supply bores.

2.3 Receiving environment

The existing landfill site is located to the east of the Darling Escarpment, approximately 12km north east of Midland on the south side of Toodyay Road. The proposed landfill extension is located adjacent and to the east of the existing landfill. The total area of the existing landfill and the proposed extension is about 93.5 hectares.

The landfill site is located at the head of the Strelly Brook catchment, with a portion of the landholding extending into the adjoining Jane Brook and Susannah Brook catchments. These water courses are tributaries of the Swan/Avon River system. Susannah Brook has also been identified by the Water Authority of Western Australia as a potentially divertable potable water resource. Landfill operations would be excluded from the portion of the landholding located within the Susannah Brook catchment (Appendix 3).

The John Forrest National Park is located approximately 2.5km to the south and downstream of the proposed landfill site (Jane Brook).

The nearest private residence is located on the northern side of Toodyay Road some 700m from the entrance to the landfill site.

About 50% of the proposed site has been cleared for quarrying or agricultural purposes in the past. The remaining Jarrah woodland has been previously logged and numerous access tracks cross the site.

The site of the proposed landfill extension is currently zoned Rural. It is intended that this land be rezoned Special Purposes - Waste Disposal.

2.4 Landfill strategy

The total landfill strategy, based on the site being affected by the Main Roads Department "Orange Route" and spine road (ie design option 3), entails the deposition of some 3,650,000 m^3 of waste over a projected period of 14 years (from 1996 to 2010).

The proposal is to develop the Redhill site extension as a sequence of staged excavated cells which are subsequently filled with waste. The excavation of each cell will involve the clearing of existing vegetation, removal and stockpiling of the laterite, gravel, sand and silt overburden for later use as cover material, removal and stockpiling of some of the underlying kaolinitic clay for subsequent cover and cell sealing purposes, reworking and compaction of the exposed kaolinitic base to further reduce permeability. Filling will then be a recurring daily sequence of waste deposition, compaction and soil cover. Systems for controlling groundwater, surface water, leachate and landfill gases will be progressed as the individual cells are developed.

2.5 Municipal waste management

The extension to the existing landfill site would generate both leachate and gaseous waste products.

Leachates and gases would be generated as the landfill biodegrades. It is intended to seal the surface of each landfill cell with impermeable soils. This would reduce the amount of landfill gases that may escape. In addition the impermeable soil cover would virtually eliminate the introduction of rainfall into the landfill, improving the scope for total leachate containment on-site.

Leachates that would be generated as the waste biodegrades would be contained, collected, ponded and re-introduced to the working face of the landfill.

Depending on the composition of the waste that would be received at the site it may be feasible to shred and compost vegetable material on site. This material could then be used for site rehabilitation work and could be backloaded by local authorities for use as mulch in public open spaces. In addition, valuable landfill space savings would be generated.

On site surface runoff would be contained and later discharged downstream. Should water be contaminated to an unacceptable level it would be recirculated on site.

Groundwater would be intercepted up slope and bypassed around the landfill to a down slope pond for subsequent reuse or discharge. Groundwater that was found to be contaminated would be recirculated on site.

All on site ponds would be sealed with impermeable kaolinitic clays. Any downstream discharges would be conducted in such a manner as to avoid soil erosion and water contamination.

The current intention is for the proponent to flare landfill gases, thus reducing the emission of Greenhouse gases. The EMRC would allow and encourage third parties to further investigate and develop economic uses for the gases on site. This possibility appears remote because landfill gas generation would be minimized by restricting the moisture content and organic content of the landfill material.

2.6 Forrestdale Industrial Liquid Waste Treatment Plant waste management

Disposal of sludge from the Forrestdale Industrial Liquid Waste Treatment Plant currently occurs at the Redhill site. It is proposed that this activity continue in its current format. That is, the sludge is isolated between two layers of impermeable kaolinitic clay at an accessible location near the surface of each landfill cell.

An analysis of Forrestdale Industrial Liquid Waste Treatment Plant leachate shows that this material is essentially similar in composition to municipal waste leachate, with two important exceptions. Cadmium concentrations are considerably higher in the Forrestdale leachate (0.05 mg/l compared to <0.001 mg/l) and concentrations of Manganese and Zinc increase dramatically in the leachate when the sludge cake is exposed to acidic conditions (pH 7.0 - 5.4). Domestic landfills have a typical pH range of 5.0 - 6.5 for waste buried less than two years, and 6.5 - 7.5 for waste buried for more than 10 years. The sludge from the treatment plant is strongly alkaline to start with because of liming (pH 9.0 - 10.0).

The water content of the industrial sludge is currently being reduced by on site centrifuging at the Forrestdale Industrial Liquid Waste Treatment Plant. This ensures easier waste handling at the Redhill site and reduces the volume of leachates generated by the landfill.

3. Public review

During the public review of the CER a total of seven submissions were received from members of the public, community groups, local government and government agencies. A detailed summary of these submissions is presented in Appendix 2. The EMRC's response to the issues and comments raised in the summary of submissions is included in Appendix 3.

4. Environmental impacts and management

The proponent has suggested three options for development of the site based on future road use plans for the area. The Main Roads Department's submission, made during the consultative process, confirms the need for a portion of the intended landfill site for the construction of a future highway and feeder road (Appendix 4). Accordingly, the proponent has effectively

discounted landfill design options 1 & 2 on the advice of the Main Roads Department. The Environmental Protection Authority has therefore only considered the environmental impacts of design option 3 only.

It is important to note that design option 3 now precludes any landfill cells from being located within the Sussanah Brook catchment (Appendix 3).

The existing landfill and extension will require pollution control licences for emissions of dust, noise, landfill gases and off-site liquid discharges (surface and groundwater). The specifics of these pollution control licences will be resolved through that approval process.

Based on its assessment of the proposal, additional information provided in the public submissions, the EMRC's response to the public submissions and further clarification of issues by the proponent and government agencies, the Authority recommends as follows:

Recommendation 1

The Environmental Protection Authority concludes that the proposal to extend the Redhill Waste Disposal Facility, as described in the CER and subsequently modified in the proponent's response to submissions, is environmentally acceptable.

In reaching this conclusion, the Authority identified the main environmental factors requiring detailed consideration as:

- **leachate control and groundwater protection;**
- **surface water protection;**
- **transport; and**
- **visual impact.**

The Environmental Protection Authority notes that these environmental factors have been addressed adequately by environmental management commitments given by the proponent, or by the Environmental Protection Authority's recommendations given in this report.

The Environmental Protection Authority therefore recommends the proposal may proceed subject to the undertakings and commitments provided by the proponent, (Appendix 1) and subject to the recommendations of this report.

The Authority's experience is that it is common for details of a proposal to alter through the detailed design and construction phase. In many cases alterations are not environmentally significant or have positive effects on the environmental performance of the project. The Authority considers that such insubstantial changes should be provided for within the assessment process.

The Authority also considers that any approval for the proposal based on this assessment should be limited to five years. Therefore, if the proposal has not substantially commenced within five years of the date of this report, then such approval shall lapse. After this time, further consideration of the proposal should occur only following a new referral to the Authority.

4.1 Water quality

The potential for landfills to cause groundwater and surface water pollution is substantial — particularly when these landfills are sited on the sandy soils of the Swan Coastal Plain. If appropriate safeguards and construction techniques are employed and the landfill is located in a suitably impermeable terrain (or sealed) then the risk of water pollution is greatly diminished.

The Authority recognizes the inherent suitability of the Redhill site for landfill purposes and the potential for the extension of this site to result in the closure of numerous smaller, inappropriately located coastal plain landfills.

The Authority is also aware that the Susannah Brook is potentially a divertable potable water resource, as identified by the Water Authority of Western Australia. Coincidently the area required for the planned future National Highway in the vicinity of the Redhill Landfill now means that no waste deposition would occur within the Susannah Brook catchment (design option 3)(Appendix 3, section 3.5), thus obviating any potential contamination of this valuable surface water resource.

The Redhill site is ideally suited for landfill operations from a groundwater view point due to its location at the top of the hill and the impervious clays present throughout the site.

The soils of the area exhibit a typical laterite/granite weathering profile, consisting of impermeable kaolinitic clays at depth. These impermeable clays provide a physical barrier to the movement of water both into and out of the individual cells within the landfill.

The proposed extension is environmentally sensitive for a number of reasons. Under the proposal landfill activities would be extended into the catchments of two of the tributaries of the Swan River. Both tributaries could potentially transport contaminants from the landfill site to the Swan River. The landfill is also located in the vicinity of the popular John Forrest National Park and numerous private water supply bores. Consequently, emphasis is placed on the need for adequate long term containment of waste on the Redhill site.

The Authority would expect licence conditions to be applied which would not allow contamination of groundwater and surface water resources in the area.

A number of submissions were received by the Authority expressing concern over both the thoroughness and public availability of historical water quality sampling conducted in the vicinity of the existing landfill, especially with regard to potable domestic supplies on individual properties. The results of this sampling should be made publicly available. The Authority suggests that the proponent undertake a detailed audit of private bores in the vicinity of the existing landfill and the proposed extension to establish baseline levels for future comparisons should the proposed extension proceed.

4.2 Dust

Dust control measures have been outlined in the CER. These include regular grading and watering of site roads, particularly during the dry months.

Dust control measures would also be incorporated in works approval and licence conditions under the Environmental Protection Act.

4.3 Noise

The nearest private residence is located some 700m away, north of Toodyay Road. In all likelihood traffic noise levels associated with Toodyay Road would be higher and more continuous than those emanating from the landfill.

The Authority would expect licence conditions to be applied which would not allow unacceptable noise impacts. The intended operating hours for the landfill of 7am to 5pm would confine noise to daylight hours.

4.4 Odour

Obnoxious odours are frequently perceived to be a major problem associated with waste disposal facilities. The proponent does not envisage that odour would provide problems given the distance and direction of the nearest private residence and low frequency of southerly and south-easterly winds (about 10% of the time).

In addition, potential odour impacts would be minimized by the daily coverage of the waste with earthen fill. Special precautions will be taken to dispose of potentially offensive waste, such as crayfish offal.

Odour generation from the existing landfill will be significantly reduced by the sealing of open manholes in the waste pile.

The Authority would expect licence conditions to be applied which would not allow odour impacts.

4.5 Dieback and hygiene

The elevated nature of the proposed landfill site and burial of plant materials provide ample opportunity for the introduction and migration downslope of forest diseases. The Authority understands that most prevalent forest diseases (eg *Phytophthora cinnamomi*) are unlikely to survive composting. Once composted this material would be suitable for earthen cover of the fill and rehabilitation of the site.

Shredding and composting of plant material would substantially increase the life span of the landfill.

Recommendation 2

The Environmental Protection Authority recommends that the effluent disposal design, monitoring, management and contingency strategies to be prepared and implemented by the proponent should ensure that potential on-site and off-site impacts arising from the operation of the landfill, including:

- **contamination of groundwater and surface water resources;**
- **dieback disease spread, and**
- **odour, dust and noise generation**

do not arise or are mitigated, to the satisfaction of the Environmental Protection Authority on the advice of the Water Authority of Western Australia and the Health Department of Western Australia.

4.6 Traffic movements

The incidence of large, slow moving trucks on Toodyay Road is expected to increase by about 50% should the extension proceed. The Authority anticipates an increase in the background noise levels in the area, associated with an increase in heavy vehicle movements in the vicinity of the landfill. However, this should not lead to unacceptable noise levels for local residents.

The Main Roads Department advises that the projected increase in heavy vehicle movements on Toodyay Road (approximately 100 per week) is easily accommodated under the current design criteria for this section of the road. In addition, it is envisaged that the future construction of the proposed National Highway ("Orange Route") would alleviate any future traffic problems associated with the operation of the Redhill landfill.

4.7 Visual impact

The site of the proposed Redhill landfill extension is visible from the Toodyay Road, consequently screen plantings are required. However, the land between Toodyay Road and the landfill extension site is low lying. Any screen plantings conducted in this area would require considerable time to reach an effective screening height.

Plantings for screening purposes would be best conducted on the higher ground nearer the Toodyay Road, where effective screening could be achieved in about 12-18 months after planting. Plantings conducted in this area would need to comply with Main Roads Department safety requirements and guidelines.

Because of the elevated nature of the landfill site some sections of the landfill could be visible from the Swan Coastal Plain. This could have a significant impact on the landscape amenity of the Darling Scarp (Escarpment). Screen plantings should be undertaken, where appropriate, to minimize the visual impact of the landfill from the Swan Coastal Plain.

Recommendation 3

The Environmental Protection Authority recommends that the proponent conduct and maintain screen planting in the vicinity of the site of the landfill extension, to the satisfaction of the Main Roads Department and the Environmental Protection Authority, with particular attention to the exposure from Toodyay Road and the Swan Coastal Plain.

4.8 Industrial sludge disposal

The Forrestdale Industrial Liquid Waste Treatment Plant sludge contains significant amounts of potentially hazardous materials. Included are a number of metals which are persistent in the environment, bioaccumulate and can be toxic at low levels. These metals typically exhibit increased solubility under acidic conditions.

Although the Authority recognizes the alkali status of the sludge at the time of burial it is believed that the acidic nature of the landfill, particularly in the early stages of burial, poses a significant possibility for increased contaminant solubility, largely due to the recirculation of acidic leachate waters to the top of the waste pile.

The current procedure at the Forrestdale Plant is to measure the conductivity and pH of the incoming waste. The waste exiting the plant is periodically tested for suspended solids, COD, BOD, oils and grease and heavy metals. In addition, new industries are required to undertake comprehensive testing prior to entering waste to the plant.

Variations in the composition of the incoming and outgoing waste from the plant will occur, both in terms of the existing and future industrial sources. Therefore the long term composition of industrial waste that could be buried at the Redhill site is variable.

Analysis of the current industrial waste inputs to the Redhill site indicate low to moderate levels of contaminants, however these levels can be expected to increase substantially in the future, particularly with the intended introduction of electroplating wastes to the Forrestdale Plant.

The Authority is aware that, in the event of unlikely leakage of contaminants from the landfill, groundwater decontamination, isolation and recovery of the offending source waste would be extremely costly under the landfill strategy proposed in the CER.

It is currently the proponent's intention that the completed site would be available for public recreational use.

Because of the large size and proximity of the landfill to tributaries of the Swan River, the intended end use, the importance of down stream water amenity (eg John Forrest National Park) and local reliance on private groundwater supplies in the vicinity of the landfill, the landfill operation should afford a high level of environmental protection. Environmental protection measures should include isolation of the industrial sludge into separate landfill cells. In addition, the leachate collection and recirculation systems associated with these specialized cells should also be isolated from the domestic waste cell systems thereby ensuring long-term containment and localization of potentially hazardous wastes. In the unlikely event of contaminant leakage the offending source material could be relatively easily located and removed — of particular importance given the long term contaminant storage function of the site.

Recommendation 4

The Environmental Protection Authority recommends that industrial waste disposal be restricted to burial within specialized landfill cells and that the collection and recirculation of leachates from these cells be maintained separately from the remainder of the landfill, to the satisfaction of the Health Department of Western Australia and the Environmental Protection Authority.

4.9 Decommissioning and post-closure management

Management of the waste site is necessary until the waste has fully degraded, which can be many decades after the closure of the site for tipping. When the waste is fully degraded methane is no longer generated and pollutant concentrations in leachates stabilize at levels that are unlikely to have an adverse impact on the environment.

The Authority considers that responsibility for post-closure management should remain with an agency or group of agencies which are accountable to the community, have a guaranteed existence and sufficient funds to manage the site in the long term. The Authority believes that the Eastern Metropolitan Regional Council is such an agency because funds can be generated during the operation of the landfill and would effectively be a permanent, accountable body.

Recommendation 5

The Environmental Protection Authority recommends that the Eastern Metropolitan Regional Council be responsible for construction, operation, decommissioning and post-closure management of the site until such time as the waste has fully degraded as determined by the Environmental Protection Authority.

The strategy for decommissioning and post-closure of the landfill needs to be determined prior to the closure of the site so that closure can take place in a manner consistent with the post-closure management plan and so that the likely costs of post-closure management can be identified. The proponent may consider incorporating such costs into the charges levied for waste disposal.

Whilst early consideration of a decommissioning and post-closure management plan is desirable, the plan may need to be amended to reflect standards current at the time of closure. Consequently, the plan should be sent to the Authority for comments when it is prepared and sent to the Authority for final approval when it has been determined that the remaining landfill space is likely to be filled within two years.

Future use of the site must be compatible with the post-closure management plan.

It is currently the proponent's intention that the completed site would be available for public recreational use. However, as provided in the proponent's response to submissions (Appendix 3), the EMRC is keen for local input when determining an end use for the site. The Authority supports community consultation in determining the end use for the site.

Recommendation 6

The Environmental Protection Authority recommends that prior to closure of the site the Eastern Metropolitan Regional Council should prepare and subsequently implement an Environmental Management Programme for decommissioning and post-closure management to the satisfaction of the Environmental Protection Authority.

4.10 Planning aspects

The proposed landfill extension site is currently zoned for rural purposes. Implementation of this proposal would require the site to be rezoned to a more appropriate Special Purposes zone. This rezoning would need to be initiated by the Shire of Swan and approved by the Department of Planning and Urban Development and the Minister for Planning.

The Authority's advice on the environmental impacts associated with this proposal in no way should be seen to pre-empt this planning approvals process.

The Shire of Swan may wish to consider placing a buffer zone around the landfill site. This would prevent the construction of residences or introduction of other incompatible land uses within 500m of the landfill for the working life of the facility.

Appendix 1

Proponent's commitments on the proposal

7. Commitments

7.1 DESIGN AND MANAGEMENT: GENERAL

The extensions to the Redhill waste disposal facility will be designed to the same high standards as the existing facility. Particular emphasis will be placed on the visual appearance during the operational life of both sites to fit in with the existing surrounding landscape. The design will comply with the Department of Health guidelines.

In response to submissions made by the MRD, the existing site and proposed extension will be designed on the basis of Option No. 3 described in the CER, to allow for the proposed "Orange Route" national highway and associated "spine road". Design Option No. 3 allows for all waste to be deposited within Strelly Brook or Jane Brook catchments. It is expected that all groundwater and surface water flows from the site will be contained within the Strelly Brook and Jane Brook catchment.

Responsibility:	EMRC
To satisfaction of:	Department of Health
Timing:	Design to commence post EPA approvals, and site management to be an on-going task

7.2 SHORT TERM SCREENING

Vegetation screen planting will be implemented at the Toodyay Road end of the site to provide an improvement in the aesthetics of the existing operation.

Responsibility:	EMRC
To satisfaction of:	Department of Health
Timing:	Planting to commence after the granting of EPA approvals

7.3 REHABILITATION AND END USE

The area will be progressively re-vegetated with vegetation suitable for each of the three zones of the tip area to blend the finished landfill site into the existing landscape.

1. The flatter top areas
2. The steeper flanks of the landfill
3. The margins of the site with no landfill beneath the surface

The end use of the site will be a parking and picnic area with potential for walking tracks and lookout, finished to a standard that will enhance the appearance and utility of the area.

Responsibility:	EMRC
To satisfaction of:	Department of Health/EPA
Timing:	On-going rehabilitation to be carried out in conjunction with management of the site

7.4 COMMUNITY INVOLVEMENT

EMRC will continue its policy of community consultation by making available EMRC meeting minutes to the public, and addressing any concerns arising directly with community members. This will ensure that the views and concerns of local residents are known and taken into account on a continuing basis.

Responsibility:	EMRC
To satisfaction of:	Department of Health
Timing:	On-going commitment

7.5 RECYCLING

A limited amount of on-site recycling is carried out at the existing site. Similar facilities will be incorporated into the new site, if the demand exists, when operations commence there.

The EMRC is considering moves to encourage recycling off-site of household garbage in member council areas.

Responsibility:	EMRC
To satisfaction of:	Department of Health
Timing:	On-site recycling to commence at commissioning of new site, and off-site recycling activities to be investigated

7.6 FIRE MANAGEMENT PLAN

The EMRC will prepare a Fire Management Plan for the new site. The plan will take into account the 9000 litre water tanker stationed on the existing site full time. Fire breaks are currently maintained on the existing site and these will be extended as necessary on the opening of the extension.

Responsibility:	EMRC
To satisfaction of:	Department of Health/Swan Shire Fire Brigade
Timing:	Prepared after granting of EPA approvals

7.7 MONITORING

Surface and groundwater will be monitored at 3 monthly intervals to ensure its compatibility for release to the environment. Water that has been contaminated to an unacceptable level will be recirculated on site.

Landfill gas will be monitored to analyse the gas constituents and pressure.

Responsibility:	EMRC
To satisfaction of:	Department of Health
Timing:	On-going commitment, frequency of measurements will be under continuous review

Surface water from active areas of the site will be controlled with retention basins and drains. Water retained will be monitored at 3 monthly intervals to ensure it is of satisfactory quality to release. Water that has been contaminated to an unacceptable level will be recirculated on site.

Groundwater will be monitored at 3 monthly intervals to check the integrity of the groundwater and leachate control system. If unacceptable contamination is found, remedial action will be taken to recirculate contaminated water or intercept its movement.

7.8 CLOSURE OF SITE

The EMRC will continue its responsibility for the Redhill landfill site after closure until it is no longer discharging effluent. The EMRC will consider the costs of this responsibility and will make provision for these costs in the management and operation of the site.

Responsibility:	EMRC
To satisfaction of:	Department of Health/EPA
Timing:	On-going commitments

Appendix 2

Issues raised during the public review period

PROPONENT: The Eastern Metropolitan Regional Council

PROPOSAL: Redhill Waste Management Facility Extension

CLOSING DATE: 27th May 1991

NO OF SUBMISSIONS: 7

The following comments, issues and questions have been raised with the Environmental Protection Authority during the public submission period.

1. General comments

1.1 The Geological Survey of Western Australia is of the opinion that this site is suitable for waste disposal and that the proposed management strategies will minimize the risk of groundwater pollution.

1.2 The Gidgegannup Progress Association consider a decision not to proceed with the Redhill extension would place more pressure on other less adequate landfills. The Redhill proposal is an engineering benchmark, but even so should be the last large landfill of its type constructed for Perth.

1.3 Why has ERMC not conducted regular groundwater testing of the existing landfill site? The proposed monitoring program is questioned in terms of the spatial distribution of the program and in terms of the historical non-compliance of monitoring conditions for the existing site.

1.4 Local residents should be consulted and have a say in the ultimate fate of the landfill site. If it is concluded that this site should be used for public open space locals again should be consulted at the design stage.

1.5 The Main Roads Department advise that design options 1&2 (figures 9&10) are inappropriate due to the need for future roadworks in the area (Orange Route & Spine Rd). Buffer zones should be planned to account for these constructions and any intended future recreational use of the site.

1.6 Main Roads Department have no objection to the EMRC undertaking screen planting in the Toodyay Rd reserve provided that liaison with the department's Landscape Architect occurs and sightline and safety standards are met.

2. Alternative proposals

2.1 There is potential for fluidized bed combustion and drying technology to provide significant economic and environmental benefits for the disposal of oily wastes, rubber tyres, landfill gas, shredded wood, activated sludge and more easily separated problem refuse.

3. Environmental impacts

3.1 The Gidgegannup Progress Association support the flaring of landfill gases in order to reduce the emission of Greenhouse Gases.

3.2 Industrial waste should be contained in a separate cell, as originally recommended. A suitable leak monitoring program for this cell should then be established.

3.3 Initiatives for recycling at the Redhill Landfill are to be commended.

3.4 The runoff containment dams should be designed to contain 1:100 yr runoff events, not the 1:50 yr events as currently proposed. This will ensure a high degree of confidence in the measures employed to protect Jane Brook and Susannah Brook — even after closure of the landfill site. This will also provide a safety margin in case there is a change in the rainfall/runoff frequency due to the Greenhouse Effect.

3.5 The Water Authority of Western Australia require that no discharge of waters to Susannah Brook occur from the landfill site. This can be achieved by diverting surface runoff (via contour drains) and groundwater interception channels away from the north east section of the property.

3.6 Surface runoff detention ponds should be lined and be designed for a 30 day detention period (minimum).

3.7 Design should detail more fully how contaminated waters will be reticulated on site.

3.8 Subsoil drains should be designed to discharge in a southerly or westerly direction to reduce the risk of contamination to valuable water resources.

3.9 A census of local bores should be conducted and these bores sampled. These samples, and future samples, will then provide data to help detect any future problems associated with leaking leachates.

4. Technical issues

4.1 SECWA believe the assessment of the quantity and quality of landfill gas being produced at the existing landfill is inaccurate. The presence of 21-23% nitrogen in the sample analysis suggests that the samples were from locations where air had been present (eg manholes) and may not have been typical of the gas within the landfill. The lack of oxygen doesn't mean air had not entered the sample area as oxygen is rapidly consumed within a landfill.

If nitrogen is excluded from the sample analysis the proportions become:

CH_4	43%
CO_2	53.8%
H_2S	3.16%

At these proportions the landfill gas has a useful energy content. Further testing is required.

4.2 SECWA believes that the low landfill gas pressures may be caused by:

a) High atmospheric pressure at the time of the tests. Fluctuations are often of the order of 150mm water column.
b) The landfill may not be well sealed.

Low pressures do not mean that little gas is being produced.

5. Transport

5.1 Toodyay Rd is in a poor state between the Campersic Rd intersection and the Redhill landfill site. This section of road has only two overtaking lanes for east bound, mostly ascending traffic only. Traffic frequently has to slow to about 10 km/hr when heavily laden trucks enter this section of the road. A 50% increase in the frequency of trucks, cars and car/trailers is projected once disposal at Redhill commences.

The imminent relocation of the Herne Hill quarry will mean that Pioneer Concrete's trucks will then enter Toodyay Rd nearer the Redhill Landfill site, placing further pressure on this inferior section of road.

Toodyay Rd should be upgraded to provide for the safe overtaking of slow moving vehicles (in both directions) and for the higher volume of traffic that will occur.

5.2 Main Roads Department advise that long-term planning for the site should allow for development of a permanent access point from the future Hills Spine Rd. Direct access from the future National Highway will not be available.

6. Visual impact

6.1 A substantial strip of the existing flora should be left along Toodyay Rd as a ready-made screen. This will coincide quite well with the need to leave a Highway Reserve for the future building of the Orange Route (linking Great Eastern Hwy with Toodyay Rd).

7. Suggestions

7.1 The EMRC should immediately implement a surcharge on tipping fees to be placed into a trust fund for future establishment costs of alternative waste disposal technologies.

7.2 A surcharge should be added to households and businesses that do not separate waste. This will facilitate more efficient recycling of waste.

Appendix 3

Proponents response to the issues raised during the public review period

REDHILL WASTE MANAGEMENT FACILITY EXTENSION
CONSULTATIVE ENVIRONMENTAL REVIEW
RESPONSE TO SUMMARY OF PUBLIC SUBMISSIONS

INTRODUCTION

This report has been prepared in response to submissions made to the Environmental Protection Authority (EPA) during the public submission period for the report; "Redhill Waste Management Facility Extension; Consultative Environmental Review, April 1991", prepared by Sinclair Knight on behalf of the Eastern Metropolitan Regional Council. The section headings and submission reference numbers below refer to the EPA's summary of public submissions, dated 21 June 1991.

1.0 GENERAL COMMENTS

1.2 The Gidgegannup Progress Association's (GPA) comment that the Redhill waste management facility should be the last large landfill of its type constructed for Perth is at variance with the West Australian Government's Waste Strategy, as expressed in the Health Department's discussion paper, dated November 1988, which proposes a regional council concept, with suitably designed regional landfill sites, rather than a greater number of smaller landfill sites.

The Perth Metropolitan Region will have a need for some form of landfill within the foreseeable future, although alternative waste management technologies, such as composting, and an increase in recycling of waste may reduce the proportion of waste stream deposited in landfill sites.

1.3 Groundwater testing was not implemented on the existing landfill site because the potential problem was considered to relate to surface water. Groundwater monitoring was not a formal requirement of approval for the existing site. A geological and hydrological investigation carried out in 1990 delineated two distinct groundwater layers; a level within the upper layer of laterite, where it is perched on the underlying kaolinite clay, and a lower level within the bedrock at the base of the kaolinite. The need to monitor sub-surface water quality is recognised and the proposed monitoring bores will be installed in both the upper and lower groundwater zones.

The existing Redhill site and the proposed extension area lie at the headwaters of the Susannah Brook, Strelly Brook and Jane Brook catchments. The five locations of the proposed monitoring bores for both the existing and the extension of the site are at low points within the catchments, to intercept groundwater flow in both the upper and lower zones. These locations are considered appropriate to adequately monitor the quality of sub-surface groundwater flow in the vicinity of the Redhill site.

Monitoring bores have been installed, and samples taken, at two locations on the eastern side of the existing site (refer to Figure 6 of CER).

1.4 The Proponent, the Eastern Metropolitan Regional Council (EMRC), is keen to have input from local residents on the ultimate end use of the Redhill site, and would welcome involvement from residents during the design stage of any future proposed use.

1.5 The Main Roads Department's future planning for a national highway, the "Orange Route", and intersecting "Spine Road", through the Redhill area has been taken into account in preparing the CER (refer to Section 3.2 of CER). The projected life of the existing Redhill landfill site, and proposed extension is based on construction of both the "Orange Route" and "Spine Road", described as Option No. 3 in the CER. The current design of the existing site, based on the "Redhill Sanitary Landfill Site Management Plan", July 1984, has been amended accordingly to account for the MRD's proposed roadworks development.

2.0 ALTERNATIVE PROPOSALS

Alternative waste management technologies suitable for the Perth Region have been assessed as part of a report commissioned by the Department of State Development, entitled "Perth Metropolitan Region Solid Waste Management Systems Study", May 1991, Sinclair Knight. This report recommends an overall strategy for the Perth Metropolitan Region, including policies for waste minimisation, recycling and composting.

The issue of special problem wastes, such as rubber tyres, and other potentially hazardous wastes need to be assessed as part of the overall strategy for the Perth Region.

3.0 ENVIRONMENTAL IMPACTS

3.2 Management of the residual sludge waste from the Forrestdale Industrial Waste Treatment Plant at the existing Redhill site consists of isolating the sludge between two layers of low permeability kaolinite clay at an accessible location near the surface of the landfill (refer to Section 3.4 of CER). Investigations of the leachate from the sludge indicate that its characteristics are similar to that of municipal refuse leachate. The existing leachate collection underdrainage system will be extended to cover the extended landfill site, and a separate leachate drainage system for the industrial waste sludge is not considered warranted in view of the similarities of the leachate characteristics.

3.4 The difference in flow magnitude between a 1 in 50 year flood event (refer to Section 5.1 of CER), and a 1 in 100 year flood event for the size of the catchment under consideration at Redhill is not significant. The detailed design of the surface water control system for the proposed extension will be designed to collect site runoff from a flood event of 1 in 100 years, as suggested by the Water Authority of Western Australia.

3.5 As discussed in Section 1.5 above, the Main Roads Department's future planning for a national highway through the area, the "Orange Route", and a proposed "Spine Road" intersecting with the highway within the Redhill site has been taken into account in preparing the CER (refer to Section 3.2 of CER). The "Spine Road" runs diagonally across the north-east corner of the Redhill site location (refer to Figure 1 of CER). This part of the site, which is located within the Susannah Brook catchment, is therefore not available for waste deposition, and all waste will be deposited within Strelly Brook or Jane Brook catchments (refer to Figure 11 of CER). It is expected that all groundwater and surface water flows from the site will be contained within the Strelly Brook and Jane Brook catchments.

3.6 The leachate collection ponds on the existing site are lined with the low permeability kaolinite clay excavated from the site. Retention and leachate collection ponds for the proposed extension will be constructed from the same low permeable clay material. The existing retention ponds are designed on the basis of 120 cubic metres capacity per hectare of catchment area (refer to page 17 of "Redhill Sanitary Landfill Site Management Plan", July 1984). If necessary, this criteria will be reviewed during the detailed design of future sedimentation ponds to ensure a minimum retention time of 30 days for silt laden water from the site.

3.7 The leachate will be recirculated onto the working face of the landfill, and will be fully contained within the leachate collection system, as a closed system (refer to Section 3.8 of CER). A significant proportion of the leachate will be lost be evaporation. Detailed design of the facility will include the design of the pumping system from the leachate collection pond to the working face.

3.8 Development of the Redhill site extension will be a staged sequence of excavating cells which are then filled with refuse. The exposed clay layer in the floor of these excavations will be graded to a low point in each cell. When the cell has been excavated a downstream trench will divert any water falling into the excavation into the leachate collection system. As the cell is filled with refuse, a downstream clay cut-off wall will be constructed as the landfill rises. A leachate drain upstream of this cut-off wall will divert foul groundwater by gravity flow to a leachate collection pond, which will be located at a low point on the site.

As discussed in Section 3.5 above, the planned site development (Option No. 3) precludes the deposition of waste within the Susannah Brook catchment, consequently, all sub-surface leachate drains will flow to ponds located in the same catchment as the existing site pond, Jane Brook, south of the site, or into ponds constructed in the Strelly Brook catchment, to the west of the site.

3.9 The EMRC will investigate the locations of existing bores in the locality of the Redhill site, and will sample water quality to establish base-line monitoring data, if the locations are within an appropriate distance of the landfill site.

4.0 TECHNICAL ISSUES

4.1 The assessment of the quantity and quality of landfill gas being produced at the existing site is based on inspection of the site, and the limited trials and measurements undertaken to date.

The relatively low proportion of readily biodegradable organic matter in the waste stream, and the proposed use of organic matter as a compost blend for topsoil enhancement will limit gas production on the site.

However, the landfill gas has a useful energy content, and the EMRC would allow and encourage third parties to further investigate the potential of using the gas from the site.

4.2 The low gas pressures recorded in an existing sealed deep well field trial system at the site was one indicator used in the assessment of gas production from the site. An open ended pipe, contained within a pervious "wick" should develop a significant blow-off rate and pressure installed within an "efficient" gas producing site. However, the organic content of the waste stream is relatively low, and testing by Apex Environmental (ref 6 of CER) has confirmed a low gas production rate.

A more thorough field trial would provide better data on likely gas production under steady state conditions for potential third party users.

5.0 TRANSPORT

The traffic volume entering the Redhill landfill site is projected to increase by approximately 50% (Section 3.5 of CER). However, this does not translate to a 50% increase in total traffic volume for this section of Toodyay Road, as inferred from the submission.

6.0 VISUAL IMPACT

It is proposed to provide short term screenings with plantings along the Toodyay Road site frontage. This could be implemented in conjunction with the Mains Road Department, and could include utilisation of any existing flora along Toodyay Road. However, to provide an effective screening, part of this land may have to be increased in level prior to planting, and retention of the existing flora would not be possible. The EMRC is negotiating with an adjacent landowner to purchase a section of land for screenings purposes.

Appendix 4

The Main Roads Department's comments regarding the proposed future National Highway in the vicinity of the Redhill site

MAIN ROADS DEPARTMENT

WATERLOO CRESCENT, EAST PERTH, WESTERN AUSTRALIA.
PO Box 6202 EAST PERTH WA 6004 Phone (09) 323 4111 Fax (09) 323 4430 Telex AA 92894

Enquiries Mr R Moore on 323 4552

Our Ref 72-394-79

Your Ref

The Chairman
Environmental Protection Authority
1 Mount Street
PERTH WA 6000

ATTENTION: MR G BOTT

REDHILL WASTE MANAGEMENT FACILITY

Thank you for the opportunity to comment on the "Redhill Waste Management Facility Extension; Consultative Environmental Review" prepared on behalf of the Eastern Metropolitan Regional Council (EMRC).

Comments on the CER are as follows:

- The site will be affected by the planned future National Highway ("Orange Route") and also by an associated distributor road ("Hills Spine Road") as indicated by the attached plan. Planning for the proposed extension to the Redhill waste disposal facility should be on the basis that both roads will be required (ref: page 14, last paragraph). Accordingly Options 1 and 2 (Figures 9 and 10) are not appropriate.

- Long term planning for the site should allow for the development of a permanent access point from the Hills Spine Road. Direct access from the future National Highway will not be available.

- This Department would have no objection to the EMRC undertaking screen planting in the Toodyay Road reserve (ref: page 24), provided:

  (i) EMRC liaises with the Department's Landscape Architect;

  (ii) Sightlines and safety standards can be maintained;

  (iii) A variety of indigenous tree and shrub species are used.

  It is considered that the majority of the screen planting should be carried out on the waste disposal site, and that planting within the Toodyay Road reserve be supplementary to this. To ensure visual screening is maintained in the future, it is suggested an ongoing commitment be obtained form EMRC to replant within their site, as needed.

- It is suggested the future recreational value and visual quality of the site would be increased if the EMRC allowed a buffer zone of 20m minimum adjacent to the planned future National Highway and distributor road. Early planting of longer lived shrubs and trees within the buffer zone would provide long term screening by the time the National Highway is constructed (ref: page 28).

R E Moore
DIRECTOR OPERATIONS CENTRAL

June 12 1991

Enc

ENVIRONMENTAL PROTECTION AUTHORITY

Your views are welcome on any of these matters

FORMAL ASSESSMENT

The EPA will formally assess this project. The developer must provide detailed information about the project's environmental impact.

Consultative Environmental Review

1. New river development plan, **South Bussleton**.

SUBMISSIONS CLOSE

2. Public Environmental Review: Pelican Point, **Bunbury** (2.10.91).
3. A discussion paper on the appeals system under the Environmental Protection Act (30.8.91).

NOT ASSESSED BUT ADVICE GIVEN

The EPA will give advice to help developers and relevant agencies ensure these projects are environmentally acceptable.

4. Caravan park, Lot 64 Bandy Creek Road, **Esperance**.
5. Upgrading of Vasse River diversion drain, **Busselton**.
6. Rezone lots 58, 59, 60 and 61 **Muchea**, from rural to special residential.
7. Resubdivision (no additional lots), Eden Road, Nullaki Point, **Albany**.
8. Land for Aboriginal community, Gap Point, **Wyndham**.

NOT ASSESSED

The EPA will not assess these projects on the basis that the Department of Mines has committed to refer back to the EPA before allowing any ground disturbing activity, and that the NPNCA has indicated acceptability of issue of licence.

9. Prospecting licences 77/1824 and 77/351, Jilbadji Nature Reserve, **Yilgarn**.
10. Prospecting licence 77/134, Jilbadji Nature Reserve, **Yilgarn**
11. Prospecting licences 77/2064, 77/143 and 77/372, Jilbadji Nature Reserve, **Yilgarn**.
12. Prospecting licence 77/166, Jilbadji Nature Reserve, **Yilgarn**.
13. Prospecting licence 77/168, Jilbadji Nature Reserve, **Yilgarn**.
14. Prospecting licences 77/240 and 77/255, Jilbadji Nature Reserve, **Yilgarn**.
15. Prospecting licence 77/1377, Jilbadji Nature Reserve, **Yilgarn**.

WORKS APPROVAL AND LICENCE ASSESSMENTS

These projects will be assessed under the works approval and licensing provisions of the Environmental Protection Act.

16. Licence application for a cement product manufacturing works, Lot 34 Strelley Street, **Bussleton**.
17. Licence application for sandblasting operations, Lot 209 Kambalda Road, **Boulder**.
18. Licence application for a mobile garnet blasting operation, **Maddington**.
19. Works approval application for a chemical works, 12 Dampier Road, **Welshpool**.
20. Works approval application for an oil recycling facility, Lot 1014 Murrena Street, **South Hedland**.
21. Licence application for abbrasive blasting works, 54-58 Chalfers Street, **Boulder**.

Ecologically sustainable development — reports of the working groups available for viewing in the EPA's information centre at 1 Mount Street, Perth.

*For more information on projects before the EPA, please call **(09) 222 7000** or visit EPA offices in Bunbury, Karratha, or 1 Mount Street, Perth. Pollution Abatement Notices and Licences are available for public viewing at 57 Murray Street, Perth. For further information please telephone Michelle Geiles on (09) 222 7104. For after hours EMERGENCY pollution complaints, please ring **(008) 01 8800**.*

Western Australia — an environment worth protection

24.8.91