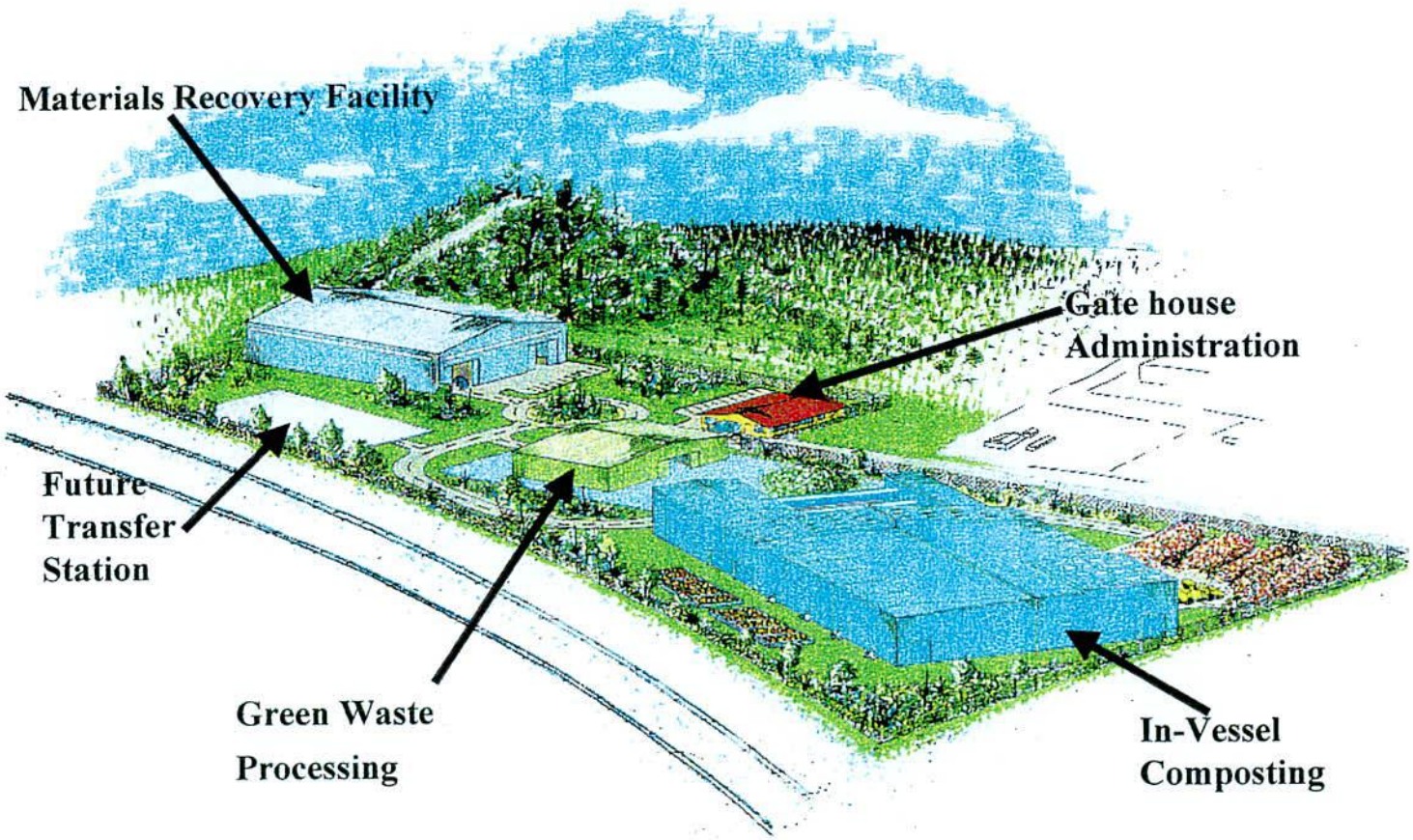
SOUTHERN METROPOLITAN REGIONAL COUNCIL

PROPOSED REGIONAL RESOURCE RECOVERY CENTRE, CANNING VALE
CONSULTATIVE ENVIRONMENTAL REVIEW



ALAN TINGAY & ASSOCIATES

JANUARY 1999

REPORT NO: 98/84

SOUTHERN METROPOLITAN REGIONAL COUNCIL

PROPOSED REGIONAL RESOURCE RECOVERY CENTRE, CANNING VALE CONSULTATIVE ENVIRONMENTAL REVIEW

ALAN TINGAY & ASSOCIATES

JANUARY 1999

REPORT NO: 98/84

AN INVITATION TO COMMENT ON THIS PUBLIC ENVIRONMENTAL REVIEW

The Environmental Protection Authority (EPA) invites people to make a submission on this proposal which has been prepared on behalf of the Southern Metropolitan Regional Council.

The Consultative Environmental Review (CER) proposes the establishment of a Resource Recovery and Recycling Centre in Canning Vale.

In accordance with the Environmental Protection Act, 1986 a CER has been prepared which describes this proposal and its likely effect on the environment.

The CER is available for public review for up to four weeks from 25 January 1999 to 22 February 1999.

After receipt of comments from Government agencies and from the public the EPA will prepare an Assessment Report with recommendations to the Government, taking into account issues raised in public submissions.

Why write a submission?

A submission is a way to provide information, express your opinion and put forward your suggested course of action - including any alternative approach.

It is useful if you indicate any suggestions you have to improve the proposal.

All submissions received by the EPA will be acknowledged. Submissions will be treated as public documents and may be quoted in full or in part in each report unless specifically marked confidential.

Submissions may be fully or partially utilised in compiling a summary of the issues raised or where complex or technical issues are raised, a confidential copy of the submission (or part of it) may be sent to the proponent.

The summary of issues is normally included in the EPA's Assessment Report.

Why not join a group?

If you prefer not to write your own comments, it may be worthwhile joining a group or other groups interested in making a submission on similar issues.

Joint submissions may help to reduce the work for an individual or group, while increasing the pool of ideas and information.

If you form a small group (up to ten people) please indicate all the names of the participants. If your group is larger, please indicate how many people your submission represents.

Developing a submission

You may agree or disagree with, or comment on, the general issues discussed in the ER or the specific proposals. It helps if you give reasons for your conclusions, supported by relevant data. You may make an important contribution by suggesting ways to make the proposal environmentally more acceptable.

When making comments on specific items in the review document:

- clearly state your point of view;
- indicate the source of your information or argument if this is applicable; and
- suggest recommendations, safeguards or alternatives.

Points to keep in mind

By keeping the following points in mind, you will make it easier for your submission to be analysed:

- Attempt to list points so that the issues raised are clear. A summary of your submission is helpful.

- Refer each point to the appropriate section, chapter or recommendation in the PER.

- If you discuss different sections of the PER, keep them distinct and separate, so there is no confusion as to which section you are considering.

- Attach any factual information you wish to provide and give details of the source. Make sure your information is accurate.

Remember to include:

- your name,
- your address,
- the date, and
- whether you want your submission to be confidential.

The closing date for submissions is: Monday 22 February 1999.

Submissions should be addressed to:

Environmental Protection Authority
8th Floor, Westralia Square
141 St George's Tce
PERTH WA 6000

Attention: Mr Richard Sutherland

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF APPENDICES

EXECUTIVE SUMMARY

Community opposition to uncontrolled dumping of waste in landfills has been growing for two decades. This opposition is making it increasingly difficult to establish landfills and is also resulting in all levels of government moving towards alternative methods of managing waste.

The Southern Metropolitan Region Council (SMRC) has decided that its future waste management strategies would be based on treating and recycling the waste stream to maximise the diversion of waste from landfill. To this end, the SMRC proposed to construct waste processing and recycling facility in Canning Vale.

The SMRC referred the proposal to the Environmental Protection Authority (EPA) in May 1998 and the EPA decided that the environmental issues associated with the proposal were of sufficient significance to warrant the formal assessment of the project at the level of Consultative Environmental Review (CER).

Subsequently, the EPA has issued guidelines describing the significant environmental factors which would be considered when assessing.

This CER has been prepared by the SMRC for the purpose of:

- Describing the project.
- Describing the existing environment.
- Describing the potential environmental impacts associated with the project.
- Describing the environment management measures proposed to minimise environmental impacts.
- Demonstrating that the proposal complies with relevant environmental standards and policies.
- Assisting the EPA in assessing whether the project is environmentally acceptable.

The project will involve the construction of an integrated waste processing facility on land adjacent to Bannister Road, Canning Vale. The plant will consist of:

- An enclosed, In-vessel waste digestion and composting plant.
- An enclosed Materials Recycling Facility; and
- An enclosed Green Waste Processing Facility.

All waste processing facilities will be undertaken in enclosed buildings or vessels to minimise the potential for environmental impacts.

The digestor/composting facility incorporates sophisticated odour treatment systems based around forced ventilation systems and the use of high efficiency bio-filters.

The EPA guidelines identify a number of significant environmental factors to be considered when assessing the project and these are listed in Table S1 together with a summary of the findings in CER.

The environmental assessment undertaken through the CER indicates that the plant can be designed and operated to meet all relevant standards.

The construction of the facility would be a significant advance for waste management in Western Australia as it will divert significant amounts of waste from landfill and will result in providing a wide range of other environmental benefits.

TABLE S1

SUMMARY OF KEY RELEVANT ENVIRONMENTAL FACTORS

RELEVANT FACTOR	EPA OBJECTIVE	EXISTING ENVIRONMENT	POTENTIAL IMPACT	MANAGEMENT	PREDICTED OUTCOMES
Biophysical:					
Vegetation	To maintain the abundance, species diversity, geographic distribution and productivity of vegetation communities.	Vegetation on the site is generally in good condition although some areas have been significantly disturbed by human activity. The three main vegetation types are *Banksia* Low Open Woodland on flat low-lying areas and on sloping land and Paperbark Woodland on swampy low-lying areas (Figure 9).	The clearing of vegetation for the development will remove vegetation which is potentially of local significance. Similar vegetation of equivalent quality or better is retained in adjacent conservation reserves.	1. Clearing of remnant vegetation will be minimised as far as possible. 2. The final layout of the facility will be developed in discussion with government agencies to maximise the value of uncleared vegetation. 3. Vegetation on the site adjacent to Ken Hurst Park will be retained where feasible. In this area, fences will be placed as close as possible to buildings in order to minimise disturbance to vegetation and permit free access for fauna to the larger area of vegetation at Ken Hurst Park; 4. The landscape plan for the site will utilise vegetation types indigenous to the area in order to return the site as far as possible to its natural state. The landscape plan will be prepared in discussion with CALM and the DEP.	The clearing of vegetation is not of regional significance as the RRRC site supports a small area of remnant vegetation compared with that contained in Ken Hurst Park, Jandakot Airport and Jandakot Regional Park. Management measures will ensure that clearing is managed to maximise the environmental value of retained vegetation.
Fauna	To maintain the abundance, species diversity and geographic distribution of native fauna.	The site supports three major habitats in terms of vertebrate fauna. *Banksia* woodlands are significant habitats for a diverse range of vertebrate fauna, and its presence combined with low lying swampy areas enables fauna dependent on either of these habitats, and those preferring a combination of habitats, to inhabit the site.	The clearing of vegetation will result in some loss of habitat on the site.	In addition to measures 1 – 4 outlined in respect of vegetation, boundary fences will be erected prior to clearing commencing and a trapping program instituted to capture vertebrate fauna of particular significance such as the Southern Brown Bandicoot. Any trapped animals will be relocated in accordance with the requirements of CALM.	The clearing of vegetation will not have a significant impact on fauna populations present as there are a number of similar areas of bushland located in the vicinity of the site.
Pollution Management:					
Water	Quality of groundwater is maintained in accordance with the requirements of the draft Western Australian Water Quality Guidelines for Fresh and Marine Waters (EPA Bulletin 711).	The site is underlain by a shallow unconfined aquifer at depths ranging from 1m - 15m. Groundwater flows in year are to the north and west towards the Canning River. Some contamination is present in the shallow aquifer due to the operations of the adjacent Ranford Road landfill.	Any facility handling waste has the potential to contaminate soil and groundwater as a result of nutrients or contaminants leaching from the waste.	Installation of monitoring bores (one upstream and two downstream of the site). Groundwater monitoring will be conducted at the installed bores. All waste handling facilities and internal roads will be sealed. Waste will only be handled within covered and sealed areas. Each facility will incorporate sumps capable of handling liquids generated during processing operations.	The plant will be designed and operated in a manner that minimises the possibility of contaminating either surface or groundwater. Monitoring bores will be installed upstream and downstream of the site to monitor water quality impacts.
Odour	To ensure that odour emissions do not cause nuisance to surrounding land users.	All of the plant is at least 400m - 500m south-east of residential areas and other sensitive land uses. The Ranford Road landfill represents a significant odour source. Other potential odour sources are located nearby.	The management and processing of waste has the potential to cause odours. Under typical operating conditions the plant is predicted to comply with the odour standards and sensitive land uses will not be adversely affected by the plant.	All waste handling facilities will be enclosed. Feedstock will be stored in enclosed buildings that are ducted to the biofilter. Any liquid wastes will be stored in an enclosed vessel ducted to the biofilter. Initial commissioning of the in-vessel composting facility and biofilters will be progressive. The performance of the biofilters will be assessed by odour monitoring and the results reported to DEP. Blending of feed stock will be carefully controlled to maintain optimum composting conditions. Waste materials will be processed within 24 hours of receival, with the total amount of waste stored external to the in-vessel composting facility not exceeding $1000m^3$.	The design of the plant and the proposed management and contingency measures will ensure that unacceptable impacts are prevented even when the plant is operating under non-standard conditions.

RELEVANT FACTOR	EPA OBJECTIVE	EXISTING ENVIRONMENT	POTENTIAL IMPACT	MANAGEMENT	PREDICTED OUTCOMES
				Any equipment or process that has the potential to generate odours or dust will be housed in enclosed buildings or undertaken in enclosed vessels that are ducted to the biofilter. Contingency plans will be developed for power failures and other non-standard operating conditions. Preventative maintenance will be undertaken and multiple redundancy included in the plant design to minimise the likelihood and impact of plant failure. Regular inspections of the compost facility and biofilters each shift including to assess odours. Where an odour source is identified, immediate implementation of corrective actions. A complaint log will be kept to register any complaints and the actions taken to address them.	
Particulates/Dust	To ensure that dust does not adversely impact on the health or amenity of nearby residents.	All of the plant is at least 400m - 500m south-east of residential areas and other sensitive land uses. Ranford Road landfill is a significant source of particulates/dust and is located immediately adjacent to the site. Other adjacent land uses that have the potential to generate particulates and dust include the railway, the City of Canning dog pound and the Canning Vale markets.	The good buffering of the site and the nature of the surrounding land uses means that dust will not impact adversely on the surrounding areas.	Site works during construction will be managed so that the potential for generation of nuisance dust is minimised. All waste handling facilities will be enclosed and internal roads sealed. Storage of feedstock in enclosed buildings that are ducted to the biofilter. Biosolids used in the composting process will be delivered as sludge or slurry and stored in tanks. The moisture content of the processed compost material will be maintained. Misting water sprays will be used as necessary prior to any activities that may generate dust or particulates.	Compliance with the National Environment Protection Measure for Ambient Air Quality.
Greenhouse gases	To ensure the emission of greenhouse gases is minimised.	Waste is currently disposed of directly to landfill.	A significantly reduced contribution to the greenhouse effect.	Composting of the organic fraction of the waste stream.	A significantly reduced contribution to the greenhouse effect.
Noise	To protect the amenity of nearby residents from noise by ensuring that noise levels meet the Environmental Protection (Noise) Regulations 1997.	The plant is at least 400m - 500m south-east of residential areas and other sensitive land uses. Adjacent land uses include major roads (Ranford Road), the standard gauge railway, the City of Canning dog pound and the Canning Vale Markets. The site is zoned for commercial and industrial use.	A number of activities on the site will result in noise emissions. Preliminary modelling indicates that emissions can be managed to meet the requirements of the Environmental Protection Noise Regulations.	All processing facilities are enclosed and will incorporate measures to attenuate noise. Noise bunds and walls will be used as necessary to attenuate transport noise. Additional assessment and modelling of the final plant configuration conducted once the design is finalised to demonstrate compliance with environmental criteria. The final plant specification will have a sound power levels rating equal to or less than the values provided in Table 16. Construction activities limited to between 0700 and 1900 hours. Noise levels will be monitored during construction and following commissioning to verify compliance with relevant criteria.	Compliance with the Environmental Protection (Noise) Regulations 1997. Additional assessment and modelling results will demonstrate compliance. Annual compliance reports will be submitted to DEP to verify compliance..
Wastes	To reduce as far as practicable the generation of solid and liquid wastes and to dispose of wastes in a manner that is environmentally acceptable and meets statutory standards.	The State and Federal Government's have stated an objective of halving waste to landfill by the year 2000.	Reduced environmental impacts associated with landfilling.	Putrescible waste will no longer be disposed of to landfill and will be reprocessed to produce valuable compost.	The proposed facility will help reduce the pressure on the current landfills operating in the SMRC and fulfil the Government's objectives by recycling up to 90% of the waste stream.

RELEVANT FACTOR	EPA OBJECTIVE	EXISTING ENVIRONMENT	POTENTIAL IMPACT	MANAGEMENT	PREDICTED OUTCOMES
Social Surroundings:					
Road Traffic	To ensure the public is not exposed to unreasonable risk from the facility.	Adjacent land uses include major roads (Ranford Road).	Compared to nearby operations, the proposed facility will have a negligible effect.	Access roads and traffic flow will be designed and controlled to the requirements of the MRWA and City of Canning.	No significant impact on existing road network.
Flammable/ Explosive gases	To ensure the public is not exposed to unreasonable risk from the facility.	Surrounding land uses, such as the Ranford Road landfill, are existing potential sources of public risk.	The potential for public risk at the RRRC may arise due to transport of wastes, accidental receipt of hazardous materials, or generation of flammable/ explosive gases.	Community education programs will reinforce the need to manage household hazardous waste and safety. Existing household hazardous waste drop-off centres will be maintained through the region. Any hazardous materials identified in the waste stream will be segregated, stored and disposed off-site at an approved facility. The contingency procedures will minimise the potential for flammable/ explosive gases to be generated Flammable gas detectors will ensure early detection of any potential hazard.	The facility will be designed and operated in a manner which results in minimal levels of public risk.
Public Consultation	To provide the public with ample opportunity to fully understand the environmental aspects of the proposed facility.	The surrounding community has demonstrated through actions with previous projects that it takes a strong interest in environmental issues.	Without effective consultation the community will not be properly informed with regard to the project.	The SMRC has undertaken an extensive community consultation program, including community surveys, meetings with residents adjoining the facility location, and consultation with numerous State and Federal politicians. This program will continue through the life of the project.	The regional community, Local Governments, State and Federal members of parliament have reacted favourably to consultation to date and are supportive.

1. INTRODUCTION

1.1 Background

This Consultative Environmental Review (CER) describes a proposal by the Southern Metropolitan Regional Council (SMRC) to establish and operate an Integrated Regional Waste Processing Facility at Pt Lot 78 and 85 Bannister Road Canning Vale (Figure 1).

As there is only limited capacity remaining at the three putrescible landfills currently operating within the boundaries of the SMRC, the SMRC has resolved to develop a whole of waste stream processing facility which will be capable of recycling well in excess of 50% of the waste stream. This will serve the population of the region into the next century.

The decision to establish a facility that diverts waste from landfill is in line with National, State and community goals to reduce and eventually eliminate the use of landfill as a primary means of waste disposal.

The proposed development will be an integral component of the SMRC's Regional Waste Management Strategy for managing waste in the local government area. The strategy will provide a regional collection system, which will collect co-mingled dry recyclables, organic and non-recyclable waste in containers and clean green waste collected from three verge-side collections per year. The waste processing facility has been designed to optimise the recovery of these materials.

The processing facility will initially consist of the following elements:

- a materials recycling facility (MRF) for sorting co-mingled recyclables;
- a greenwaste receivable and processing facility (GRPF); and
- a waste receival and in-vessel composting facility (WCF) for the mixed organic waste stream.

The facility may also incorporate an area for storage of mature compost and, eventually, an on-site transfer station to cater for domestic trailer and car traffic.

The waste receival and in-vessel composting facility proposed in this CER will be capable of handling of handling 300 tonnes per day. However, in the future the capacity of the plant may be expanded to 375 tonnes per day by the addition of another digester. However, this expansion would be the subject of a separate referral under the Environmental Protection Act, 1986.

The site of the proposed development is adjacent to the existing Ranford Road landfill and abuts both the landfill and the adjacent railway reserve. Other adjacent land uses include the City of Canning dog pound, the Canning Vale markets and landscape supply companies. The nearest residential areas are located some 500m the north west of the site.

The site is very close to the centroid of population for the five member councils being serviced at this location and has excellent road access through major arterial roads. Given its central location, compatible surrounding land uses and the ability to provide adequate buffer distances to sensitive land uses such as residential areas, the site is almost unique in the Metropolitan region.

1.2 Proponent

The Southern Metropolitan Regional Council (the proponent) is a formally constituted regional Council, which comprises the following local governments:

- City of Fremantle;
- Town of East Fremantle;
- City of Melville;
- City of Cockburn;
- City of Rockingham;
- City of Canning; and
- Town of Kwinana.

These local governments have a combined population of approximately three hundred and fifty thousand (350,000) and a total of one hundred and twenty thousand (120,000) residences.

The Regional Council was formed in 1991 with a constitution that restricted the Regional Council to Strategic Waste Management planning and co-ordination activities. In January 1998 Regional Council and Member Councils resolved and agreed to change the constitution to enable the Regional Council to undertake all facets of waste management on behalf of the Member Councils. The new Establishment Agreement was approved by the Minister on 22 April 1998. This is a significant step and demonstrates the resolve of the Regional Council and Member Councils to comply with the State and Federal Government's stated objective of halving waste to landfill by the year 2000.

There are currently three putrescible landfills operating within boundaries of the regional Council. These are:

- Canning landfill - Ranford Road, Canning Vale;
- Henderson landfill - Rockingham Road, Spearwood; and
- Millar Road landfill - Millar Road, Baldivis.

1.3 The Environmental Assessment Process in Western Australia

The environmental impact assessment process in Western Australia is specified by the Environmental Protection Act, 1986 and is illustrated in the flow chart presented in Figure 2. The Act requires a proponent to notify the EPA of any proposals, which may have significant environmental implications. The EPA then determines whether the proposal should be formally assessed. If a decision is made to formally assess the proposal, the EPA requires the proponent to prepare a detailed account of the environmental implications in a report such as the present CER.

After the CER has been prepared, it is reviewed by the Department of Environmental Protection (DEP) to ensure that it provides sufficient detail and a comprehensive coverage of issues. When this has been established, the CER is released for a public review period. During this period any person may make a written submission to the EPA on any aspect of the proposal. At the end of the public review period, the EPA supplies a summary of submissions to the proponent and a response is sought.

The EPA then begins its assessment of the development proposal taking into account the CER, the public submissions, the proponent's response to the submissions, and any other relevant information.

The results of the EPA assessment are published in the form of an Assessment Report, which includes recommendations made to the Minister for the Environment. Interested parties can appeal to the Minister about the content of the EPA Assessment Report, or any of its recommendations. Ultimately, the Minister for the Environment in consultation with decision making authorities (DMAs) decides whether the proposal may proceed and what conditions will be imposed on it.

The environmental assessment process is designed to enable State authorities to consider in detail the environmental and social implications of development proposals. These considerations are based on technical assessments of the nature and extent of changes to the existing biophysical, pollution and social environments, on proposed management strategies designed to control or limit adverse changes, and on monitoring programs designed to document and analyse the effectiveness of such strategies.

The facility will also be required to hold an Environmental Protection Act licence obtained under Part V of the Act and administered by the Pollution Prevention Division of the DEP. The premises fall under the following categories of licensed premises:

- Class 61 Waste Disposal
- Class 67A Composting and Soil Blending Works

Prior to a licence being issued, the SMRC must first apply for and be granted a Works Approval pursuant to s.54 of the Environmental Protection Act, 1986. This involves lodging a further application and providing detailed plans and specifications for the plant along with the prescribed fee. The DEP's Pollution Prevention Division examines these plans to ensure that the plant is capable of conforming to any environmental approval and will also meet all relevant environmental standards.

The issuing of a Works Approval allows construction to proceed, however, the plant cannot be operated until all aspects of the Works Approval have been met.

1.4 Relevant Legislation

The proposed waste processing facility requires both planning and environmental approval. The relevant planning statutes are:

- Metropolitan Region Town Planning Scheme Act, 1959;
- Town Planning and Development Act, 1928; and

- Local Government Act, 1995.

During development the following statutes will apply:

- Wildlife Conservation Act, 1950; and
- Aboriginal Heritage Act, 1972.

During the operation of the waste processing facility the following statutes will also apply:

- Environmental Protection Act, 1986;
- Health Act, 1911-1979;
- Environmental Protection (Swan Coastal Plain Lakes) Policy, 1992;
- Environmental Protection (Peel Inlet-Harvey Estuary) Policy, 1992;
- Draft Environmental Protection (Jandakot Mound Groundwater) Policy, 1993;
- Metropolitan Water Supply Sewerage and Drainage Act Amendment, 1982;
- Waterways Conservation Act, 1976; and
- Swan River Trust Act, 1988.

1.5 Decision Making Authorities and Involved Agencies

The DMAs which have provided input to this formal environmental assessment and which will be involved in the ongoing operational management of the waste disposal facility include:

- Environmental Protection Authority (EPA)

  The EPA will provide recommendations to the Minister for the Environment on the proposal.

- The Department of Environmental Protection (DEP)

  The DEP will facilitate the assessment of the CER and will be the key agency for ensuring that SMRC complies with environmental conditions and regulations.

- Department of Conservation and Land Management (CALM)

  CALM will assess impacts arising from the facility on flora and fauna.

- Water and Rivers Commission (WRC)

  The WRC is the State Government agency that protects and manages WA's water resources. Its role will include providing information and advice on the proposed development, policies and guidelines on best practices to protect water resources, and pollution control techniques.

- Agriculture Western Australia (AgWA)

  Agriculture WA, and the Commissioner for Soil and Land Conservation, through the provisions of the Soil and Land Degradation Act, provide advice to ensure the prevention of land degradation.

- City of Canning

  The site of the proposed facility lies within the City of Canning. Under the Local Government and Miscellaneous Provisions Act, 1960, municipal authorities have the power to make by-laws with respect to matters including planning, zoning and land use or environmental controls to the extent that such by laws are not inconsistent with Commonwealth or State laws. Thus, the City of Canning will be responsible for issuing planning and development approvals and monitoring the site for compliance with the Health Act.

- City of Melville

  As an adjacent local authority, the City of Melville has an interest in the planning and environmental decision making process and must be closely consulted with.

1.6 Scope and Structure of the CER

This CER has been prepared to comply with guidelines issued by the EPA. The guidelines that specify the information required for assessment purposes are provided in Appendix 1.

In summary, the CER provides:

- Background information about the proposal, the proponent, the environmental impact assessment process in Western Australia, statutes relevant to the establishment and operation of the waste processing facility, and public consultation to date.

- A description of the proposed waste processing facility, the site, and relevant aspects of the surrounding area.

- An analysis of the implications of the waste processing facility in terms of the existing environment.

- A description of environmental management procedures which will be adopted by the SMRC.

- A series of commitments by the proponent that are intended to ensure that the proposal will be implemented in a manner that is consistent with EPA objectives. These commitments will become conditions associated with the environmental approval from the Minister for the Environment and will be binding.

2. JUSTIFICATION AND ALTERNATIVES

2.1 Waste Management in the Southern Metropolitan Region

2.1.1 Current Waste Management

The locations of existing waste facilities in the Southern Metropolitan Region are shown in Figure 3.

A number of local government landfills exist in the region, including:

- Ranford Rd
- Beasely Rd (closed)
- Thomas Rd (inert private site)
- Millar Rd
- Henderson Rd.

The Ranford Road landfill in the City of Canning receives waste from both the City of Canning and the City of Fremantle and the City of Melville as well. The Ranford Road landfill is located on the southern boundary of the City of Canning (near the proposed RRRC site), adjacent to the Cities of Melville and Cockburn. Review of available groundwater data indicates that significant groundwater pollution has occurred from previous uses of the site. Based on current waste disposal volumes, it is likely that the landfill will close prior to the year 2001.

The Beasely Road landfill in the City of Melville, which prior to closing received waste from the City of Melville and the Town of East Fremantle, is now used solely as a greenwaste receival and processing facility and may close with the opening of the RRRC.

The Thomas Road landfill site in the Town of Kwinana has been in operation since 1972. Initially, the site received solid and liquid industrial waste, but in 1976 the type of industrial waste was restricted to organic and biodegradable wastes. In 1981-82, the Town of Kwinana implemented upgrade management controls as the landfill is not lined. The Town of Kwinana closed the site on December 1995. Subsequently the site was re-opened as an inert landfill operated by a private operator.

The City of Rockingham operates a landfill site at Millar Road. The Millar Road site is a Class III landfill and is fully lined with a leachate management system.

The Henderson Road landfill is sited within an exhausted limestone quarry. It is the only operating landfill in the City of Cockburn, and is also used by the Town of East Fremantle. To protect local groundwater resources, the site is lined with an impermeable membrane liner. The management system incorporates a leachate collection and treatment system. The site continues to operate as a Class II landfill.

The Millar Road and Henderson Road landfills, together, have sufficient capacity to serve the region for at least ten years at current and projected waste generation rates following the closure of the Ranford Road landfill. However, with the closure and impending closure of landfills adjacent to the region the pressure on the existing regional landfills may increase substantially reducing the projected life span of these facilities.

2.1.2 Future Waste Management Requirements

To address future waste management requirements, the Southern Metropolitan Regional Council has adopted a Regional Waste Management Strategy. The strategy is based on an integrated domestic waste collection and waste processing system and is designed to reduce the amount of domestic municipal waste sent to landfill by up to 85%. The Regional Waste Management Strategy will provide a regional collection system which segregates the waste stream into three components, co-mingled dry recyclables, organic and non-recyclable waste (referred to here as MSW) collected in separate containers and clean green waste collected from three verge-side collections per year. The strategy will provide a regional collection system, which will collect co-mingled dry recyclables, organic and non-recyclable waste in containers and clean green waste collected from three verge-side collections per year. The waste processing facility has been designed to optimise the recovery of these materials.

The Regional Strategy provides for the establishment of two waste processing facilities within the region known as Regional Resource Recovery Centres (RRRC), as shown in Figure 4. The first RRRC (which is the subject of this submission) is to be established in the northern section of the region to service the municipalities of Canning, Melville, Fremantle, Cockburn and East Fremantle. It is anticipated that this facility will be completed by mid 2001. The second RRRC is to be established at the southern end of the region to service the municipalities of Kwinana and Rockingham (possibly at the Millar Road landfill site), and is due to be completed by mid 2004.

The provision of additional waste management facilities is closely linked to the future rates of waste generation and population growth. As the municipalities of the City of Rockingham and the Town of Kwinana will not be serviced by the currently proposed RRRC, they will not be considered in the remainder of this review. The projected population growth for the Cities of Canning, Cockburn, Fremantle, Melville and the Town of East Fremantle is detailed in Table 1. Appendix 2 provides further information on the projected number of households and the projected population growth, for each of the above municipalities.

TABLE 1

PROJECTED POPULATION GROWTH FOR THE CITIES OF CANNING, COCKBURN, FREMANTLE, MELVILLE AND THE TOWN OF EAST FREMANTLE

Year	Fremantle	Canning	Melville	E. Fremantle	Cockburn	TOTAL
2001	24,348	75,828	94,000	6,080	76,750	277,006
2002	24,348	76,791	93,400	6,070	80,050	280,659
2003	24,348	77,754	93,000	6,050	83,350	284,502
2004	24,348	78,717	92,850	6,040	86,650	288,605
2005	23,995	79,680	92,634	6,038	89,950	292,297
2006	23,995	80,643	91,500	6,038	93,250	295,426
2007	23,995	81,606	91,300	6,038	96,550	299,489
2008	23,995	82,566	91,200	6,038	99,850	303,649
2009	23,995	84,415	91,000	6,038	103,150	308,598
2010	23,987	86,265	90,896	6,069	106,450	313,667
2011	23,987	88,115	90,750	6,069	109,750	318,671

Year	Fremantle	Canning	Melville	E. Fremantle	Cockburn	TOTAL
2012	23,987	89,357	90,600	6,069	112,937	322,950
2013	23,987	90,599	90,400	6,069	116,124	327,179

Source: Ministry of Planning (Medium Scenario Assumptions, July 1995).

The projected waste generation for the Cities of Canning, Cockburn, Fremantle, Melville and the Town of East Fremantle is included in Appendix 2. This information is summarised in Table 2.

TABLE 2

PROJECTED WASTE GENERATION (TONNES)

Year	MSW	Recyclable	Greenwaste	Bulk	Total
2000	74,826	21,774	7,275	1,455	105,330
2001	77,261	22,535	7,512	1,503	108,811
2002	78,171	22,800	7,600	1,520	110,091
2003	79,132	23,081	7,693	1,538	111,444
2004	80,169	23,383	7,795	1,558	112,905
2005	81,072	23,646	7,883	1,577	114,178
2006	81,964	23,906	7,969	1,594	115,433
2007	82,992	24,206	8,069	1,615	116,882
2008	84,046	24,513	8,171	1,635	118,365
2009	85,323	24,886	8,296	1,659	120,164
2010	86,636	25,269	8,422	1,685	122,012
2011	87,928	25,646	8,549	1,710	123,833
2012	89,021	25,965	8,655	1,730	125,372
2013	90,100	26,280	8,760	1,753	126,893

Source: Southern Metropolitan Regional Council, 1998.

2.2 Alternative Waste Disposal Options

Prior to resolving to proceed with the RRRC option, the SMRC considered a range of alternative waste disposal and management strategies. These alternatives were considered in terms of the waste management hierarchy. The waste management hierarchy, which sets out waste management options in decreasing order of preference, is:

- waste minimisation (avoiding the creation of waste);
- re-use;
- recycling and reprocessing (including treatment);
- energy recovery; and
- disposal (as a last resort).

Waste minimisation or avoidance is the preferred option in the waste management hierarchy. In the context of this CER, waste minimisation refers to any activity that prevents waste entering the waste stream managed by the member local governments.

Activities that may prevent the production of waste include:

- National programs that target manufacturing and packaging industries in order to minimise unnecessary packaging and maximise opportunities for recycling;
- National, State and local level community education programs aimed at altering purchasing and consumption patterns; and
- Community and education programs to promote in-situ treatment options such as home composting and worm farms;

Although the avoidance of waste production is the preferred option, it is difficult for local governments to influence behaviour greatly in this area other than to provide support and educational programs such as those suggested in points 2 and 3 above.

Similarly, it is not feasible or desirable for Local Governments to mandate home composting as effective home composting requires sufficient yard space and an ongoing commitment from the householder. Instead local governments can encourage and support its use through activities such as public education and incentive schemes such as subsidised composting bins.

After waste minimisation, recycling is the next most preferred option in the waste management hierarchy. In addition to those listed above, activities that can be undertaken by local governments to promote recycling include:

- Community programs aimed at encouraging support for recycling; and
- Provision of comprehensive and efficient collection programs for recyclables and green waste.

Based on 1991 data, it is estimated that a maximum of 35% of MSW can be recovered by kerbside collections (Department of Commerce and Trade (DCT) and the Western Australian Municipal Association (WAMA), 1993). In the "Review of Perth Waste Management", Sinclair Knight (1994) estimated that this would result in a 10% reduction of the total waste stream.

It is therefore clear that this disposal option could not be used by itself to achieve the target of a 50% reduction of waste to landfill by the year 2000. For this reason, recycling is viewed by the SMRC in the context of providing an opportunity to reduce the amount of waste to be treated in conjunction with other waste management strategies.

The next alternative under the waste management hierarchy is waste treatment. The SMRC investigated the use of incineration and composting.

Incineration

Incineration has been widely used overseas as the principal means of disposing of mixed wastes. The primary attractions of this method is that it can achieve volume reductions of up to 90% while also recovering energy in the form of heat or electricity from the incineration of wastes.

Historically, there has been strong community opposition to the use of this method of waste treatment in Australia. This community opposition has largely been based on concerns regarding the potential for hazardous emissions arising from incomplete combustion of plastics and other organics. The cost of incineration has also been a significant barrier while landfill disposal remains a relatively low cost alternative.

The non-homogenous nature of the waste stream makes it difficult to achieve adequate control over the combustion process and as a result older municipal waste incinerators were often the source of unacceptable and possibly hazardous gaseous emissions. This has, in turn, contributed to community complaints and concerns. Modern incineration plants have addressed these performance problems through the use of sophisticated combustion chamber design and control system and the use of state of the art gas cleaning systems. Not withstanding the proven performance of municipal waste incinerators, the Australian community seems to retain deep-seated fear of incineration as a disposal option.

Composting

Composting refers to the controlled natural biological breakdown of material involving a complex interaction of various microorganisms and resulting in a major reduction in volume and weight (DEP, 1997a). Composting operations can range from simple windrowing methods to more complex systems such as in-vessel composting systems.

One of the main advantages of composting is that in addition to reducing the amount of waste to landfill, the process yields a product that can be used as a soil amendment product provided it meets health and environmental standards. This is particularly useful in coastal regions such as Perth, where it could not only improve the poor sandy soils common in coastal cities but also reduce the amount of water needed for gardens.

Another advantage of composting is reduced greenhouse gases emissions. The primary gas produced by composting under aerobic conditions is carbon dioxide, compared to disposal to landfill which produces predominantly methane. Methane is six times more damaging than carbon dioxide as a greenhouse gas (DCT & WAMA, 1993).

The economic viability of composting facilities is generally determined by the availability of a market for the compost product. If proper sorting processes are not used, it can be difficult to keep contaminants such as household and industrial chemicals and heavy metals out of the compost. The use of biosolids may also raise concern in the community about the possibility of pathogen contamination. As a result, it is often necessary to demonstrate over a period of time that the compost is of consistently high quality before it is accepted in the marketplace (Select Committee on Recycling and Waste Management, 1995).

The least preferred option in the waste management hierarchy is direct disposal to landfill. If not managed properly, landfill disposal has the potential to cause surface and groundwater pollution, contaminate land, add to the greenhouse effect, waste resources and energy, and reduce social amenity (DEP, 1997b).

Irrespective of how landfills are managed large areas of land are quarantined for long periods of time and the potential for contamination of ground and surface water remains.

Landfills also significantly impact on the social amenity of the area and therefore require large buffer zones to separate them from other sensitive land uses.

The current available landfill capacity in the Perth Metropolitan Region will meet demand for only the next 10 to 15 years (DEP, 1997b). The siting of new landfills is becoming in increasingly problematic as community opposition to landfill facilities grows and State Government policy is strongly against the establishment of further landfill facilities on the Swan Coastal Plain.

Also, modern management requirements including tip liners, leachate collection and treatment and landfill gas controls will add considerably to the development and operation costs (DCT & WAMA, 1993). The DEP (1997b) predicted that the landfill disposal gate charges, which averaged about $23 per tonne, may escalate to the level prevailing in larger cities such as Sydney where gate fees approach $70 per tonne. Since 1997, the average landfill disposal gate charges in Perth have increased to about $35 - $40 per tonne.

Conclusion

Disposal of waste to landfill is the currently accepted method of waste disposal in Western Australia. Existing landfills are reaching capacity and the development of new landfill sites is becoming increasingly problematic. The need to reduce the amount of waste to landfill is well documented and as a consequence, disposal of the total wastestream to landfill was not considered by the SMRC as an appropriate future waste management strategy.

Waste minimisation was another option considered. Most of the waste minimisation activities outlined previously need to be conducted at a state or national level to be effective. Even if optimal waste minimisation strategies were implemented, it is unlikely that waste minimisation alone could reduce the amount of waste generated sufficiently to meet the SMRC's waste management requirements. However, components of the waste management initiatives are included as part of the overall waste management program adopted by the SMRC, and it is anticipated that the public will gain an awareness of the need for waste minimisation.

The SMRC is already involved in undertaking community programs aimed at encouraging support for recycling, and has devised comprehensive segregate collection programs for recyclables and green waste. The proposed collection system has been successfully trialed within the City of Melville and the behaviour of the community in using the proposed system is well understood. However, as with waste minimisation, recycling is viewed by the SMRC as a strategy to be used in conjunction with other waste management strategies.

Incineration can achieve volume reductions of up to 90% and be used in conjunction with waste-to-energy (WTE) technology, but is expensive, has the potential to cause significant environmental impacts and may cause strong opposition within the community. Thus, the SMRC did not consider that this strategy was a viable waste management option.

In addition to reducing the amount of waste to landfill, composting produces a saleable product that can be used as a soil amendment that is particularly useful in coastal regions such as Perth. Composting also results in reduced greenhouse gas emissions when compared to landfills. Provided that the facility is properly managed, composting does not cause any significant environmental impacts, especially when compared to the traditional method of landfill disposal. Consequently, composting was chosen as the best waste treatment option for the RRRC.

2.3 Site Selection

In determining the final location for proposed facility, the Regional Council considered a range of options. In most cases, the sites considered were located on, or adjacent to, existing or closed landfill facilities. The most promising of these alternative sites was a location on Alcoa's red mud lakes just north of the closed Thomas Road landfill. Whilst this site offered many advantages including the presence of the existing lining system and excellent compatibility with surrounding land uses, it was not possible to reach agreement with Alcoa over use of this site. In addition, this site was located well to the south of the centroid of population for the region and was therefore not optimal with respect to the transportation of waste.

The site eventually selected is located adjacent to the existing Ranford Road landfill and abuts both the landfill and the adjacent railway reserve. Other adjacent land uses include the City of Canning dog pound, the Canning Vale markets and landscape suppliers. The nearest residential areas are located approximately 500m the north west of the site.

A central location for the facility is critical to the success of the proposal, as the economic aspects of the proposal are sensitive to transport costs, both for delivery of waste and subsequent sale of compost and recyclables. The site is located very close to the centroid of population for the five member councils being serviced at this location and has excellent road access through major arterial roads.

In summary, the proposed site is almost unique in the Metropolitan region given its central location, compatible surrounding land uses and the ability to provide adequate buffer distances to sensitive land uses such as residential areas.

2.4 Justification for the Facility

As discussed previously, there is limited capacity remaining at the three putrescible landfills. The siting of new landfills to replace these existing facilities is becoming in increasingly problematic as community opposition to landfill facilities grows and State Government policy is strongly against the establishment of further landfill facilities on the Swan Coastal Plain.

Construction of the proposed RRRC will reduce the pressure on these landfills and significantly extend landfill life by reducing the waste volume by 50% to 85%. This will help fulfil the Government's commitment to achieving the goal of halving waste to landfill by the year 2000.

The RRRC will also reduce the adverse environmental impacts associated with landfilling as putrescible waste will no longer be disposed of to landfill. In addition to reducing the amount of greenhouse gas emissions when compared to landfilling, the rapid aerobic degradation within the confines of the vessel eliminates objectionable gases and odours often associated with landfill sites. The composting process also detoxifies and sanitises, and the small inorganic portion remaining is inert and thus will not pose leachate or methane gas problems in landfills.

The design of the digester units, which are modular and operate independently, will allow for incremental expansion in line with increasing waste generation.

The RRRC will also contribute to the safe management of another problematic waste stream by co-composting MSW with sewerage sludge. Disposal of sewerage sludge has been a long standing problem for the Western Australian Water Corporation as it is not fully stabilised and requires additional composting to destroy residual pathogens.

The composting process also produces a valuable product. In addition to the economic gains that can be achieved by sale of the product, compost has beneficial environmental applications as a soil amendment product. It is particularly useful in coastal regions such as Perth, where it can not only improve the poor soil quality common in coastal cities but also reduce the amount of water needed for gardens.

A summary of the key characteristics of the project is provided in Table 3 below.

TABLE 3

KEY CHARACTERISTICS OF THE REGIONAL RESOURCE RECOVERY CENTRE

Element	Description
Location	Pt Lot 78 and 85 Bannister Road, Canning Vale
Areas serviced	City of Fremantle, Town of East Fremantle, City Melville, City of Cockburn, and City of Canning
Total area	20ha
Area of disturbance	12ha
Nature of work	Resource recovery, including recycling and waste processing
Nominal waste acceptance rate	300-410 tonnes per day[1]
Products	Stabilised compost, segregated recyclables (paper, plastic, glass, ferrous and non-ferrous metals), chipped green waste, and inert waste for landfill

Note: 1 The initial nominal rate is 300 tonnes per day. If an extra digestion unit is added the nominal rate will increase to 375 tonnes per day. In addition, de-bottlenecking may also lead to an estimated 10% to 15% increase in throughput.

3. DESCRIPTION OF THE PROPOSAL

3.1 Site Description

The site in question consists of parts of Lots 78 and 85 Bannister Road and is currently uncleared, partially vegetated land approximately 20ha in area. Of this area, 12ha will need to be cleared for the construction of this plant (Figures 1, 6, 9).

The land lies within the boundaries of the City of Canning and is zoned for public purposes waste processing under the Metropolitan Region Scheme (MRS) of City of Canning Town Planning Scheme No. 40.

The site is adjacent to the existing Ranford Road landfill and abutts both the landfill and the adjacent railway reserve. Ken Hurst Park, which contains regionally significant bushland, also adjoins the site. Other nearby land uses include the City of Canning dog pound and the Canning Vale markets. The nearest residential areas are located some 500m to the north west of the site.

The site is well served in terms of road access from major arterial roads and therefore traffic impacts will not affect the surrounding area. The number of vehicles entering the site will be significantly less than current traffic to the Ranford Road landfill.

The site slopes gently from north and west to the south and east, with elevations varying from approximately 32m AHD to approximately 25m in depressions. Figure 5 shows the topography of the site.

Geology of the site has been mapped by Jordan (1986) and comprises a thin layer of Bassendean Sands overlying Guildford Formation. The Bassendean Sand is described by Jordan (1986) as being of aeolian origin and comprising white/pale grey to yellow, fine to medium grained quartz sand. Jordan (1986) describes the Guildford formation as comprising sandy clay to clayey sand and is of alluvial origin.

Groundwater at the site comprises a shallow, unconfined aquifer at depths ranging up to 7m below the ground surface depending on the topography of the site. Groundwater flows are to the north and west towards the Canning River. Some shallow depressions on the site may be seasonally inundated, although site inspections did not confirm that inundation had occurred recently.

The sandy nature of the soils and the shallow depth to groundwater mean that there is some potential for pollution of the groundwater system, unless care is taken with the design of facilities. It's is known that pollution of the aquifer has occurred as a result of the operations of the adjacent Ranford Road landfill. As a result, this landfill facility has now been lined and monitoring of the ground water pollution is continuing.

The site is characterised by Banksia woodland with a few scattered Jarrah trees and small areas of seasonal damplands located along the southern boundary adjacent to the railway. The vegetation is generally in good condition, although there are areas of the site that have been significantly disturbed by human activity (partial clearing, tracks and non-aggressive weeds).

A search of the CALM database of rare and endangered flora that could be present in the area around the site indicated that only one species of declared rare and priority flora *triptercoccus paniclatus*. This species was listed as appearing in several other areas adjacent to the Swan/Canning system. A copy of the results of the CALM data base search is included at Appendix 3.

Further information describing the site is detailed in the following sections.

3.2 Site Plan

The proposed site layout is shown in Figure 6. The main components of the regional resource recovery centre are:

- The Materials Recycling Facility (MRF) is located on the eastern boundary of the site. The MRF is fully enclosed including the discharge and loading areas to prevent the spread of litter and control noise emissions on site. The MRF will be designed to sort approximately 25,000 tonnes per year of co-mingled recyclables (see Figure 7);

- A green waste receivable and processing facility capable of processing approximately 30,000 tonnes. The verge-side collected green waste will be chipped or mulched in a specialised facility enclosed within the building with impermeable concrete floors and a drainage system to capture any leachate;

- A waste receival and in-vessel composting facility for the mixed organic waste stream of food waste and green waste. The in-vessel composting plant will be entirely enclosed within the building, which will be maintained under negative pressure at all times. The in-vessel composting system will treat approximately 95,000 tonnes of waste and 40,000 tonnes of biosolids per year (see Figure 7);

- An area for temporary storage of mature compost. This area may not be required as the site incorporates 1,000m^3 of enclosed compost storage;

- An area has been allocated for development of a trailer tipping facility but this facility does not form part of this proposal. Should the SMRC decide to proceed with the trailer tipping facility, it will be the subject of a separate referral to the EPA; and

- A transfer station for non-recyclable waste to landfill which will be capable of handling approximately 10,000 tonnes per year may be constructed at some time in the future.

3.3 Process Overview

3.3.1 Domestic Waste Collection System

The Regional Resource Recovery Centre has been designed to cater for a segregated domestic wastestream that is collected from a two-bin system. One 240 litre MGB will be

collected weekly and will contain the organic fraction of the waste stream including food waste, small green waste and other non recyclables. A second 240 l MGB will be used to collect co-mingled dry recyclables. This bin will be collected fortnightly. Large items of green waste will be collected from the verge-side three times per year.

Figure 8 provides a schematic description of both the collection system and the mass flows of waste through both the collection system and the RRRC.

The proposed collection system has been successfully trialed within the City of Melville and the behaviour of the community in using the two-bin system is well understood. The results of the trial showed that, if the 240 litre recycling MGB is used, a weekly set out rate of 71% and a yield of 7kg of recyclables (or 35% of household waste) is achievable. Paper comprised 65% of the materials collected (Total Recycling Pty Ltd *The Melville Trial* 1992) (DCT, 1993).

Recent survey's undertaken by the City of Melville and the SMRC in 1996/1997 have shown that the fortnightly set out rate for recycling collection is now 74% yielding an average 9.08 kg/household/fortnight, which represents 21% of the domestic waste stream. Attitudinal and behavioural studies of the Melville community indicate that 95% of the community is participating in recycling collections, and are very satisfied with the collection system.

In addition, the Regional Council operates drop-off centres for household hazardous waste at 3 locations in the region. This provides the community with a convenient opportunity to dispose of these items and assists in diverting them from the MSW stream.

The existing management systems and the studies that have been performed provide a high degree of confidence in the nature and quantities of the various segregated waste streams that will be delivered to the waste processing facility. As a result, the process facilities can be designed to meet the requirements of the waste steam and this will minimise any problems associated with commissioning and subsequent operation.

The following sections describe the main elements of the process facility.

3.3.2 Waste Receival

All waste will be received within enclosed buildings to ensure that noise and odour emissions are minimised. Each of the waste processing facilities incorporates its own enclosed waste receival areas.

All waste will be processed within 24 hours of the day it is received, with the total volume of waste stored prior to processing never exceeding 1000m^3.

3.3.3 Green Waste Processing

The green waste processing facility will receive segregated green waste from the three verge-side collections each year. The waste will then be either chipped or mulched. The final design of the mulching equipment has not been determined; however, care will be taken to ensure that the design of the equipment and building will ensure compliance with the noise regulations.

The processing equipment will be housed in a specialised facility enclosed within a building. The building will be constructed with impermeable concrete floors and a drainage system to capture any leachate. In areas where leachates may be generated or stored the concrete floor will be coated with an epoxy coating or similar coating to protect the surface, prevent leakage and for ease of cleaning. The enclosed nature of this facility will prevent windblown waste creating a problem, either within the facility, or outside the plant boundaries.

The mulched green waste will either be sold off-site as mulch or processed in the in-vessel composting facility subject to market conditions. If the mulch is to be sold off site, it will be analysed to ensure compliance with the *Australian Standard for composts, soil conditioners and mulches* (AS4454-1997).

As the waste will be processed on the day it is received and the processed mulch then directed for sale or further composting, the period of time the waste is stored on site is very short. Consequently, the possibility of odours and accidental fire is virtually eliminated.

3.3.4 In-Vessel Composting

The majority of the waste stream delivered to the site will be processed using a vessel composting system. The in-vessel composting plant will consist of an enclosed waste receival area where waste collection vehicles tip waste on to a push floor so that it can be progressively pushed, using a front end loader, into the feed hopper for the composting plant. The waste will be sorted to remove oversized and other items that are not suitable for the composting process and then directed to the rotary compost vessels via a screw conveyor.

Expressions of interest have been sought for the most appropriate composting technology and an in-vessel system such as the Bedminster type process has been selected as the best technology for this waste stream.

All materials handling areas of the composting plant will be enclosed within a building which will be maintained under negative pressure at all times, with the extracted air being directed to a biological filter which has a proven odour destruction efficiency in excess of 95%. In addition, all gaseous emissions from the composting vessels are directed to the biofilter prior to discharge to atmosphere. This approach virtually eliminates any potential for off-site odour impacts associated with this facility.

The in-vessel composting system will treat approximately 95,000 tonnes of waste and 40,000 tonnes of biosolids per year. It will require a mixed feedstock of wastes in order to achieve the optimum carbon-nitrogen and moisture ratios for efficient composting. The Regional Council will use a mixture of biosolids from various sources such as stabilised biosolids from the Water Corporation and Wool Scourers. More detail on biosolids is presented in section 3.4.4.

The residence time in the compost vessel is approximately 3 days in which the waste reaches temperatures of 60°C as a result of biological activity. This ensures complete pathogen destruction and organic degradation, after which the compost material is discharged through a trommel to separate the oversize inorganic material from the finely

divided organic material. This organic material is not fully stabilised and is directed for further aerobic maturation in windrows inside an enclosed building.

After the maturation process the compost is further screened through a de-stoning process to produce fine grade mature compost. The recovered inorganic material is passed through eddy current and magnetic separators to recover any metals, the remaining residue materials is generally free of organic matter allowing for disposal at inert landfill sites.

It is important to note that the entire process occurs under aerobic conditions and that all gaseous emissions are discharged through the high efficiency biofilter.

The matured compost will generally be trucked directly off site to wholesale distributors. The facility building will have sufficient capability to store one weeks production of compost plus a temporary open stockpile area for the compost which will be located on the northern corner of the site.

3.3.5 Materials Recycling Facility

The Materials Recycling Facility (MRF) is located on the eastern boundary of the site and is also an enclosed facility which includes the discharge and loading areas to ensure minimal litter on site. It will sort up to 25,000 tonnes per year of co-mingled recyclables delivered to the site in dedicated trucks and will use modern sorting techniques. The final stage will be a conventional sorting belt, but will be designed to maximise the recovery of recyclable materials.

The co-mingled recyclables will be delivered in dedicated trucks and tipped onto the floor of the MRF. The co-mingled recyclables are then picked up by a front end loader placed on a conveyor where they undergo a complex sorting process involving both automated processes and manual sorting. The final design will be determined by the successful contractor.

3.4 Waste Inputs and Products

The Regional Resource Recovery Centre will accept a wide range of wastes including:

- Municipal Solid Waste (MSW)
- Co-mingled Recyclables
- Green Waste
- Biosolids

Other wastes may be accepted with the approval of the DEP. The exact nature of wastes received will be specified by conditions of the site's Environmental Protection Licence. It is envisaged that any significant change to the types of waste received would be referred to the EPA for further assessment.

The RRRC will also produce a range of products and some small waste streams. These include:

- stabilised compost;
- segregated recyclables (paper, plastic, glass, ferrous and non-ferrous metals);
- chipped green waste; and
- inert waste for landfill.

3.4.1 Municipal Solid Waste (MSW)

It is estimated that approximately 75,000 tonnes of Municipal Solid Waste (MSW) will be generated in the year 2000 by the municipalities included in Table 2, increasing to approximately 90,000 tonnes in the year 2013.

The composting facility will initially be able to receive and process 95,000 tonnes of waste. The spare capacity of the composting facility will be used to treat domestic waste from to private operators until the waste generated by local governments equals the capacity of the composting plant.

3.4.2 Co-mingled Recyclables

An estimated 25,000 tonnes of co-mingled recyclables will be generated in the municipalities included in Table 2 in the year 2000. Each fortnight, this waste will be collected and processed in the MRF. The MRF is designed to sort 25,000 tonnes per year.

Once processed in the MRF the recyclables, excluding the glass portion, are compacted into bales ready to be sent to their respective reprocessors.

3.4.3 Green Waste

An estimated 8,000 tonnes of green waste will be generated in the municipalities included in Table 2 in the year 2000. This waste will be collected by the verge-side collections three times per year and processed at the RRRC. Additionally, green waste will be accepted from commercial greenwaste contractors.

The green waste will be chipped or mulched, and will either be sold off site as mulch or processed in the in-vessel composting facility subject to market conditions. If the mulch is to be sold off site, it will be analysed to ensure compliance with the *Australian Standard for composts, soil conditioners and mulches* (AS4454-1997).

The facility will be designed to receive up to 30,000 tonnes of green waste from commercial and domestic sources.

3.4.4 Biosolids

The in-vessel composting system will require the addition of biosolids in order to achieve the optimum carbon-nitrogen and moisture ratios for efficient composting. It is estimated that in the year 2001 the RRRC will receive approximately 40,000 tonnes of biosolids. This has the additional advantage of using this problematic waste stream to manufacture a safe and useful product.

The Regional Council envisages using a mixture of different biosolids from various sources such as stabilised biosolids from the Water Corporation and Wool Scourers. The biosolids will be closely monitored to ensure that the resulting compost complies with the *Australian Standard for composts, soil conditioners and mulches* (AS4454-1997).

The biosolids will be transported to the composting facility in tankers and stored in enclosed vessels vented to the biofilter to prevent the emission of odours. This method of handling will ensure that the liquid biosolids are fully contained at all times.

3.4.5 Compost

It is estimated that the RRRC will produce approximately 56,000 tonnes of compost in the year 2001. It is not possible to accurately define the composition of the compost that will be produced as the technology and feedstocks have not been finalised. However, it is expected that the compost produced at the RRRC will be similar in composition to compost produced at Bedminster plants in the United States that utilise a similar co-composting process using biosolids and municipal waste. The typical analysis of compost from the Sevierville Bedminster Plant in the USA is detailed in Table 4.

TABLE 4

COMPOSITION OF COMPOST

Element	Compost (g/kg)
Aluminum	10.7
Boron	0.03
Calcium	21
Copper	0.20
Iron	9.5
Magnesium	2.2
Manganese	0.24
Nitrogen	11
Phosphorous	6.0
Potasssium	4.0
Sulfur	4.9
Zinc	0.59

Source: Bedminster Bioconversion Australia, 1997.

Note:
1. Results reported on a dry unit basis by A & L Analytical Laboratories, Inc.
2. Compost samples from Sevierville Bedminster Plant, taken from January to December, 1994.
3. It is anticipated that concentrations of most parameters will be lower for a plant in WA because of the lower level of industrial activity and the relative uncontaminated nature of WA's sewage sludge.

The relatively high content of nutrients in the compost increases the value of the compost as a soil conditioner.

3.4.6 Compost Process Residue

Once the compost material is discharged from the composting vessel it is passed through a trommel to separate the oversize inorganic material (process residue) from the finely degraded organic material. The residue is then passed through an eddy current and

magnetic separators to recover any metals. As the metals have undergone bacterial cleaning in the digesters, they emerge with any food scraps or labels removed. The remaining residue material is inert, allowing for disposal at inert landfill sites.

The heavy metal concentrations of the compost process residue produced at a similar plant in the United States are shown in Table 5.

TABLE 5

HEAVY METAL CONCENTRATIONS OF COMPOST PROCESS RESIDUE

	Total Content (mg/kg)		TCLP[1] (mg/L)	
Analyte	Process Residue[1]	Class II	Process Residue[1]	Class II
Arsenic	<0.009	30	<0.006	0.07
Barium	90	-	<0.8	7
Cadmium	0.7	5	0.004	0.02
Chromium	89.9	250	003	0.5
Lead	52	300	0.1	0.1
Mercury	1.6	2	0.011	0.01
Selenium	0.15	10	<0.006	0.1
Silver	2.1	-	0.01	1

Notes: 1. Source: Aqua Air Analytical Laboratories, Rarlton, USA. Test date 7/10/93.
2. Classified using the EPA "Draft Waste Acceptance Criteria for Landfills in Western Australia".

Assuming that the compost residue produced at the Canning Vale facility is similar in composition, comparison with the "Draft Waste Acceptance Criteria for Landfills in Western Australia" indicates that, based solely on the heavy metal content, it will be suitable for disposal to a Class II landfill such as Ranford Rd.

3.4.7 Excluded Wastes

The following wastes will be excluded from the facility:

- liquid wastes of industrial origin, i.e. Categories 5 to 14 in Environmental Protection (Liquid Waste) Regulations, 1997;
- radioactive substances other than smoke detectors and other low yield sources commonly found in MSW;
- any explosive, flammable, corrosive or reactive material;
- any refuse from leather processing, petrochemical, chemical, paint manufacturing, mineral or vegetable oil, or pharmaceutical plant other than that contained in sewerage sludge; or
- any material which contains contaminants in excess of the EPA criteria for landfill;
- intractable wastes such as organochlorine pesticides or PCBs.

3.5 Operating Times

The site will receive waste between Monday and Saturday inclusive between the hours of 0700hrs and 1700hrs. The processing facilities will generally operate every day during the following hours:

•	MRF	0700-1700 hours	Monday to Saturday[1]
•	Greenwaste	0700-1700 hours	Monday to Saturday[1]
•	Compost Vessels	Continuous	Every day[1]
•	Compost Screening	0700-1700 hours	Every day[1,2]
•	Compost Maturation	Continuous	Every day[1]

Notes:
1 Except where plant breakdowns cause a backlog of waste which must be treated prior to closing the plants for the night.
2 Only the primary trommels will operate on Sundays.

In the event of upset conditions there is a staff member assigned on call 24 hours a day, seven days a week. If a complaint or an alarm is raised, the assigned staff member will be paged and the relevant contingency plan will be implemented. It is envisaged that a response to the complaint/alarm will be achieved within 60 minutes of the plant being contacted.

3.6 Transport

The projected traffic flows for the Regional Resource Recovery Centre for a 300 tonnes per day In-Vessel Composting Facility are shown in Appendix 4. This information is summarised in Table 6.

TABLE 6

PROJECTED TRAFFIC FLOWS FOR THE REGIONAL RESOURCE RECOVERY CENTRE

Year	300 tonnes/day vehicles/day	375 tonnes/day vehicles/day
2001	151	171
2002	152	171
2003	152	171
2004	154	173
2005	154	173
2006	155	174
2007	157	178
2008	156	177
2009	157	178
2010	157	179
2011	159	181
2012	159	181
2013	160	182

All waste will be delivered to the site in enclosed trucks.

4. ENVIRONMENTAL ISSUES

4.1 Introduction

The EPA, in its guidelines for this CER (Appendix 1), has defined a series of relevant factors that it considers are particularly important for its assessment of the proposed integrated regional waste processing facility at Canning Vale. Relevant environmental factors are defined as those which have the potential to have significant environmental impacts, and which the EPA may therefore be required to report to the Minister for the Environment.

The discussion of the environmental implications of the regional waste processing facility given in this section of the CER addresses the relevant factors. For each factor, the existing environment and proposed management strategy is stated, and a discussion of the environmental implications associated with the proposed development is then provided. This includes commitments for environmental management where appropriate, and a description of the monitoring programs which will be implemented during the operation of the facility when relevant. All this information in summarised in Section 5.

4.2 Biophysical Factors

4.2.1 Vegetation

Existing Environment

A survey of the vegetation and flora on the site was undertaken in September 1998.

The vegetation is generally in good condition although partial clearing, tracks and non-aggressive weeds on the site indicate some areas have been significantly disturbed by human activity.

The vegetation belongs to the Bassendean Complex – Central and South (Heddle *et al*, 1980). Specifically the site contains three main vegetation types as follows (see also Figure 9):

- *Banksia* Low Open Woodland on flat low-lying areas;
- Paperbark (*Melaleuca preissiana*) Woodland on swampy low-lying areas; and
- *Banksia* Low Open Woodland on sloping land.

The *Banksia* Low Open Woodland on the flat areas are dominated by *B. attenuata* but also contain B. *grandis*, B. *ilicifolium*, *Allocasuarina fraseriana* (Sheoak) and *Eucalyptus marginata* (Jarrah). The understorey contains tall shrubs of *Melaleuca thymoides*, *Xanthorrhoea preissii* and *Adenanthos cygnorum* (Woolly Bush) and common small shrubs such as *Scholtzia involucrata*, *Dasypogon bromeliifolius* and *Patersonia occidentalis*.

Two small pockets of *Melaleuca preissiana* (Moonah Paperbark) Low Woodland occur in areas where the watertable is close to the surface. The understorey of both areas is very disturbed and contains mostly weed species. Surrounding the Paperbark Woodland

in the south-west sector is a Low Heath of *Scholtzia involucrate, Xanthorrhoea preissii, Patersonia occidentalis* and *Dasypogon bromeliifolius*. This area has the appearance of the Banksia woodland areas but without the trees. In all probability the trees have been logged from this area.

The vegetation on the sloping land in the north-west portion of the site is a Banksia Low Open Woodland. This vegetation is similar to the *Banksia* Low Open Woodland on the flat areas, but containing species indicative of drier conditions such as *Hibbertia hypericoides, Stirlingia latifolia* and *Macrozamia riedlei* (Zamia Palm) and lacks other species particularly *B. ilicifolium* and *Melaleuca thymoides*.

Flora

A total of 116 native species was recorded during the March 1998 and September 1998 surveys for the area (Appendix 3). The total consisted of 1 Gymnosperm, 39 Monocotyledons and 76 Dicotyledons. The families with the highest number of species were the Myrtaceae (Myrtle family – 14 species), Proteaceae (Banksia family – 12 species), and the Papilionaceae (Pea family – 8 species). These families typically dominate the flora of the Perth Metropolitan Area (PMA).

A search was undertaken of the CALM database for Declared Rare and Priority Species known to occur in or near the study area. The conservation status of significant taxa in the region is summarised in Table 7.

TABLE 7

CONSERVATION STATUS OF SIGNIFICANT TAXA IN THE REGION

SPECIES	CONSERVATION STATUS	LOCALITY
Caladenia huegelii	R	Perth-Yallingup, Scott River
Diuris purdiei	R	Perth-Waroona
Tripterococcus paniculatus	1	Canning Vale, Cannington, Willeton, Leeming, Forrestdale
Aotus cordifolia	3	Jandakot, Red Hill, Byford, Witchcliffe, Upper Swan, Dwellingup, Helena Valley
Phyllota gracilis	3	Jandakot airport, Collie, Narrogin, Kojonup, Wagin, Jitarning

Note: R Species that are declared rare
1-3 Species which are poorly known

Suitable habitat occurs on the site for the two Declared Rare Fauna orchid species. However, no Declared Rare or Priority Flora was identified during the field survey of the study area.

Management

Vegetation Significance

The main criteria used to determine regionally significant vegetation is the objective to protect a minimum 10% of each vegetation complex remaining in the Perth Metropolitan

Area (PMA). Presently there is 22% of the Bassendean Complex Central and South remaining in the Perth Metropolitan Area, of this 6% is currently protected. An additional 7% is proposed for reservation in Perth's Bushplan.

Ken Hurst Park adjoins the study area and has regionally significant bushland. Ken Hurst Park is part of the Bassendean Complex – Central and South and is identified in the draft Bushplan. The Park has a total of 204 native flora species as well as 10 of unknown origin. The families with the highest number of species were the Myrtaceae (Myrtle family – 25 species), Papilionaceae (Fabaceae) (Pea family – 16 + 3 unidentified species), and the Orchidaceae (Orchid family – 14 + 1 unidentified species).

Species found in the study area but not in Ken Hurst Park are summarised in Table 8.

TABLE 8

SPECIES FOUND IN THE STUDY AREA BUT NOT IN KEN HURST PARK

FAMILY	SPECIES
Cycadaceae	Macrozamia riedlei
Anthericaeae	Corynotheca micrantha Thysanotus arenarius Thysanotus patersonii
Cyperaceae	Lepidosperma leptostachyum Lepidosperma squamatum
	Schoenus asperocarpus
Orchidaceae	Pterostylis nana Leporella fimbriata
Restionaceae	Laxmannia squarrosa Loxocarya pubescens Loxocarya flexuosa Meeboldina fasciculata Meeboldina flexuosa
Xanthorrhoeaceae	Xanthorrhoea brunonsis
Asteraceae	Helipterum roseum Quinetia urvillei
Epacridaceae	Astroloma pallidum Conostephium preissii Leucopogon australia Leucopogon sprengelioides
Goodeniaceae	Scaevola paludosa
Lamiaceae	Hemiandra pungens
Myrtaceae	Melaleuca thymoides
Papilionaceae	Daviesia preissii Hardenbergia comptoniana
Proteaceae	Banksia grandis Beaufortia elegans
Rubiaceae	Opercularia hispidula
Thymeleaceae	Pimelea leucantha
Violaceae	Hybanthus calycinus

The intended clearing of vegetation for the development of the proposed facility is not expected to have a significant impact. The RRRC site supports only a very small area of

remnant vegetation compared with that contained in Ken Hurst Park, Jandakot Airport and Jandakot Regional Park. The RRRC site is situated towards the extremity of a broader area of remnant vegetation and the proposed clearing will not result in fragmentation of the bushland.

Whilst the clearing of vegetation on the site is unlikely to be of regional significance, the following measures are proposed to minimise impact on vegetation:

- Clearing of remnant vegetation will be minimised as far as possible;
- The final layout of the facility will be developed in discussion with government agencies to maximise the value of uncleared vegetation. (A final clearing plan will be developed to the satisfaction of the DEP);
- Vegetation on the site adjacent to Ken Hurst Park will be retained to the extent that is feasible. In this area, fences will be placed as close as possible to buildings in order to minimise disturbance to vegetation and permit free access for fauna to the larger area of vegetation at Ken Hurst Park;
- The landscape plan for the site will utilise vegetation types indigenous to the area in order to return the site as far as possible to its natural state. The landscape plan will be prepared in discussion with CALM and the DEP and submitted for review prior to implementing the landscaping.

Outcome

On the basis of these criteria, the exclusion of the land from the draft Bushplan, and the presence of larger remnants of the Bassendean Complex Central and South within the nearby Ken Hurst Park, it is argued that the vegetation in the study area is of local significance only, and is not vital to meet the government's objective for urban bushland conservation. The management measures proposed will minimise the impacts arising from clearing vegetation.

4.2.2 Fauna

Existing Environment

The RRRC site supports three major habitats in terms of vertebrate fauna, namely:

- *Banksia* woodland on flat low-lying areas.
- *Melaleuca pressiana* (Paperbark) woodland on swampy low-lying areas.
- *Banksia* woodland on sloping land.

Banksia woodlands are recognised as significant habitats for a diverse range of vertebrate fauna (How and Dell, 1989). The presence of *Banksia* woodlands combined with low lying swampy areas enables fauna dependent solely on either of these habitats, together with those preferring a combination of habitats, to inhabit the RRRC site. This suggests the RRRC site may potentially support a relatively high diversity of fauna.

An intensive vertebrate fauna survey of Ken Hurst Park, which lies adjacent to the RRRC site, recorded a total of 65 species (Dell and Cooper, 1992). This comprised 4 amphibian, 17 reptile, 36 bird and 3 native and 5 introduced mammal species. Ken Hurst Park covers a more extensive area of remnant vegetation, and includes areas of fauna habitat representative of that present within the RRRC site as well as others not present on the RRRC site.

The species list for the Park includes one species, the Short-billed Black-Cockatoo (or Carnaby's Cockatoo) (*Calyptorhynchus latirostris*), that is listed as Specially Protected Fauna (Schedule 1) under provisions of the Wildlife Conservation Act, 1950. Two Priority taxa, namely the Southern Brown Bandicoot (or Quenda) (*Isoodon obesulus*) and Western Brush Wallaby (*Macropus irma*), were recorded at several sites within the Park. The Southern Brown Bandicoot was recently removed from the list of Specially Protected Fauna (Schedule 1). This species appeared relatively abundant within the Park with considerable evidence of its presence in low lying or inter-dunal areas.

Ken Hurst Park was also found to support several bird species that have suffered a reduction in distribution or abundance on the Swan Coastal Plain. These comprise Brown Goshawk, Painted Button-quail, Common Bronzewing, Grey Shrike-thrush, Yellow-rumped Thornbill, Splendid Fairy-wren, White-cheeked Honeyeater and Black-faced Woodswallow. Four of these species, the Painted Button-quail, Yellow-rumped Thornbill, Splendid Fairy-wren and Black-faced Woodswallow were detected only within habitats (*Regelia* spp. Shrubland) not present within the RRRC site.

Previous surveys within Jandakot Airport (How *et al.*, 1996) and in the Canning Vale region (Maryan, 1993) identified a further 22 species of vertebrate fauna in the area that may potentially inhabit the RRRC site. These species comprise 16 reptiles and 6 birds. None of these species is declared rare or listed as Priority taxa. One of these species, the Varied Sittella (*Neositta chrysoptera*) is a habitat specialist that has suffered a reduction in distribution on the Swan Coastal Plain. This species typically inhabits areas where trees are present, particularly rough-barked eucalypts, and was recorded within Jandakot Airport.

Several of the reptile species recorded at Ken Hurst Park, Jandakot Airport and Canning Vale have generally disappeared from the urban environment but persist on relatively large areas of natural bushland. Significant species include burrowing snakes, and the elapid Crowned Snake (*Drysdalia coronata*) and Reticulated Whip Snake (*Demansia psammophis*), which appear to be affected by habitat fragmentation and disturbances.

A search of CALM's database for Threatened Fauna identified three species that may occur in or near the study area (Table 9).

TABLE 9

SIGNIFICANT SPECIES EXPECTED TO OCCUR IN THE REGION

SPECIES	CONSERVATION STATUS
Calyptorhynchus latirostris (Short-billed Black-Cockatoo or Carnaby's Cockatoo)	Schedule 1 – Rare or likely to become extinct
Falco peregrinus (Peregrine Falcon)	Schedule 4 – Other specially protected fauna
Isoodon obesulus fusciventer (Southern Brown Bandicoot or Quenda)	Priority 4 Taxa

The Short-billed Black-Cockatoo or Carnaby's Cockatoo is a regular seasonal inhabitant of the Swan Coastal Plain, where it feeds on *Banksia* and introduced *Pinus* species. It does not breed in the location of the proposed site but may seasonally feed at the site. This species was recorded at Ken Hurst Park during the 1992 survey.

The Peregrine Falcon is an occasional visitor to areas of open woodland and along margins of semi-rural land. This species was not recorded in any of the surveys consulted but could occasionally occur as an opportunistic visitor.

The Southern Brown Bandicoot or Quenda occurs in *Banksia* woodland and dense low heath communities and is often found associated with low lying or wetland areas. The Bandicoot is still moderately common in the Canning Vale area and was considered to be abundant within Ken Hurst Park.

Habitats within the RRRC site may potentially support many of the species of fauna detected within Ken Hurst Park and neighbouring areas. The relatively high diversity of species recorded within Ken Hurst Park can be partly attributed to the range of major habitat types, and presence of several *Banksia* species that flower at varying times of the year. The diversity present within the study area is expected to be lower than that at Ken Hurst Park due to the absence of certain habitat types and smaller total areal extent. In addition, there is a lower diversity of *Banksia* species within the RRRC site, and the virtual absence of *Banksia menziesii* which flowers during the winter months providing a valuable food source, suggests a lower diversity of resident Honeyeaters (Meliphagidae) can be expected at the site.

All of the habitats present within the RRRC site are represented within Ken Hurst Park. The fauna assemblages inhabiting the site are likely to also occur within the Park or other nearby areas of remnant vegetation such as Jandakot Airport and Jandakot Regional Park, which lie to the south and south east of the RRRC site and occupy more extensive areas.

The intended clearing of vegetation for the development of the proposed facility is not expected to have a significant impact on the maintenance of populations of species present. The RRRC site supports only a very small area of remnant vegetation compared with that contained in Ken Hurst Park, Jandakot Airport and Jandakot Regional Park. The RRRC site is situated towards the extremity of a broader area of remnant vegetation and the proposed clearing will not result in fragmentation of the bushland.

Management

Whilst the clearing of vegetation on the site is unlikely to be of regional significance, the removal of vegetation will result in a reduction or removal of habitat for fauna using the site. In view of this the following measures are proposed to minimise impact on fauna:

- Clearing of remnant vegetation will be minimised as far as possible;
- The final layout of the facility will be modified in discussion with government agencies to maximise the value of uncleared vegetation;
- Vegetation on the site adjacent to Ken Hurst Park will be retained to the extent that is feasible. In this area, fences will be placed as close as possible to buildings in order to minimise disturbance to vegetation and permit free access for fauna to the larger area of vegetation at Ken Hurst Park;
- Prior to clearing commencing, the boundary fences will be erected and a trapping program instituted to capture vertebrate fauna of particular significance such as the Southern Brown Bandicoot. Any trapped animals will be relocated in accordance with the requirements of CALM. This program will be detailed in a Fauna Management Plan developed to the satisfaction of CALM.
- The landscape plan for the site will utilise vegetation types indigenous to the area in order to return the site as far as possible to its natural state. A landscape plan will be prepared in discussion with CALM and the DEP and submitted for review prior to being implemented.

Outcome

The clearing of vegetation will result in some loss of habitat on the site, however, this will not have a significant impact on fauna populations present as there are a number of similar areas of bushland located in the vicinity of the site.

The management measures proposed will minimise the impact on fauna by:

- Retaining vegetation where possible;
- Trapping and relocating fauna prior to clearing; and
- Landscaping and revegetating the site with local species to provide additional useable habitat following completion of construction.

4.3 Pollution Management

4.3.1 Groundwater Quality

Existing Environment

The site is characterised by grey sands of the Bassendean system. It is underlain by a shallow unconfined aquifer at depths ranging from 1m - 15m depending on the surface contour of the site. Groundwater flows are to the north and west towards the Canning River. Some shallow depressions on the southern boundary appear to be seasonably inundated. The water and ground contours are shown in Figure 5.

Some contamination is present in the shallow aquifer due to the operations of the adjacent Ranford Road landfill. As a result, this landfill facility has now been lined and monitoring of the ground water pollution is continuing. Table 10 contains a list of analytes for which one or more guideline concentrations have been exceeded in samples collected between 1995 and 1998.

TABLE 10

ANALYTES FOR WHICH ONE OR MORE GUIDELINE CONCENTRATIONS HAVE BEEN EXCEEDED IN SAMPLES COLLECTED BETWEEN 1995 AND 1998

Analyte	Units	ADWG1 Guideline	EPA2 Guideline 1	EPA3 Guideline 2	EPA4 Guideline 3
Cadmium	mg/L	**0.002**	**0.0002-0.002**	**0.005**	**0.01**
Chromium	mg/L	0.05	**0.010**	0.05	1.0
Copper	mg/L	2	**0.002-0.005**	1.0	0.2
Lead	mg/L	**0.01**	**0.001-0.005**	**0.05**	**0.2**
Manganese	mg/L	**0.5**	*	**0.1**	2.0
Nickel	mg/L	**0.02**	**0.015-0.150**	0.1	0.2
Zinc	mg/L	3	**0.005-0.050**	5.0	2.0
Ammonia - nitrogen	mg/L	**0.39**	**0.02-0.03**	*	*
pH	-	**6.5-8.5**	**6.5-9.0**	**<0.2 change**	4.5-9.0
Total Soluble Salts	mg/L	**500**	*	*	*
TPH	µg/L	*	*	**10**	*

Cells that are bolded and shaded indicate that the monitoring results have exceeded or equalled the guideline value.

* - denotes no guideline value
1 - Australian Drinking Water Guidelines 1996, NHMRC & ARMCANZ
2 - Summary Guidelines for Protection of Aquatic Ecosystems (Fresh waters), (Draft) Western Australian Water Quality Guidelines for Fresh and Marine Waters. Bulletin 711. October 1993.
3 - Summary Guidelines for Protection of Aquatic Ecosystems (Marine waters), (Draft) Western Australian Water Quality Guidelines for Fresh and Marine Waters. Bulletin 711. October 1993.
4 - Summary of Guidelines for Irrigation Water Quality. (Draft) Western Australian Water Quality Guidelines for Fresh and Marine Waters. Bulletin 711. October 1993.

In view of the presence of this contamination in the aquifer, SMRC will monitor groundwater quality under the site to establish baseline water quality for all relevant parameters.

Management

Any facility handling waste has the potential to contaminate soil and groundwater as a result of nutrients or contaminants leaching from the waste. As a result, it is important that the design and management procedures for any waste disposal facility incorporate appropriate safeguards.

The sandy nature of the soils and the shallow depth to groundwater at the proposed site also act to increase the potential for pollution of the groundwater system.

In order to prevent groundwater contamination, all waste handling facilities on the site and all internal roads will be sealed. Waste will only be handled within covered and sealed areas. The biofilter design incorporates a sump to collect any excess water. This water will be recycled to maintain optimum moisture condition in the filter. In addition, the biofilters will be roofed to reduce evaporation in summer and prevent rainfall from affecting the moisture balance of the filters.

If water sprays are required for dust suppression, the amount of water used will be kept to a minimum.

The drainage system design for the facility will allow for the diversion and segregation of stormwater to ensure stormwater is not contaminated with waste products. Drainage from sealed areas adjoining the processing facilities will be diverted by bunds to an appropriate sized sump.

Each facility will incorporate sumps capable of handling liquids generated during processing operations. Captured liquids will be disposed of as soon as possible. Experience with similar facilities indicates that minimal quantities of liquids will be generated given the enclosed nature of the facilities.

Notwithstanding the very low risk of contamination, the Regional Council will install monitoring bores (one upstream and two downstream of the site) to monitor water quality impacts. The bores will be located on the southern and northern boundary of the site in locations approved by the DEP.

Monitoring will commence prior to construction of the RRRC to establish baseline data, and will be ongoing during construction and operation of the RRRC. Parameters to be monitored will include nutrients, heavy metals, organochlorines and pathogens. Monitoring results will be reported annually to the DEP.

Outcome

The plant will be designed and operated in a manner that minimises the possibility of contaminating either surface or groundwater. Monitoring bores will be installed upstream and downstream of the site to monitor water quality impacts.

4.3.2 Odour

Existing Environment

The site proposed for the facility is adjacent to the Ranford Road Landfill. This major landfill represents a more significant odour source than the RRRC. In addition, other potential odour sources such as the dog pound are located nearby.

Other surrounding land uses which may be impacted by odours are the Canning Vale Markets and residential areas in Leeming some 500m to the north-west of the site.

To assess the potential odour impacts, meteorological data collected at the DEP's Caversham air quality monitoring station was used. The Caversham monitoring station is located approximately 20km from the coast. The waste processing facility is located approximately 13.5km from the coast and therefore should be adequately represented by the Caversham data.

The meteorological data supplied by the DEP is for the 1994 year, and consists of 1-hourly averaged wind speed, wind direction, sigma theta, temperature, stability class and mixing height.
As the region surrounding the waste processing facility is relatively flat, adjustments of predicted ambient concentrations on the basis of topography were not considered necessary.

Management

Odour Assessment

Odour assessment is a developing area of environmental management and involves some unique methodologies which require explanation before the approach adopted for assessing the odour impact of the RRRC can be understood.

The impact of odours is a very subjective subject. The response of the human nose to odours varies greatly between individuals and according to the situation what may be obnoxious to one person may be acceptable to another. An odour that may be acceptable in one situation may be offensive in another. A bakery and other food manufacturers are a good example of this latter characteristic. Most of us find the odour of baking bread acceptable or desirable, when we walk into a bakery to purchase bread. However, residents living in the vicinity of a bakery often complain about this odour when subjected to it on a regular basis.

Another difficulty with odours is that what we detect as a particular odour may consist of many different compounds combining to create a particular odour response. The characteristics of the receiver and also the relative concentrations of the different chemical compounds that constitute the odour contribute to a widely varying response to odours. It is therefore not currently possible to develop an instrument to quantify odours accurately.

In view of this, the methodology for assessing odour is based on using a panel of human subjects to assess the characteristic of odours. This methodology is called dynamic olfactometry and is well established.

Dynamic olfactometry involves delivering samples of the odour in question in a very controlled fashion to a panel of best subjects. The equipment used allows the sample to be successively diluted to a level at which it can no longer be identified. The level at which the odour can no longer be identified is known as the odour threshold, while the number of times the sample was diluted to reach the odour threshold is used to characterise the waste in terms of 'odour units'.

For example, if an odour sample needs a tenfold dilution to reach the odour threshold then the sample is said to have an odour concentration of 10 odour units.

Thus for dispersion modelling, an emission expressed in OU can be considered analogous to mass and hence assigned to a volumetric flow of air and expressed as OU/m^3 or OU/s. The convention used in this document is to use OU when referring to the results from dynamic olfactometry and OU/m^3 when referring to an odour "concentration" in the environment.

The design of the proposed RRRC at Canning Vale will be based on a technology similar to the Bedminsiter composting facility at Sevierville, Tennessee. The capacity will be 300 tonnes per day of MSW and 150 tonnes per day of municipal biosolids. The plant is totally enclosed with odorous gases treated in biofilters before release to atmosphere.

Odour Sources and Characteristics

The processing plant and In-vessel Composting buildings will be maintained under negative pressure through the use of ventilation fans, and the air ducted to a biofilter. The intakes of the fans will be appropriately designed and located to effectively prevent the escape of air within the buildings. The cladding of the building will be regularly inspected and maintained to control leakage of air into or out of the facility. Off-gases from the digesters will also be ducted directly to the biofilter. On this basis, the main odour sources are the biofilter used for treating building and process gases and fugitive odour emissions released through the truck-entry door of the processing plant building.

It is anticipated that there will be low/negligible odour emissions from the stabilised compost stockpiled on the external storage pad. For conservatism however, potential odour emissions from the stockpile have been included in the prediction of odour impacts.

The Materials Recycling Facility and the Greenwaste Processing Facility are not considered to be significant odour sources as the odour characteristic is not offensive and have been excluded from further consideration in terms of odour impacts.

Fugitive emissions from trucks delivering biosolids are considered to be negligible as the biosolids will be delivered to the site as a slurry, in sealed tankers, and discharged via pipes to sealed holding tanks that are vented to the biofilters. Thus, they have been excluded from further consideration in terms of odour impacts.

Biofilters

A proven technology for removing odours from gas streams is through the use of biofilters. They consist of a vessel or container that is filled with an organic matrix of compost and pine bark. This organic matrix is conditioned to maintain optimum conditions of moisture for establishing a population of microorganisms. The gas stream to be treated is introduced on one side of the filter and allowed to slowly percolate through the organic matrix.

Gaseous emissions pass through the biofilters at a rate that provides sufficient residence time for the odoriferous compounds (odourants) to be absorbed in the layer of moisture that surrounds the filter media. The odourants are oxidised and broken down by microorganisms present in the liquid layer. In addition to removing odourants, biofilters also remove a range of other volatile organic compounds (VOC's).

Biological filters offer significant advantages, particularly their high removal efficiency, the ability to handle variations in concentrations, and their relatively low cost to construct and operate. The organic material used can be either directly sold or recycled through the compost system.

It is proposed that the design and capacity of the RRRC plant and the biofilters are similar to the Sieverville plant. The waste feeds for both plants will also be similar, being a mixture of municipal solid waste and biosolids. The biofilter design will be modified slightly to incorporate a sunshade to reduce the drying effect of direct sunlight on the filter medium

The biofilter trials at the Sieverville plant were conducted on a hot (31°C maximum), humid day. The temperature and pressure measurements for the two biofilter mixes are summarised below (E&A Environmental Consultants Inc, 1997):

	2:1 Mix	3:1 Mix
Inlet velocity (m/s)	4.1	3.6
Inlet flow (m^3/s)	33	29
Nominal gas residence time (s)	52	59
Media Temperature (°C)	32	32
Inlet pressure (kPa)	99[1]	174[1]

Note: (These values have been converted from 0.4 and 0.7 inches water column for the 2:1 and 3:1 mixes respectively, assuming a temperature of 20°C).

These conditions are within the range of expected conditions in Perth.

Ambient conditions in Perth are generally warmer and more moderate than Sieverville and this should act to enhance biofilter efficiency.

As a result, the performance data from the Sieverville plant is therefore considered to be representative of the performance of the RRRC plant in Perth. Monitoring following commissioning should provide confirmation that this assumption is correct.

The biofilter at the Sieverville plant consists of five rectangular bays that are approximately 61m in length and 6m in width. Air flow is driven by two blowers nominally rated at 18.9m^3/s. An identical unit is proposed for the RRRC.

The source of data used to determine odour emissions rates for modelling odour impacts are the results of tests conducted by E&A Environmental Consultants for Bedminister at its composting facility located at Sevierville, Tennessee (E&A 1997).

The testing at Sevierville involved the use of two media blends:

1. Two parts by volume softwood chips with one part well stabilised yard waste compost; and

2. Three parts by volume softwood chips with one part well stabilised yard waste compost.

Eight air samples were collected before and after the biofilters on 15 July 1997. Activities at the composting facility that day included discharging of the digesters and screening through the primary trommel. The aeration floor was loaded to capacity.

The air loading rates to the biofilters were 1.42m^3/min/m^2 and 1.24m^3/min/m^2 for blends #1 and #2 respectively. These are slightly higher than the design loading rate of 1.16m^3/min/m^2 (Bedminster Bioconversion Corporation, 1997) and hence are slightly conservative.

Odour analysis was undertaken on 16 July 1997 and included determining the odour threshold using dynamic olfactometry ASTM Method E-679-91. The sampling results are summarised in Table 11.

TABLE 11

RESULTS OF BIOFILTER ODOUR SAMPLING AT SEVIERVILLE COMPOSTING PLANT

Sample ID	Sample Location	Odour Concentration (OU_{ASTM})	
		As measured	Average
Blend #1	Inlet	545	502
		459	
Blend #2	Inlet	421	421
		421	
Average	**Inlet**		**461.5**
Blend #1	Outlet	13	15
		17	
Blend #2	Outlet	16	17.5
		19	
Average	**Outlet**		**16.1**

The conclusion from the testing was that the performance of both biofilter media was virtually identical. The odour removal efficiency was 97% for blend #1 and 95.8% for blend #2.

The efficiency of biofilters decrease over the life of the filter due to decomposition and associated compaction of the media, variable moisture gradients in the media, and clogging from dust and particulate in the air stream.

To prevent these problems from occurring, the following filter management program will be implemented:

- The biofilter media will be agitated and remixed on a periodical basis.
- To prevent the media degrading to a point where it becomes compacted, the media will be replenished with fresh media during agitation and remixing on a periodical basis. The frequency for replacing the media will be in accordance with the manufacturers recommendations.
- Exhaust air from the composting building will be humidified prior to going to the biofilters to maintain the optimum moisture content and prevent moisture gradients from occurring within the media.
- The biofilters consist of multiple cells. This means that if one cell is off line for maintenance, the others can continue to operate at slightly higher loadings and biofilter efficiency is maintained at a high level.

The emissions concentration selected for this study is 20 OU_{ASTM}/m^3 on the basis that it is approximately equal to the highest measured emission biofilter outlet concentration measured from the test results (see Table 11) and hence should embody adequate conservatism. The volumetric flow selected for this study is $35m^3/s$, which is based on the dimensions of the biofilter and the design loading rate ($1.16m^3/min/m^2$). The combination of selected odour concentration and air flow gives an odour emission rate of 700 OU_{ASTM}/s.

The RRRC biofilter is located about 14m away from the In Vessel Composting building. Dispersion of emissions from the biofilter will be enhanced by the wake of the building however this effect will be reduced from wind directions parallel to the biofilter axis and building (around 76° and 256°). For wind having these directions, it may be misleading to assume that the wake effect is the same as that for winds perpendicular to the biofilter axis (ie. 346° and 166°). In order to generate a conservative estimate of the ground level concentrations for this situation (notably for winds around 76° and 256°), the crosswind building width used to calculate enhanced dispersion from the building wake should be varied as a function of wind direction.

Therefore biofilter odour emissions were modelled as a series of seven point sources elevated 1m from the ground, for which Ausplume allows the use of variable building widths.

In Vessel Composting Facility

Odorous air is likely to be emitted from the In Vessel Composting Facility building while the door is open. An estimate of these emissions needs to consider that the inside of the building will be under negative pressure, and that the door will be open and closed on an as-needs basis to allow trucks to enter and depart.

For estimating the odour emission it was assumed that the area of door opening is $64m^2$ (8m x 8m), and the estimated velocity of air through opening is 0.5m/s. This gives a volumetric flow rate of $32m^3/s$.

The odour concentration inside the building is assumed to be 550 OU_{ASTM}/m^3 on the basis that this was the highest biofilter inlet odour concentration measured during the Sevierville tests. This should be conservative because it is probable that exhaust air from the digesters has a higher odour concentration than ventilation air.

The combination of volumetric flow and odour concentration gives an odour emission of 17,600 OU_{ASTM}/s while the door is open. Although the door will be opened only to allow the entry and departure of trucks, it has been conservatively assumed for the purpose of modelling that the doors will be continuously open between 0700 and 1900 hours 7 days/week.

Compost Storage

The In-vessel Composting Facility will incorporate an enclosed storage area capable of meeting normal storage requirements. However, the facility includes a small external storage area to temporarily store compost in windrows outside of the In-Vessel Composting Facility. This area will incorporate a roof to prevent rainfall and sun affecting compost quality but will be open-sided. For the purposes of the odour assessment, a total windrow surface area of about 510 m^2 has been assumed.

The calculation of odour emissions from compost windrows is based on emission rate measurements given in CH2M Hill (1997). CH2M Hill sampled compost windrows from operating facilities in Perth. Unfortunately the report does not provide information on the nature of the compost sampled, however, it is probable that since they were still being turned, the compost was still biologically active. The compost at the RRRC will not be biologically active by the time it is stockpiled; hence the emissions rates estimates derived from the CH2M Hill study are likely to be conservative.

The static windrows sampled by CH2M Hill were found to have a representative odour emission rate of 4 $OU_{NVN2820\text{-}FC}/m^2/s$, once adjusted to a sampling height wind speed of 0.6m/s to account for the estimated roughness of the compost windrow surface. Using this value, a conservative estimate of total odour emissions from the RRRC compost windrows is 2,040 $OU_{NVN2820\text{-}FC}/s$.

Predicted Impacts

Various regulatory odour criteria used within Australia are shown in Table 12.

TABLE 12

REGULATORY ODOUR CRITERIA USED WITHIN AUSTRALIA

Australian State	Method	Response (a)	Source Type	Averaging Period (mins)	Compliance (%)	Concentration (OU/m^3)
Victoria/ Tasmania	B2 (EPAV 1985b)	Yes/No	All	3	99.9	1.0
Queensland	Method 6	Yes/No	Point sources with building wake effects/Area sources	3	99.5	2.5
			Point sources without building wake effects	3	99.5	0.5
(Dept of Environment proposed [b])	NVN2820	Forced Choice (FC)		60	99.5	10
(Stakeholder proposed)	NVN2820	FC		60	99.5	15
New South	(e)	FC, certainty [c]	Scheduled premises	3	99.0	0.3
Wales [b]		FC, detection [d]		3	99.0	1.0
		FC, certainty [c]	Non-scheduled	3	99.5	0.6
		FC detection [d]	premises	3	99.5	2.0

(a) Detection threshold unless otherwise stated.

(b) Informal criteria as at 10 March 1997.

(c) Reported as "recognition threshold" in units of OU_{50R}.

(d) Reported as "detection threshold" in units of OU_{50D}.

(e) EPA NSW (1994)

The Victorian, NSW and Queensland regulatory agencies have based their odour criteria concentrations on different odour measurement methods (as well as different averaging times and percentiles) therefore the criteria are not directly comparable.

The DEP in Western Australia currently refers to the Queensland criteria as a guide for assessing odour impacts (EPA, 1997).

The Queensland Department of Environment and Heritage's (QDEH's) policy refers to the AUSPLUME model as being the preferred air dispersion model for odour assessment against the criteria. The AUSPLUME model was developed, and is maintained, by the Environment Protection Authority of Victorian (EPAV 1985a) and is widely used throughout Australia to assess air quality impacts from industrial sources.

The dispersion modelling results should be compared to the odour criterion in the QDEH's "Policy for Odours from New Developments" (QDEH 1994). This criterion is, for area sources and point sources with building wake effects, 2.5 $OU_{QDEH\text{-}M6}/m^3$ (3-minute averages) expressed as the 99.5 percentile of one year's data. This criterion applies at "odour sensitive" land uses which includes single residential (including high rise), hospitals, hotels, caravan parks, schools, aged care facilities, child care facilities, shopping centres, play grounds, recreational centres etc.

An adjustment for olfactometry method is required because the source odour emission rates have been based on different methods to that on which the DEP-preferred criterion for acceptable odour impacts is based.

The ASTM and NVN2820 methods are essentially the same. They are based on "forced-choice" olfactometry in which odour panelists attempt to distinguish a sample of diluted odorous air from odour-free air. The panelists are "forced" to nominate which presentation contains the odour, irrespective of whether they can actually distinguish a difference with odour-free air.

The 2.5 OU odour concentration in the DEP's odour criterion is based on dynamic olfactometry using the Queensland DEH Method 6 (QDEH-M6), which is similar to the Victorian B2 method. In these methods, panelists attempt to distinguish whether an odour is present in a sample without reference to odour-free air in an alternate sniffing port.
The fundamental difference between the ASTM/NVN2820 and QDEH-M6/B2 methods is that the odour thresholds for the same substance differ. Bardsley and Demetriou (1997) have shown that, for environmental samples, the B2 method will give an odour threshold expressed in odour units, half that of the NVN2820 method (i.e. the forced choice methods are twice as sensitive in determining the odour threshold). Hence, it is appropriate for modelling odour impacts to multiply the aggregate odour emission rate data derived from forced choice olfactometry by 0.5 to enable proper comparison against the QDEH criterion.

TABLE 13

FINAL EMISSION RATES USED FOR ODOUR MODELLING

Source	Emissions Rate ($OU_{QDEH-M6}/s$)	Frequency
Biofilter	350	Continuous
In Vessel Compost Building door	8800	Between 0700 – 1990 hours
Compost Storage	1020	Continuous

Figure 10 shows the extent of the 99.5 percentile 2.5 $OU_{QDEH-M6}/m^3$ (3-minute average) contour attributable to odour emissions from the RRRC. This is the criteria currently preferred by the DEP for the assessment of acceptable odour impacts to odour-sensitive areas. The prediction has been based on source information supplied by the client, data considered to be the most appropriate, and a number of conservative assumptions as explained in the text.

The predictions indicate that under typical operating conditions the plant exceeds the standards relating to odour which have been adopted and that no sensitive land uses should be adversely affected by the plant.

Odour Management

All of the plant is at least 400m - 500m from residential areas. A detailed set of recommended buffers for various biological waste processing activities is contained in the (draft) "Guidelines for the Storage, Processing and Recycling of Organic Wastes"

(DEP 1997). This gives recommended buffers of 150-500 metres (depending on the type of feedstock) for outdoor covered windrows which are biologically active. The outdoor compost stockpiles at the RRRC contain stabilised, mature compost which will have lower odour emissions. The buffer distance required would consequently be at the lower end of the range. The modelled odour impacts are consistent with this expectation.

The Canning Vale markets may also be considered a sensitive land use. Figure 11 indicates that under typical operating conditions the level of odour impact experienced at Canning Vale markets is less than the standard and so should not be adversely affected by the plant.

In addition to the extended buffer distances for the plant, the design incorporates numerous features that will minimise potential odour impacts. These include:

- All waste handling facilities will be enclosed;
- Storage of feedstock in enclosed buildings that are ducted to the biofilter;
- The amount of waste stored external to the In-Vessel Composting Facility at any time will not exceed $500m^3$;
- Any liquid wastes delivered to the site will be stored in an enclosed vessel vented to the biofilter to prevent the emission of odours;
- Processing of waste materials within 24 hours of the day received;
- Any equipment that has the potential to generate odours or dust will be stored in enclosed buildings that are ducted to the biofilter; and
- Careful control over blending of feed stock to maintain optimum composting conditions.

A computerised processed alarm system including automatic alarms will be installed to detect critical non-standard conditions for parameters such as digester fan and drive operation, temperature, humidity, pressure, flow rate and pH. During normal working hours the alarm system will be monitored by site personnel. At night, when the plant is unattended, the alarm system will notify a responsible officer via a pager.

In the event of an alarm condition being notified, the contingency measures described in the site EMS will be implemented.

The final plant design will be approved by the DEP during the process of assessing and issuing a Works Approval.

Other Considerations

The predictions contained in the previous section indicate that, under normal operating conditions, the plant will have minimal impact on surrounding areas in terms of odour impacts. This is to be expected given the enclosed nature of the facilities and the fact that all odorous gases will be treated through an efficient biofilter system.

As with all process facilities, there is the possibility that non-standard conditions may result in odour impacts. This possibility also needs to be addressed through siting, design and management of the plant, as well as contingency measures that ensure that plant upsets do not impact adversely on the surrounding land users.

The SMRC have identified the following conditions which have the potential to result in unacceptable odour impacts if not addressed:

- Start up and shutdown of the facility including commissioning
- Power failure resulting in the biofilters being taken offline
- Failure or shutdown of critical plant items such as the digesters or the air blowers for the maturation areas.

The design features of the plant and the management approach that will minimise the impacts of these events are discussed briefly below. Detailed management plans will be presented for the approval of the DEP prior to the commissioning of the plant.

Start-up and Shut-down

Initial commissioning of the facility will be progressive to ensure that all equipment is fully functional before the plant is operated at full capacity.

The function of the biofilters and maturation floor air blowers is of critical importance to the odour impact of the plant.

Before they will function at full efficiency, the biofilters must be acclimatised and allowed to develop the necessary population of microorganisms which can digest the compounds which contribute to creating odour.

This will be accomplished by:

- Adding a percentage of active yard compost to the matrix initially to provide a starting population of microorganisms;
- Ensuring that optimum conditions of moisture, temperature and air flow are achieved in the biofilters before odorous gases are introduced to the biofilters; and
- Progressively bring the digesters and maturation area on line to ensure that the microorganisms can adapt to the increasing loads on the filter.

As the digesters are effectively batch reactors, it will be relatively easy to stage the commissioning of the plant to ensure that the biofilters are progressively loaded. Initially, only one digester will be used and for the first three days of operation and no compost will be present on the maturation floor. Other digesters will only be brought on line when the biofilter is operating efficiently.

Once the plant is operational, it is not envisaged that it will be shutdown until it is decommissioned. Waste is produced every day of the year and will need to be treated.

The nature of the composting process is such that once waste is in windrows on the maturation floor, the process of composting must continue until completion.

In case of problems during commissioning, contingency plans will be in place to divert waste from the plant. If necessary, any odorous waste which may remain on site will be disposed of by supervised burial at one of the landfills in the region within 6 hours of the situation occurring which gave rise to the problem. The enclosed nature of the facilities will ensure that even should odours be created they will be largely contained within the buildings.

Power Failures

The plant relies on electricity for all power and in the event of power failure all equipment will cease to operate. The enclosed nature of the process and the fact that there are small quantities of untreated waste held onsite means that this will not result in odour impacts for several hours following failure.

The following contingency measure are proposed in the event of a power failure:

In case of a power failure extending beyond 1 hour the following measures will be taken:

- Waste deliveries of potentially odorous waste will cease. (Waste will be directed to landfill).

- Any doors that remain open will be manually closed to contain odours.

In the event of a power failure extending beyond 12 hours, a back up generator will be provided to maintain airflow over the biofilters.

In the event of a power failure extending beyond 24 hours, the digesters will be progressively unloaded and the waste they contain directed for landfill disposal by supervised burial. Prior to commissioning, the proponent will ensure access to landfill via a contract in case waste needs to be diverted during upset conditions.

These contingency measures will ensure that odour impacts are contained within the site.

Failures of Critical Plant Items

The management of the site will also be based on using preventative maintenance to minimise the possibility of unexpected plant failure. In the event that failures occur, the design of the plant includes multiple redundancy as a measure to minimise the impact of plant failure.

Examples of the redundant design include:

- The use of multiple digesters so that in the event that one digester breaks down the waste it contains can be diverted to functioning digesters. Any loss of capacity in the plant can be accommodated by diverting waste to landfill.

- A large number of small blowers are used on the compost maturation floor rather than a single blower to provide all the necessary airflow. This means that the failure of a single blower will have minimal impact on the performance of the plant.

- The biofilters consist of multiple cells. This means that if one cell is off line, the others can continue to operate at slightly higher loadings and efficiency is therefore maintained at a high level. In addition, the biofilters will be fed from multiple exhaust fans to minimise potential redundancy problems.

This design philosophy is used throughout the plant to ensure that the plant will operate in a robust and flexible manner and is capable of withstanding plant upsets. This design approach will be combined with clear and comprehensive management and contingency plans designed to ensure that, in the unlikely event that odorous materials are created, they would be quickly removed from the site. Consequently, both government agencies and the surrounding community can be confident that the plant will not adversely impact them.

Monitoring

The performance of the biofilters will be assessed during commissioning by sampling odour concentrations before and after the biofilters and the results reported to DEP.

Provided the performance of the biofilters is acceptable (SMRC propose that an efficiency of 85% is used to judge acceptability) at commissioning, SMRC propose that further monitoring is by qualitative odour assessment conducted by SMRC and/or DEP staff.

Should any problem be identified then further quantitative monitoring would be performed.

The SMRC makes the following additional commitments in relation to monitoring odours:

1. The facility supervisor will inspect the compost facility and biofilters at least twice per shift including one inspection in the late afternoon. A qualitative assessment of odours will be made on each inspection and the findings recorded in writing. These records will be reported in summary form as part of the annual reporting on the environmental management of the plant.

2. Where an odour source is identified, the actions specified in the site management plan will be immediately implemented to ensure that the odour is addressed.

3. A complaint log, which will be contained in a bound ledger with numbered pages, will be kept to register any complaints and the actions taken to address them. This log will be made available to DEP on request and details of all complaints and the actions taken to address them will be presented in summary form to the DEP in the annual compliance report.

Other Gaseous Emissions

Pilot studies conducted by Bedminster Bioconversion Corporation (1997) investigated reduced sulphur compounds and VOC emissions. A summary of these results is shown in Table 14. Note that these results were obtained using a biofilter media of a 2:1 mixture of softwood chips to well stabilised yard waste compost.

TABLE 14

SUMMARY OF ANALYTICAL DATA FROM THE COBB COUNTY PILOT BIOFILTER

Type of Analysis	Units	Inlet	Outlet	% Removal
Reduced Sulfur Analysis				
Total Reduced Sulfur (as H_2S)	**ppb**	57.4	8.8	84.7
Total VOC's[1]	**ppm**	51	7.4	85.5

Source: Bedminster Bioconversion Corporation (1997)
Note: 1 Excludes methane

On the basis of these results, the biofilters also have a very high removal efficiency for VOC's and sulphur compounds. Results from other Bedminster plants indicate that the VOC and sulphur compounds emissions experienced by workers within the enclosed areas of the plant will be below the level of occupational concern.

Outcomes

The plant is located on a site with a buffer zone that greatly exceeds the DEP's guidelines for an enclosed composting facility of this type. This combined with the sophisticated design of the plant and the management measures proposed means that odour impacts will be minimal.

Modelling of odour impacts of the plant, performed in accordance with the approaches recommended by the DEP, indicates that the odour impact of the plant, under typical operating conditions, is well within the criteria currently used for assessing plants of this type. The current odour assessment will be reviewed as part of the Works Approval application once the plant design is finalised.

The design of the plant and the proposed management and contingency measure will ensure that unacceptable impacts are prevented even when the plant is operating under non-standard conditions.

The operation of the plant will be monitored to ensure that odour controls are maintained at high levels throughout the life of the plant.

4.3.3 Particulates/Dust

Existing Environment

All of the plant is at least 400m - 500m south-east of residential areas and other sensitive land uses.

Ranford Road Landfill is a significant source of particulates/dust and is located immediately adjacent to the site. Other adjacent land uses that have the potential to generate particulates and dust include the railway, the City of Canning dog pound and the Canning Vale markets.

Management

The grinding, screening, mixing and storage of unprocessed putrescible materials have the potential to cause dust problems. To minimise these impacts and ensure compliance with the National Environment Protection Measure for Ambient Air Quality, the following measures will be implemented:

- All waste handling facilities will be enclosed and all internal roads sealed;
- Storage of feedstock in enclosed buildings that are ducted to the biofilter;
- The amount of waste stored external to the In-Vessel Composting Facility at any time will not exceed $500m^3$;
- Biosolids used in the composting process will be delivered as sludge or slurry and stored in bins;
- Materials will be processed within 24 hours of the day received minimising the need for stockpiling of wastes and preventing waste from drying out;
- Any equipment that has the potential to generate dust will be located in enclosed buildings that are ducted to the biofilter; and
- The moisture content of the processed compost material will be maintained to prevent the generation of dust and the creation of aerosols. Misting water sprays will be used as necessary prior to any activities that may generate dust or particulates such as turning of the windrows.
- If visual detection of dust occurs, then monitoring will be undertaken to assess the significance of any potential offsite impacts and the appropriate controls will be implemented.

During construction, the site works will be managed so that the potential for generation of nuisance dust is minimised, and atmospheric particulate loads at the nearest sensitive premises meet the National Environment Protection Measure for Ambient Air Quality. This will be achieved by use of water sprays to control dust lift off and mulching to stabilise cleared areas.

Outcome

The good buffering of the site and the nature of the surrounding land uses means that dust will not impact adversely on the surrounding areas.

The amount of dust from biofilters is estimated to be below 100mg/m^3. The proposed management measures will ensure that unacceptable impacts are prevented, and that compliance with the National Environment Protection Measure for Ambient Air Quality and DEP Nuisance Dust Guidelines (1000µg/m^3 per 15 minute average) will be achieved at all times.

4.3.4 Greenhouse Gases

Existing Environment

Typically, garden wastes make up about 30% by weight of household rubbish in Western Australia. Buried in landfill sites this organic material slowly decomposes to produce large quantities of methane. In comparison, the primary gas produced by composting under aerobic conditions is carbon dioxide. Methane is six times more damaging than carbon dioxide as a greenhouse gas (DCT & WAMA, 1993).

Management

The RRRC process is designed to divert organic wastes from landfill and treat them in an aerobic environment. This approach will ensure that no methane is generated as distinct from landfill that is designed and operated to achieve methogenic conditions.

Outcome

There is a significantly reduced contribution to the greenhouse effect as a result of composting green waste rather than burying it in landfills. This is achieved due to the fact that methane is less radiatively active than the carbon dioxide that is produced during aerobic decomposition.

4.3.5 Noise

Existing Environment

The site is located on land zoned for commercial and industrial use and waste processing purposes. Adjacent land uses include major roads (Ranford Road) and the standard gauge railway as well as the City of Canning dog pound and the Canning Vale Markets. Personal observations in the area during site visits suggest that the major existing contributions to background noise in the area arise from transport noise (aircraft from Jandakot Airport and heavy road and rail). Impacts from transport noise sources are not accounted for under the Environmental Protection (Noise) Regulations, 1997.

No background noise monitoring has been performed on the site as part of this study as the Environmental Protection (Noise) Regulations, 1997 use an assigned level rather than background levels when assessing the acceptability of a proposal.

Management

Noise Assessment

Before the methodology of noise assessment can be discussed in detail, it is necessary to have an understanding of the basic concepts. The following terminology is commonly used to quantitatively describe noise:

Decibel The decibel (dB) describes the sound pressure level of a noise source. It is a logarithmic scale referenced to the threshold of hearing.

A-Weighting An A-weighted noise level has been filtered in such a way as to represent the way in which the human ear perceives sound. As the human ear is not very sensitive in the lower frequencies these frequencies are weighted more than the higher frequencies. An A-weighted sound pressure level is described by the symbol dB(A).

$L_{A\,10}$ A $L_{A\,10}$ level is an A-weighted noise level which is exceeded for 10% of the representative assessment period. A $L_{A\,10}$ level is considered to represent the *"intrusive"* noise level.

$L_{A\,1}$ A $L_{A\,1}$ level is an A-weighted noise level which is exceeded for 1% of the representative assessment period.

$L_{A\,max}$ A $L_{A\,max}$ level is the maximum A-weighted noise level during the representative assessment period.

Environmental noise is regulated in Western Australia through the Environmental Protection (Noise) Regulations, 1997, which stipulate assigned noise levels (the levels of noise allowed to be received at premises at a particular time of the day or night).

For residences, the assigned levels also depend on how close the house is to industrial and commercial areas and to major roads. Maximum allowable external noise levels are determined by the calculation of an "influencing factor" which is then added to base levels. The influencing factor is calculated according to the type of land use within two concentric circles (of radii 100m and 450m) centred at the noise sensitive premises.

Noise levels from the proposed Regional Resource Recovery Centre were calculated using the noise prediction computer program Environmental Noise Model (ENM). Results from the ENM model are accepted by all Australian environmental authorities, including the Department of Environmental Protection (DEP). ENM takes into consideration the frequency spectrum and directivity of noise sources, barrier attenuation, air absorption, meteorological conditions and the topography of the surrounding area.

Meteorological Conditions

The propagation of sound over distance is greatly influenced by the meteorological conditions and in particular the wind direction, wind strength and the temperature gradient from ground level to approximately 300 metres high.

The DEP default meteorological conditions were used for this assessment. These weather conditions, shown in Table 15 approximate the typical "worst case" weather conditions for enhancement of sound propagation.

TABLE 15

"WORST CASE" METEOROLOGICAL CONDITIONS FOR NOISE MODELLING

Parameter	Day (0700 - 1900)	Night (1900 - 0700)
Wind Speed	4 m/s	3 m/s
Wind Direction	Positive (from source to receiver)	Positive (from source to receiver)
Air Temperature	20 °C	15 °C
Relative Humidity	50%	50%
Temperature Gradient	Nil	2 °C/100m

It should be noted that the worst case wind direction for this assessment, positive from source to receiver, is a south easterly. However, the more typical conditions are a south westerly during the day, particularly in summer, and calm wind conditions (with a temperature lapse) at night. For the purpose of comparison these wind directions were also modelled.

Topographical data of the study area was used to assess the potential barrier effects created by the construction of these buildings.

Noise Sources and Characteristics

Although all of the plant is enclosed, a number of areas of the RRRC represent potentially significant sources of noise emission.

The major potential sources of noise are:

- the In-Vessel Composting Facility
- the Materials Recycling Facility
- the Green Waste Processing Facility
- the digesters; and
- vehicles transporting waste.

The operating hours of the plant are such that the only areas of the plant that will continue to operate at night are the digesters, the maturation blowers and the biofilters. This means noise emissions are significantly reduced at night.

The SMRC has not yet selected the technology that will be used in the plant and so it is not possible to provide a definitive analysis of the noise characteristics and impacts associated with the site at this time.

The final level of impact on the noise environment around the plant will depend on the choice of equipment and the attenuation measures used by the SMRC to reduce emissions

outside the site boundaries. The final decisions on these matters will be made once the final design of the plant has been completed.

As a result, the noise impacts of the plant have been assessed based on data from typical equipment at facilities operating in Perth and the Eastern States. It has also been assumed that a number of attenuation measures will be employed to reduce noise emissions. This approach has been taken to demonstrate that it is possible to construct and operate the plant in a manner that complies with current noise regulations.

Additional assessment and modelling of the final plant configuration will be presented to DEP once the design is finalised to demonstrate that the final plant configuration will comply with the regulations.

Noise sources and sound power levels used in the noise prediction model are detailed in Table 16.

TABLE 16

NOISE SOURCES AND SOUND POWER LEVELS

Item	Quantity	Sound Power Level
IN-VESSEL COMPOSTING BUILDING [1, 2]		
Tipping Floor Building		
Bobcat	1	102 dB(A)
Dump Truck	1	102 dB(A)
Digester Ram Feed *#	5	90 dB(A)
Digester Blower *#	5	92 dB(A)
Main Process Building		
Front End Loader	2	102 dB(A)
Primary Trommel Screen #	1	96 dB(A)
Secondary Trommel Screen	3	96 dB(A)
Aeration Blower *#	72	92 dB(A)
External		
Exhaust Blower *#	5	92 dB(A)
Digester Drive *#	5	99 dB(A)
MATERIALS RECOVERY FACILITY		
Dump Truck	1	102 dB(A)
Fork Lift	1	98 dB(A)
Main Trommel Screen	1	111 dB(A)
Plastic Trommel Screen	1	105 dB(A)
Glass Trommel Screen	1	112 dB(A)
Other Noise Sources [3]	N/A	104 dB(A)
GREEN WASTE GRINDING BUILDING		
Green Waste Grinder	1	111 dB(A)
MOBILE EQUIPMENT		
Dump Truck	2	102 dB(A)
Front End Loader	1	102 dB(A)

Notes:

* *Indicates that these items were considered for night time assessment.*

\# *Indicates that these items were considered for Sunday day time assessment.*

1. *Sound power levels are $L_{A\,max}$ levels and relate to each individual plant item.*
2. *Conveyor belts and drives were not modelled as these items should not significantly influence the noise environment. Similarly, the crawler cranes and screw feed turners, which will be used to aerate compost, were not modelled.*
3. *Other noise sources include glass crushers, vibrating beds, baling machines and conveyors.*

Calculations of noise levels from each building were determined according to the following procedure:

- sound power levels for the major noise sources within the building were estimated and aggregated;
- the reverberant sound pressure level within the building was calculated;
- sound power levels were determined for the building elements (ie, walls, roof, etc); and
- the received noise level was modelled from the building elements.

In-Vessel Composting Facility

The significant noise sources modelled for the In-vessel Composting Facility, together with their estimated sound power are included in Table 16.

For the purpose of this assessment the tipping floor area and the remainder of the processing plant were considered to be separate buildings. It was assumed that the roof of the tipping floor building will be treated to reduce noise emissions, and that the noise from the digester drives will be attenuated by housing them in a suitable acoustic enclosure.

The five digesters, which will not be enclosed by the building structure, were modelled as independent point sources outside the building. It was assumed that the noise from the digester drives will be attenuated by housing them in a suitable acoustic enclosure. Inlet air to the building will be provided through openings located on the southern side of the structure, and exhaust air from the In-Vessel Composting building will be located on the southern side of the building and will be suitably silenced by the aeration and biofilter beds. It was also assumed that all duct work will be made of a suitable material to prevent noise break-out. It was also assumed that inlet air to the fans and blowers will be exhausted through aeration beds, biofilters and sludge tanks (which should suitably attenuate the outlet noise).

Conveyor belts and drives were not modelled as these items are not likely to influence the overall noise environment.

As the majority of this equipment will be operated continuously throughout the day and night the noise levels predicted by the model are indicative of $L_{A\,10}$ levels.

Materials Recovery Facility

The significant noise sources modelled for the Materials Recovery Facility, together with their estimated sound power are included in Table 16.

Noise levels in the MRF are likely to be dominated by the action of the trommel screens. Other noise sources include glass crushers, baling machines and conveyors. These other sources have been combined for the purpose of this assessment. The sound power level used for these combined noise sources was based on actual measurements taken at a similar facility in NSW that had trommel screens external to the main building.

It was assumed when modelling this building that the roller door entrance will be on the south eastern side of the building. It was also assumed that the roof of the building and the walls closest to the residential area will be treated to reduce noise emissions.

Since operation of this plant is likely to occur simultaneously for 10 per cent of the day time period, the noise levels predicted by the model can be considered indicative of $L_{A\ 10}$ levels.

Green Waste Processing Facility

The significant noise sources modelled for the Green Waste Processing Facility, together with their estimated sound power are included in Table 16. The sound power level used to model emissions from the grinder is extremely conservative and the final plant specification will incorporate additional noise attenuation measures to reduce its impact.

Noise from this building will be dominated by emissions from the green waste grinder. While it is acknowledged that other noise sources will be located within this building, it is unlikely that these sources will significantly add to the noise environment when the green waste grinder is operational. As such, only the green waste grinder was modelled. It was assumed that the access door to load and unload waste products would be open continuously during operations. It was also assumed that the roof of the building and the walls closest to the residential area will be treated to reduce noise emissions.

Assuming the green waste grinder will operate for at least 10% of the time, the noise levels predicted by the model are indicative of operational $L_{A\ 10}$ levels.

Mobile Equipment

The significant noise sources modelled for the mobile equipment, together with their estimated sound power are included in Table 16.

Sound power levels of mobile equipment were derived from AS 2436-1981 *Guide to Noise Control on Construction, Maintenance and Demolition Sites*, with the lower noise level used in the noise model. It was assumed that the Front-End Loader would be fitted with a sound suppression kit, readily available from manufacturers, to further reduce noise levels from the engine.

Mobile equipment operated outside the buildings have been modelled as point sources. The sound power levels estimated for these items represent the maximum levels emitted by each plant item. Noise emissions are not likely to occur simultaneously at all times from these items. For similar operations, experience indicates that the $L_{A\ 10}$ noise level from combined equipment operation is approximately 5 dB below the maximum level. Hence in determining overall $L_{A\ 10}$ noise levels, 5 dB has been subtracted from the noise level calculated from the maximum sound power levels of all mobile equipment. The potential barrier effects created by the construction of 2.5m high earth bunds or impervious noise barriers beside the main access roads were also assessed. The location of the bunds is shown in Figure 6.

For the purpose of the modelling it has been assumed that all mobile plant is fitted with noise attenuating covers and low emission mufflers.

Predicted Impacts

The closest noise sensitive premises to the proposed Regional Resource Recovery Centre are residential properties located to the north-west. Although this assessment considers the noise impact to all these residences, a specific residence in Sellen Court was chosen as a typical, worst case location. The influencing factor for this residence was calculated in accordance with Schedule 3 of the Regulations.

Based on the information obtained from the scheme map of Town Planning Scheme No. 40, the influencing factor for the Sellen Court premises is calculated to be 2dB. This influencing factor is assumed to be approximately the same for all the nearby residences.

Allowing for the influencing factor, Table 17 gives the assigned levels for the closest noise sensitive premises.

TABLE 17

OPERATIONAL NOISE CRITERIA

Time of Day	Assigned Level		
	$L_{A\,10}$	$L_{A\,1}$	$L_{A\,max}$
0700 – 1900 hours Monday to Saturday	47dB(A)	57dB(A)	67dB(A)
0900 – 1900 hours Sunday & Public Holidays	42dB(A)	52dB(A)	67dB(A)
1900 – 2200 hours All Days	42dB(A)	52dB(A)	57dB(A)
2200 – 0700 hours Monday to Saturday	37dB(A)	47dB(A)	57dB(A)
2200 - 0900 hours Sunday & Public Holidays	37dB(A)	47dB(A)	57dB(A)

Day time noise levels at the nearest noise sensitive premises were calculated, taking into account operating plant at the In-Vessel Composting building, the MRF, and the Green Waste Processing Facility. In addition to this, mobile equipment operating outside these buildings was also considered.

At night, noise level calculations only considered operation of the In-Vessel Composting facility. This building is likely to be operated continuously 24 hours a day, whereas other facilities will not operate at night.

The results of the noise modelling are presented in Figures 12 and 13. Noise levels are presented in the form of noise contour curves, superimposed over a base map of the surrounding area. This technique is designed to allow for easy interpretation of the predicted levels and thus an understanding of the environmental impact to residences. The contour maps have been produced for day time (0700 to 1900 hours) and night time (1900 to 0700 hours) periods under the following scenarios:

- DEP default meteorological conditions (see Table 15);

- south westerly wind (day time only); and
- calm conditions (i.e. zero wind velocity) with temperature lapse (night time only).

Noise level contours are shown at 3dB intervals. These contour results have been determined such that they closely approximate the $L_{A\ 10}$ noise level generated by operations at the Regional Resource Recovery Centre. Predicted noise levels have also been determined for the residence at Sellen Court and are shown in Table 18.

TABLE 18

PREDICTED $L_{A\ 10}$ NOISE LEVELS FOR SELLEN COURT RESIDENCE

Time of Day	$L_{A\ 10}$ Assigned Level	Predicted $L_{A\ 10}$ Level	
		Worst Case Conditions	Typical Conditions
0700 – 1900 hours Monday to Saturday	47 dB(A)	46 dB(A)	35 dB(A)
0900 – 1900 hours Sunday & Public Holidays	42 dB(A)	35 dB(A)	15 dB(A)
1900 – 2200 hours All Days	42 dB(A)	33 dB(A)	22 dB(A)
2200 – 0700 hours Monday to Saturday	37 dB(A)	33 dB(A)	22 dB(A)
2200 - 0900 hours Sunday & Public Holidays	37 dB(A)	33 dB(A)	22 dB(A)

Note: On Sundays and Public Holidays the compost vessels, compost screening and compost maturation processes will be in operation (note only the primary trommels will operate).

The results clearly show how influential meteorological conditions are to the propagation of noise. Table 18 details the predicted noise levels under typical meteorological conditions. However, it should be noted that typical conditions have only been included in this report for the purposes of comparison. EPA Draft Guidance No. 8 is clear in specifying that any noise assessment undertaken in relation to the Environmental Protection (Noise) Regulations, 1997 must be based on "worst case" meteorological conditions.

It is anticipated that the construction of the RRRC will be completed by the year 2000. The operational noise levels would comply with the Environmental Protection (Noise) Regulations, 1997 at all times. The construction of Roe Highway Stage 7 (from South Street to Kwinana Freeway), which is anticipated to start sometime in 2003 or 2004, will significantly alter the allowable noise level at the closest noise sensitive premises. Once this major road is constructed a transport factor of 6 dB will apply and the assigned levels will subsequently increase by 6 dB. This is based on the assumption that this stage of Roe Highway will generate at least 15,000 vehicles per day. The most recent estimates indicate that for 2006 the average daily traffic count between South Street and Karel Avenue will be 30,951.

Noise Management

As stated above, the operational noise levels would comply with the Environmental Protection (Noise) Regulations, 1997 at all times. Table 19 summarises the noise attenuation measures assumed when undertaking the noise modelling.

TABLE 19

NOISE ATTENUATION MEASURES

Planned Measures	Additional Measures
In-vessel Composting Facility	
The noise from the digester drives will be attenuated by housing them in a suitable acoustic enclosure. Air inlets to the building will be located on the southern side of the building and will be appropriately silenced. Exhaust air from the In-Vessel Composting building will be located on the southern side of the building and will be suitably silenced by the aeration and biofilter beds. Duct work will made of a suitable material to prevent noise breakout.	The roof of the tipping floor building will be treated to reduce noise emissions.
Materials Recovery Facility	
The roller door entrance will be on the south eastern side of the building.	The roof will be insulated to reduce noise emissions. The walls closest to the residential area will be insulated to reduce noise emissions.
Green Waste Processing Facility	
	The roof will be insulated to reduce noise emissions. The walls closest to the residential area will be insulated to reduce noise emissions.
Mobile Equipment	
Construction of earth bunds or impervious noise barriers beside the main access roads.	Equipment will be silenced, at source, by the use of appropriate technology.

When purchasing equipment for the facility, the sound power levels will be specified to ensure that they are equal to or less than the values provided in Table 16. As the final level of impact on the noise environment around the facility will depend on the choice of equipment, it may not be necessary to employ any or all of the noise attenuation measures outlined in this CER to reduce emissions outside the site boundaries. If the equipment purchased has sound power ratings significantly lower than those specified in Table 16, the noise attenuation measures outlined under "Additional Measures" may not be implemented. The final decisions on these matters will be made once the final design of the plant has been completed.

Prior to obtaining a licence to operate the facility, the SMRC must first obtain a Works Approval pursuant to s.54 of the Environmental Protection Act, 1986. This involves lodging detailed plans and specifications for the plant. The final design of the plant including all noise attenuation measures and additional noise assessment results will be submitted at this time. The DEP's Pollution Prevention Division can then ensure that the final design conforms to the relevant environmental standards.

Other Considerations

Construction Noise

Noise level emissions during the construction phase of the project resulting from the operation of construction machinery should not adversely impact on the surrounding noise environment. Construction activities will be limited to between 0700 and 1900 hours and as a result noise will only be generated during the day time. In addition, plant and equipment used will be modern and in good condition. The equipment selected will be surveyed prior to use to ensure compliance with the Environmental Protection (Noise) Regulations, 1997 will be achieved.

Noise levels will be monitored periodically during the construction period to identify any significant noise emissions requiring attention.

Tonality

The noise sources which are likely to exhibit significant tonality are the fans which are either located within enclosed buildings or sheltered by the buildings from the sensitive land uses. All fans discharge through the biofilters. It is considered that this will largely eliminate any tonal characteristic. Equipment suppliers will be required to provide data on the tonal characteristics of equipment. Where this information suggests that the equipment can contribute to an overall tonal characteristic for the plant, the plant specification will include a requirement for attenuation measures.

Additional Noise Assessment

The SMRC has not yet selected the technology that will be used in the plant and so it is not possible to provide a definitive analysis of the noise characteristics and impacts associated with the site at this time.

The final level of impact on the noise environment around the plant will depend on the choice of equipment and the attenuation measures used by the SMRC to reduce emissions outside the site boundaries. The modelling demonstrates, using conservative assumptions, that the plant in its final configuration is capable of meeting relevant environmental standards.

Additional assessment and modelling of the final plant configuration will be conducted once the design is finalised to demonstrate that the final plant configuration will comply with the regulations. This final assessment will be reviewed by the DEP during the Works Approval process.

Outcome

The facility will be designed to comply with noise regulations at all times. This compliance should be readily achieved due to the substantial buffer distances to sensitive premises and the fact that all equipment will be enclosed.

As the site will only receive waste between the hours of 0700hrs and 1700hrs, vehicle noise will be minimal during the night period when ambient noise levels are lower and statutory noise criteria are more stringent.

Modelling of the noise impacts of the plant, performed in accordance with the approaches recommended by the DEP, suggests that final plant configurations will comply with the regulations. Care will also be taken during the design process to minimise noise emissions at source.

Additional assessment and modelling of the final plant configuration will be conducted once the design is finalised and submitted to the DEP for approval.

4.3.6 Waste Minimisation

Existing Environment

The waste minimisation objective is to reduce as far as practicable the generation of solid and liquid wastes in a manner that is environmentally acceptable and meets statutory standards.

The State Government has committed itself to achieving the goal of halving waste to landfill by the year 2000. As local governments are the primary agents for collection and disposal of waste, much of the responsibility for implementing the programs, which will achieve this objective, rests with local governments. It is the ultimate goal of the RRRC to reduce the amount of waste to landfill to 0%.

Management

The projected mass flow analysis for a 300 tonnes per day in-vessel composting plant is detailed in Appendix 4, and summarised in Table 20.

TABLE 20

PROJECTED MASS FLOW

Year	2001	2008	2013
Total Mass In	191,836	196,304	197,788
Total Mass Out	122,185	125,409	127,034
Total Mass Loss	69,651	70,895	70,754
Mass In[(a)]	180,610	184,878	186,384
Mass Out[(b)]	17,310	17,856	18,1093
% Reduction	90	90	90

Note: (a) Mass In refers to the mass that would be sent to landfill if the RRRC was not operating, and includes both municipal and commercial waste.
(b) Mass Out refers to the amount of residual waste produced by the RRRC that would be disposed of to landfill.
(c) Figures based on a 300 tonnes per day in-vessel composting plant.

Outcome

The proposed facility will help reduce the pressure on the current landfills operating in the SMRC and fulfil the Government's objectives by recycling approximately 90% of the waste stream. Furthermore, implementation of the proposal will reduce the adverse environmental impacts associated with landfilling, as putrescible waste will no longer be disposed of to landfill and will be reprocessed to produce valuable compost.

4.4 Social Factors

4.4.1 Road Traffic

Existing Environment

The site is well served in terms of road access from major arterial roads and therefore traffic impacts will not affect the surrounding area. The number of vehicles entering the site will be significantly less than current traffic to the Ranford Road landfill.

See Appendix 4 for the projected traffic flows.

Management

Road access and vehicle movements will be managed to the requirements of Main Roads WA and the Department of Transport.

Outcome

Compared to nearby operations such as those in the Canning Vale Industrial Estate, which has an estimated 12,221 trucks entering each day (based on Main Roads WA data for April, 1996), the 151 vehicles associated with the proposed RRRC will have negligible effect on the existing road network.

In addition, the construction of Roe Highway Stage 7 (from South Street to Kwinana Freeway) will significantly alter the number of vehicles in the general vicinity, the impact of which will be far greater than any potential impacts caused by the RRRC. It is currently estimated that this stage of Roe Highway will generate at least 15,000 vehicles per day, with the most recent estimates indicating that in 2006 the average daily traffic count between South Street and Karel Avenue will be 30,951 (ERM Mitchell McCotter, 1998a).

4.4.2 Flammable/Explosive Gases

Existing Environment

Surrounding land uses, such as the Ranford Road landfill, make a relatively small contribution to the level of public risk. The transport of dangerous goods such as petrol or LPG on the arterial roads appears to represent the most significant contribution to public risk in the area.

Management

Aspects of the RRRC which may contribute to increased public risk are:

- Transport of wastes – Accidental spills etc.
- Accidental receipt of hazardous materials – such as asbestos, batteries, and household hazardous waste (HHW).
- Flammable/explosive gases – produced if the conditions in the digesters become anaerobic.

Transport of wastes

The risk from this factor is extremely low due to the nature of the wastes received (i.e. Municipal and Green Waste).

Accidental receipt of hazardous materials

It is not possible to entirely prevent householders placing small quantities of hazardous materials in their bins. As a result, some small quantities of materials such as asbestos or HHW such as batteries or cleaning solutions, may be received at the plant.

The SMRC operates drop-off centres for household hazardous waste at 3 locations in the region. This provides the community with a convenient opportunity to dispose of these items and assists in diverting them from the MSW stream.

A component the public education program undertaken by the SMRC when introducing the new bin collection system will aim to promote awareness of HHW issues and provide relevant information such as what constitutes hazardous waste and how it should be handled.

Should HHW or other wastes be received at the RRRC and identified, it will be segregated and stored in properly designed facilities pending off-site disposal at an approved facility.

The process itself will tend to screen these materials from the feedstock to the digestors.

Flammable/explosive gases

Under normal operating procedures, the digesters maintain an aerobic environment but any deviations from normal operating procedures may result in the conditions becoming anaerobic.

If anaerobic conditions are allowed to occur, the primary gas formed is methane, which is both flammable and explosive, when present in certain concentration ranges in air.

The contingency procedures outlined in the odour management section for events such as start up/shut down, power failure and failures of critical plant items will minimise the potential for the development of anaerobic conditions in the digesters.

As an added precaution, flammable gas detectors will be installed and linked to an alarm system. The detectors will be set to detect flammable gases at low concentrations to allow time for the implementation of the required contingency measure before a hazardous condition occurs.

Outcome

The facility will be designed in a manner that minimises the possibility of public risk. Flammable gas detectors will be installed as an added precaution to monitor the potential evolution of flammable gases.

There is a small potential that minor quantities of hazardous materials may be inadvertently directed to the plant in the domestic waste stream. Management controls will ensure the quantity of hazardous materials received is small and that, where possible, they are identified and removed from the general waste stream for off-site disposal at an approved facility.

4.4.3 Public Consultation

Existing Environment

The SMRC was formed with the express purpose of developing waste management strategies for the management of the region's waste. The regional Council in 1992 adopted the following mission statement

> ***"Through its polices and practices, to work with the community, member councils and other government agencies to achieve a significant but achievable reduction in the amount of waste going to landfill"***

The mission statement underlines the consultative approach the regional council has taken in developing its waste management strategy.

This waste strategy is the result of extensive consultation with the regional community and careful analysis of numerous attitudinal and behavioural surveys undertaken within the region.

Management

Community Attitude

A number of significant attitudinal surveys have been taken over the past five years. These surveys show unequivocally that the majority of the regional community is very concerned with the environmental hazards associated with landfill as a means of waste disposal, and see the development of waste recycling systems as a high priority for local government.

Community surveys undertaken by:

- City of Cockburn, 1998
- City of Melville, 1997

- City of Fremantle, 1995
- City of Rockingham, 1995

Placed this issue in the top three most important priorities for local government to address.

Attitudinal surveys undertaken in SMRC Divided Bin Trials 1997 in the Cities of Canning, Cockburn and the Town of East Fremantle further re-enforced this position with a more detailed survey.

Community Behaviour

The SMRC over the past three years has undertaken detailed analysis of most of the existing waste collection systems in Australia and conducted its own trials to explore other opportunities (Divided Bin Trials). The analysis looked at the collection systems effect on participation behaviour and the quality and quantity of the waste streams collected.

The results of this analysis led to the selection of the Regional Waste Collection system, which in a 1997 City of Melville survey had a very high community satisfaction ratings. The system separates the domestic waste stream into four components resulting in high and consistent yields of recyclables, large green waste, Bulk waste and mixed organic and inorganic waste (food waste, small green waste and non-recyclable inorganic material).

By understanding the nature and consistency of the waste streams the Regional Council was able to match this with the known operating characteristics of waste processing facilities resulting in the development of the Regional Waste Management Strategy which optimised the recovery of re-useable material from the waste stream.

In April 1998 the SMRC sent a delegation of representatives to USA to look at the selected waste processing technology which included the Director of the Department of Environmental Protection Office of Waste Management. The tour delegates unanimously concluded that the technology was capable of meeting the processing requirements of the Regional Waste Management Strategy.

Community Consultation Program

The SMRC adopted the Regional Waste Management Strategy in October 1997 and the strategy was presented to all member Councils:

- City of Rockingham
- Town of Kwinana
- City of Cockburn
- City of Fremantle
- Town of East Fremantle
- City of Melville
- City of Canning

The presentations were favourably received and the SMRC resolved to prepare a Business Plan for the implementation of the strategy for the five northern Regional Council members;

- City of Cockburn
- City of Fremantle
- Town of East Fremantle
- City of Melville
- City of Canning

The Business Plan is currently before the member Councils which are expected to consider participation in the project in November/December 1998 round of council meetings.

Consultation with State and Federal politicians

Presentations of the Regional Strategy were made to:

- Monica Holmes MLA- Member for Southern River.
- The Hon Mike Board MLA – Minister for Works; Services; Youth Citizenship & Multicultural interests.
- Dr Judy Edwards MLA – Shadow Minister for Planning & Environment Member for Maylands.
- The Hon Graham Kierath MLA –Minister for Planning; Heritage; Employment & Training.
- The Hon Daryl Williams - Federal Attorney General Member for Tangney.
- The Hon Cheryl Edwards MLA – Minister for the Environment; Labour Relations.
- The Hon Doug Shave MLA – Minister for Trading; Parliamentary & Electoral Affairs.
- The Hon Jim Scott MLC – South Metropolitan Region.
- The Hon Simon O'Brien MLC – South Metropolitan Region.
- The Hon Barbara Scott MLC – South Metropolitan Region.

All presentations were very favourably received and encouragement given to proceed with the project.

Consultation with Residents adjoining the facility location

The SMRC held media briefings with representatives from the local community newspapers (Canning–Melville times, Fremantle Herald) and the Western Australian

newspaper. This resulted in a number of news articles explaining the nature, purpose and location of the facility.

The SMRC made a presentation of the proposal to the executive members of the Canning Vale Progress Association, which was favourably received and it was agreed that the SMRC would make the presentation at the associations general meeting on the 26th of October.

To ensure that all residents within a 2.5km radius of the facility were aware of the Regional Council's proposal, 6,500 invitations to attend public meetings where sent out. The Canning – Melville times advertised the time and locations of the public meetings. The invitations explained the nature, purpose and location of the facility and invited them to attend one of three public meetings held at:

- Canning Vale Community Centre 26th October 1998 (Canning Vale Progress Association)- The meeting was attended by 26 people and was favourably received.
- Willetton Senior High School 27th October 1998 – the meeting was attended by 4 people and was favourably received.
- Melville Glades Golf Course 29th October 1998 – The meeting was attended by 27 people and was very favourably received.

Further consultation will occur if required during the public comment period.

In addition, the Regional Council is already committed to an ongoing community education program to educate the community regarding waste minimisation and recycling and to encourage correct segregation of wastes.

Outcome

The regional community, Local Governments, State and Federal members of parliament have received the Regional Council's Waste Management Strategy favourably and are supportive.

5. CONCLUSION AND SUMMARY OF COMMITMENTS

5.1 Conclusion

The information in the preceding sections summarises the following aspects of the proposal:

- The need and justification for the proposal;
- The alternatives considered;
- The existing environment at the selected site;
- The impacts associated with the proposal;
- The approach to managing the impacts; and
- The predicted outcome as a result of the operation of the plant and in accordance with the proposed design and management systems.

The report indicates that the proposed development will meet existing environmental criteria, standards and policies. On this basis the plant is capable of being built and operated without causing unacceptable environmental impacts.

The proposal also represents a significant step for the community towards achieving the State Government's stated objective of halving the waste to landfill.

A large number of commitments have been made with regard to the management of the plant. These will be summarised in a site Environmental Management System (EMS) prepared in accordance with the principles of ISO 14000. This EMS will be submitted for review by DEP prior to commissioning.

5.2 Summary of Commitments

The proponent will fulfil the commitments set out in Table 21 to ensure an environmentally and socially acceptable development. The proponent is aware that the implementation of the proposal and all commitments made by the proponent will become legally enforceable under the conditions of the environmental approval issued in the Statement by the Minister for the Environment.

TABLE 21

SUMMARY OF PROPONENTS COMMITMENTS

RELEVANT FACTOR	EPA OBJECTIVE	COMMITMENT	TIMING	TO WHOSE REQUIREMENTS	MEASUREMENT/ COMPLIANCE CRITERIA
Biophysical:					
Vegetation	To maintain the abundance, species diversity, geographic distribution and productivity of vegetation communities.	1. Clearing of remnant vegetation will be minimised as far as possible. 2. The final layout of the facility will be developed in discussion with government agencies to maximise the value of uncleared vegetation. 3. Vegetation on the site adjacent to Ken Hurst Park will be retained where feasible. In this area, fences will be placed as close as possible to buildings in order to minimise disturbance to vegetation and permit free access for fauna to the larger area of vegetation at Ken Hurst Park; 4. The landscape plan for the site will utilise vegetation types indigenous to the area in order to return the site as far as possible to its natural state. The landscape plan will be prepared in discussion with CALM and the DEP.	Commencing prior to construction, and ongoing throughout operation of the facility.	CALM/DEP	A vegetation clearance plan will be submitted for approval by the DEP prior to clearing commencing. The landscape plan will be prepared to the satisfaction of the DEP.
Fauna	To maintain the abundance, species diversity and geographic distribution of native fauna.	In addition to measures 1 – 4 outlined above, boundary fences will be erected prior to clearing commencing and a trapping program instituted to capture vertebrate fauna of particular significance such as the Southern Brown Bandicoot. Any trapped animals will be relocated in accordance with the requirements of CALM.	Commencing prior to construction, and ongoing throughout operation of the facility.	CALM	A Fauna Management Plan will be prepared to the satisfaction of CALM.
Pollution Management:					
Water	Quality of groundwater is maintained in accordance with the requirements of the draft Western Australian Water Quality Guidelines for Fresh and Marine Waters (EPA Bulletin 711).	The plant will be designed and operated in a manner that minimises the possibility of contaminating either surface or groundwater. Waste will be handled, processed and stored within enclosed buildings with impermeable floors incorporating drainage sumps to trap leachate for recycling. The SMRC will install monitoring bores (one upstream and two downstream of the site). Groundwater monitoring will be conducted at the installed bores, with the results submitted to the DEP in the annual report.	Throughout the project life During Operation Prior to construction. Commencing prior to construction and ongoing during construction and operation.	DEP/Water & Rivers Commission	The final design of the plant and location of the bores will be to the satisfaction of the DEP through the Works Approval/ licensing process. Results of monitoring will be submitted to DEP annually.
Odour	To ensure that odour emissions do not cause nuisance to surrounding land users.	Gaseous emissions from all significant odour sources will be ducted to efficient biofilters prior to release to atmosphere. The performance of the biofilters will be assessed by odour monitoring and the results reported to DEP. The facility supervisor will inspect the digestor facility and biofilters at least twice per shift including to make a qualitative assessment of odours. Waste will be processed within 24 hours of receival at the plant. Where an odour source is identified, the actions specified in the site management plan will be immediately implemented to ensure that the odour is addressed. A complaint log will be kept to register any complaints and the actions taken to address them. This log will be made available to DEP on request and the details presented in summary form to the DEP in the annual report. The site EMP will detail maintenance and contingency procedures to minimise odour impacts.	During operation. During commissioning and operation. During operation. During operation. During operation. During operation Prior to Commissioning. During power failure.	DEP	A final assessment of odour impacts will be submitted to the DEP as part of the Works Approval application to demonstrate compliance with relevant environmental standards. A site EMS will be prepared to the satisfaction of the DEP which details contingency plans to prevent odour impact. Odour monitoring results will be submitted to the DEP for assessment.
Particulates/ Dust	To ensure that dust does not adversely impact on the health or amenity of nearby residents.	During construction, water sprays and mulching will be used to minimise particulate emissions. All wastes and products with a potential for causing particulate emissions will be handled in enclosed buildings.	During construction and operation. During operation.	DEP	Compliance with the particulate criteria and defined in National Environment Protection Measure for Ambient Air Quality

RELEVANT FACTOR	EPA OBJECTIVE	COMMITMENT	TIMING	TO WHOSE REQUIREMENTS	MEASUREMENT/ COMPLIANCE CRITERIA
Noise	To protect the amenity of nearby residents from noise by ensuring that noise levels meet the Environmental Protection (Noise) Regulations 1997.	The facility will be designed and operated to comply with Environmental Protection (Noise) Regulations, 1997. Additional assessment and modelling of the final plant configuration conducted once the design is finalised. The plant purchased will have a sound power level rating equal to or less than the values provided in Table 16. Construction activities limited to between 0700 and 1900 hours. Noise levels will be monitored periodically during construction. Plant used will be modern and in good condition.	Throughout the project life. Prior to operation. During construction. During construction. During construction. During operation	DEP	Compliance with the Environmental Protection (Noise) Regulations 1997. A noise assessment based on the final plant designed will be submitted for assessment by DEP as part of the Works Approval application. Annual monitoring reports will be submitted to the DEP.
Wastes	To reduce as far as practicable the generation of solid and liquid wastes and to dispose of wastes in a manner that is environmentally acceptable and meets statutory standards.	All waste will be disposed of in an environmentally acceptable manner at facilities approved for accepting the relevant waste. The plant will be operated with the goal of diverting more than 50% of waste from landfill.	During operation.	DEP	Final waste flows will be assessed as part of the Works Approval and licensing process.
Social Surroundings:					
Flammable/ Explosive gases	To ensure the public is not exposed to unreasonable risk from the facility.	The Regional Council's community education program. will incorporate a component dealing with household hazardous waste.. Flammable gas detectors will be installed and linked to alarms to provide early warning of flammable gases being produced. Any hazardous wastes identified in the incoming waste will be segregated, stored and disposed of off-site to an approved facility. The site EMS will incorporate contingency plans to minimise the potential for generation of flammable gas.	Prior to commissioning Prior to commissioning	DEP/DME DEP	Detailed procedures for managing hazardous wastes and flammable goods will be described in the Works Approval application for approval by DEP.
Public Consultation	To provide the public with ample opportunity to fully understand the environmental aspects of the proposed facility.	A community education program will be undertaken to ensure that the public is familiar with the purpose and operation of the plant and encourage appropriate waste segregation.	Throughout the project life.	DEP	The community education program will be developed in discussion with DEP.
Other	Best Practice Management	An EMS will be prepared for the facility generally in accordance with approach described in ISO 14000.	Prior to commissioning	DEP	The EMS will generally conform to ISO 14000 and be prepared to the satisfaction of the DEP.

REFERENCES

ARMCANZ (1995) Guidelines for Sewerage Systems – Biosolids Management

Bardsley, T. and Demetriou J. (1997) "Odour Measurements That Don't Stink" National Workshop on Odour Measurement Standardisation, Sydney, 20-22 August 1997.

Bedminster Bioconversion Australia (1997) Application for permit to construct and operate process equipment and air control devices for the proposed Cobb County Facility.

Bedminster Bioconversion Corporation (1997) Bedminster – Cobb County Co-composting Facility: Pilot Biofilter Air Sampling Report. Bedminster Bioconversion Corporation, Georgia, U.S.A.

CH2M Hill (1997) Water Corporation of Western Australia – Odour Impact Modelling – Composting Facility. Perth, WA, January 1997.

Dell, J. and Cooper, N.K. (1992). Vertebrate Fauna of Ken Hurst Park, City of Melville. Prepared for City of Melville.

Department of Commerce and Trade and the Western Australian Municipal Association (1993) State Recycling Blueprint: A Plan to Halve Waste to Landfill in Western Australia by the Year 2000.

Department of Environmental Protection (1997a) Draft Strategy for the Management of Green and Solid Organic Waste in Western Australia. A discussion paper for public comment.

Department of Environmental Protection (1997b) Draft Waste Management Strategy. Department of Environmental Protection, Perth, Western Australia.

Department of Environmental Protection (1997c) Guidelines for the Storage, Processing and Recycling of Organic Wastes. Draft for public comment.

E&A Environmental Consultants Inc (1997) Bedminister – Cobb County Co-Composting Facility – Pilot Biofilter Air Sampling Report.

Environmental Protection Authority (1997) Liquid waste treatment plant – Lot 197 Cocos Drive, Bibra Lake: Report and Recommendations of the Environmental Protection Authority. Bulletin No. 875.

Environment Protection Authority (EPA NSW) (1994) Procedures for Dynamic Olfactometry as developed by the Environment Protection Authority and the Sydney Water Board (Draft).

Environmental Protection Authority of Victoria (EPAV), (1985a) Plume Calculation Procedure: An approved procedure under Schedule E of the State Environment Policy (The Air Environment). Publication 210.

Environmental Protection Authority of Victoria (EPAV), (1985b) Air Quality Branch – Technical Services Section – Source Emissions Measurements – Standard Analytical Procedure – B2 - Odour (Dynamic Olfactometry)", December 1985.

ERM Mitchell McCotter (1998a) Noise Assessment Report – Regional Resource Recovery Centre (Canning Vale), October 1998.

ERM Mitchell McCotter (1998b) Supplementary Noise Assessment – Regional Resource Recovery Centre (Canning Vale), November 1998.

Jordan, J.E. (1986) Armadale, part sheets 2023 I and 2023 IV, Perth Metropolitan Region, Environmental Geology Series, Geological Survey of Western Australia.

Heddle, E.M., Loneragan, O.W. and Havel, J.J. (1980) Vegetation Complexes of the Darling System, Western Australia. In: Atlas of natural resources Darling System, Western Australia. Department of Conservation and Environment, Perth.

How, R.A. and Dell, J. (1989). Vertebrate Fauna of Banksia Woodlands in Western Australia. 71(4): 97-98.

How, R.A., Harvey, M.S., Dell, J. and Waldock, J.M. (1996). Ground Fauna of Urban Bushland Remnants in Perth. Prepared for Australian Heritage Commission.

Maryan, B. (1993). Herpetofauna of an Urban Area Near Perth, Western Australia. WA Naturalist. Vol 19/2, pp74-183.

Queensland Department of Environment and Heritage (1994). "Policy for Odours from New Developments", 26 August 1994.

Sinclair Knight & Partners Pty Ltd (1994) Review of Perth Waste Management. Perth, Western Australia.

Select Committee on Recycling and Waste Management (1995) Final Report. Western Australia Legislative Assembly, Perth, Western Australia.

DISCLAIMER

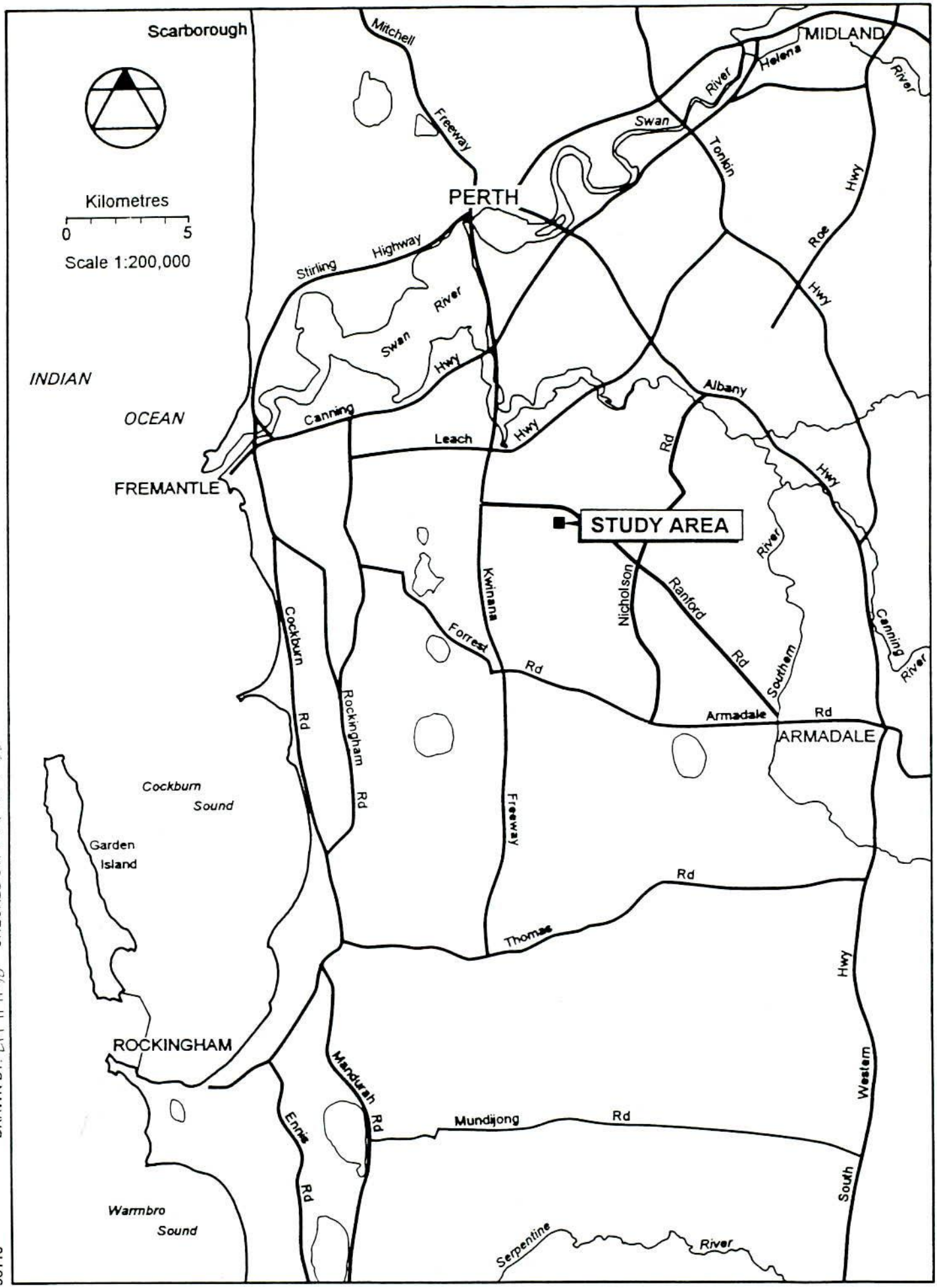
This report has been prepared on behalf of and for the exclusive use of the client, and is subject to and issued in accordance with the agreement between the client and Alan Tingay & Associates. Alan Tingay & Associates accepts no liability or responsibility whatsoever for it in respect of any use of or reliance upon this report by any third party.

Copying of this report without the permission of the client or Alan Tingay & Associates is not permitted.

As part of our Quality System, documents are checked then approved prior to distribution. Quality Assurance procedures require that the results of implementation of recommendations be validated against the intent of the recommendations. Alan Tingay & Associates is prepared to assist clients in assessing the outcomes of recommendations made in this report to establish whether those outcomes are in accord with the objectives.

Document Reference:	98110_020_DN - Report No. 98/94
Project Number:	98110
Draft:	Final
Checked:	D. Neilson
Approved:	N. Davies .
Date:	20 January, 1999

FIGURES

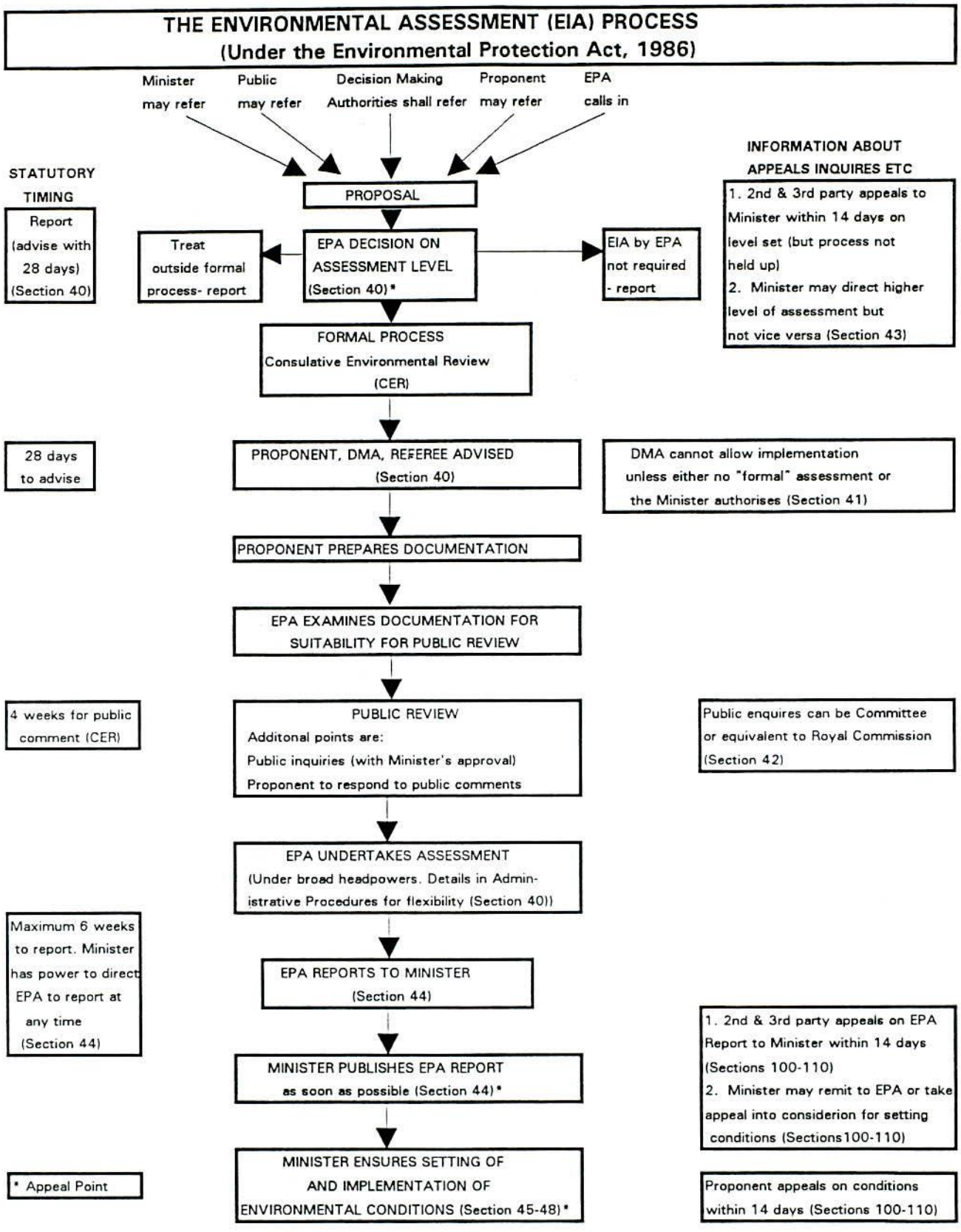


DRAWN BY: EM 11/1/98 CHECKED BY: DN 13-1-99

98110

CANNING VALE REGIONAL RESOURCE RECOVERY CENTRE
LOCATION
FIGURE 1

ALAN TINGAY & ASSOCIATES



DRAWN BY: TE. 10.9.98 CHECKED BY: DN 13-1-99

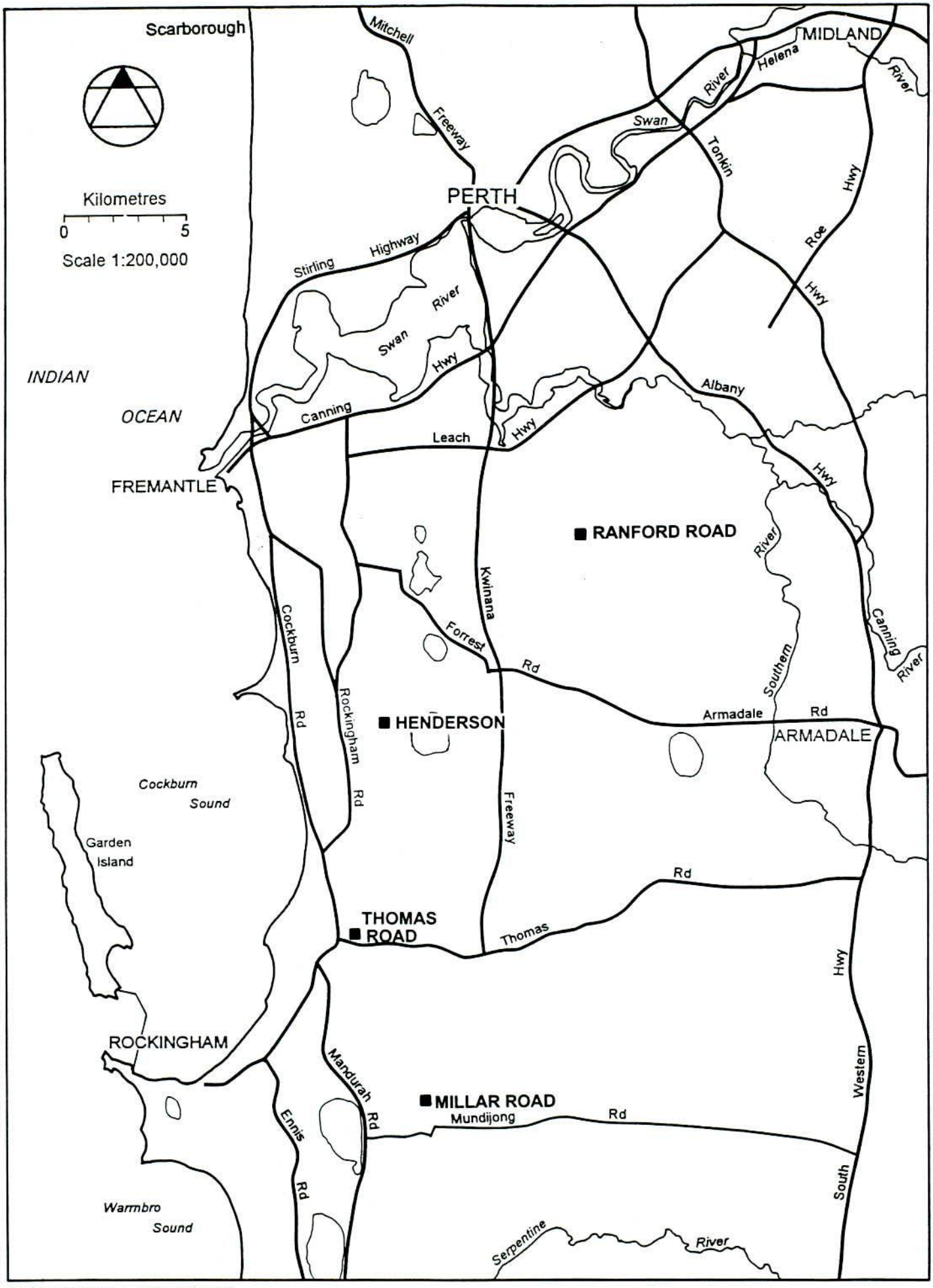
98110

ALAN TINGAY & ASSOCIATES

CANNING VALE RRRC

THE ENVIRONMENTAL ASSESSMENT PROCESS IN WESTERN

FIGURE 2

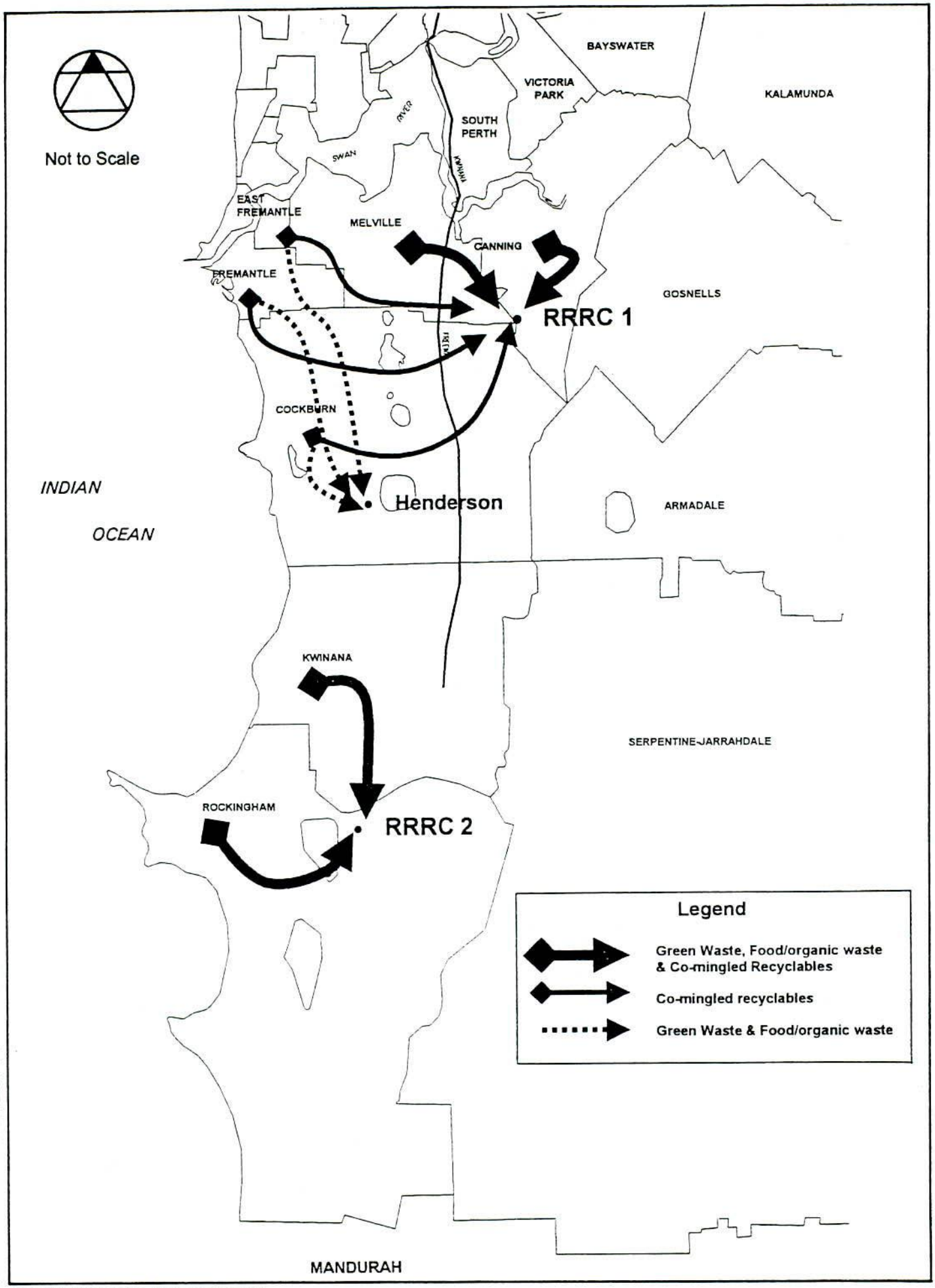


DRAWN BY: TE 19-11-98 CHECKED BY: DN 13-1-99

98110

ALAN TINGAY & ASSOCIATES

CANNING VALE RRRC
EXISTING WASTE FACILITY LOCATIONS
FIGURE 3



DRAWN BY: GLM 3-11-98 CHECKED BY: DNJ 13-1-99

98110

ALAN TINGAY & ASSOCIATES

CANNING VALE RRRC
PROPOSED FUTURE MANAGEMENT OF WASTE STREAM
FIGURE 4

ROAD

BANNISTER

ROAD

CLIFTON

ROAD

RESERVE

RAILWAY

Pt 85

Pt 79

Pt 78

Pt 77

1

Ken Hurst Park

LEGEND

Boundary of Site

25 Estimated maximum watertable contour in metres above AHD

39 Natural surface contours in metres above AHD

metres

0 50 100

Scale 1:2000

CANNING VALE REGIONAL RESOURCE RECOVERY CENTRE WATER CONTOURS AND GROUND CONTOURS FIGURE 5

DRAWN BY: T.E. 22-9-98 CHECKED BY: DN 13-1-99

98110

ALAN TINGAY & ASSOCIATES

FUTURE ROE HIGHWAY EXTENSION

Access to Ranford Road

Pt79

1

ROAD

BANNISTER

MATURE COMPOST STORAGE

LIMIT

OF

LEASE

Noise Attenuation Barrier

Pt 85

Pt 78

IN VESSEL COMPOSTING (ENCLOSED FACILITY)

ADMIN

Noise Attenuation Barrier

GREEN WASTE GRINDING

500m

500m from nearest residential area (Sellen Court)

BIOFILTER

MATERIALS RECOVERY FACILITY (ENCLOSED FACILITY)

TRANSFER STATION

CLIFTON

ROAD

RESERVE

RAILWAY

Pt 77

451

metres

0 50 100

Scale 1: 2000

LEGEND

Boundary of Site

500m From Nearest Residential Area (Sellen Court)

CANNING VALE REGIONAL RESOURCE RECOVERY CENTRE

SITE PLAN

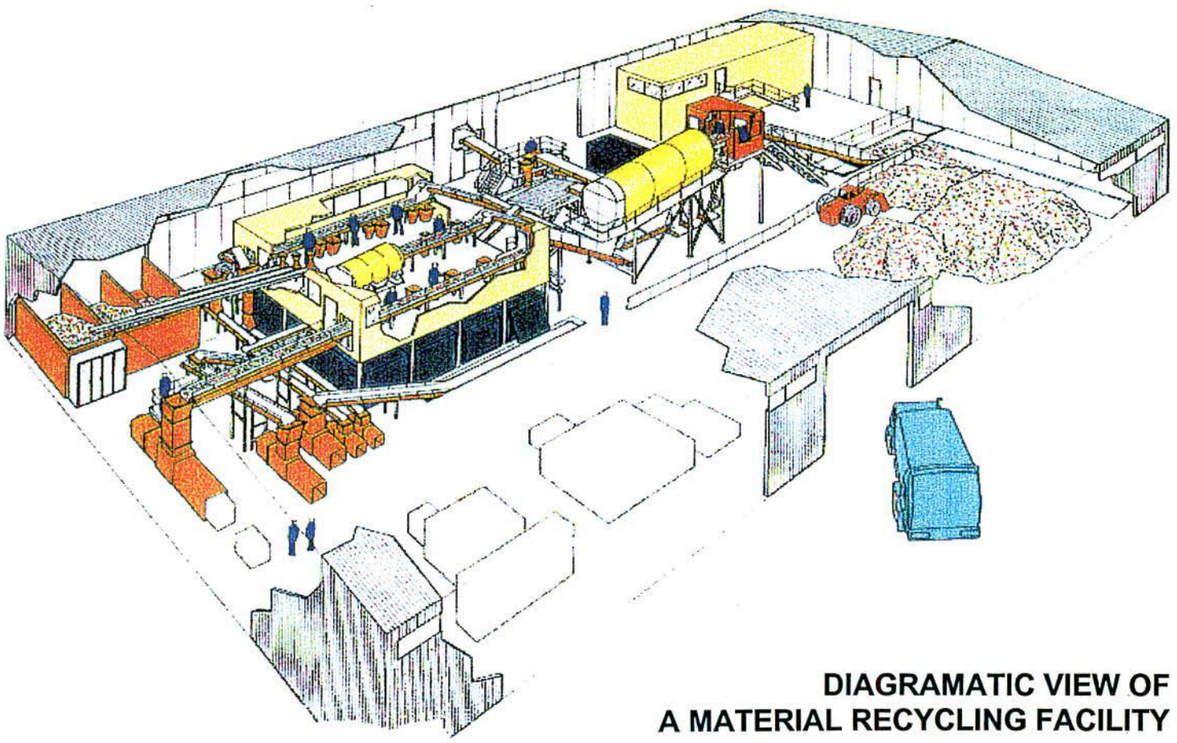
FIGURE 6

DRAWN BY: GLM 13-1-99 CHECKED BY: D.N. 13-1-99

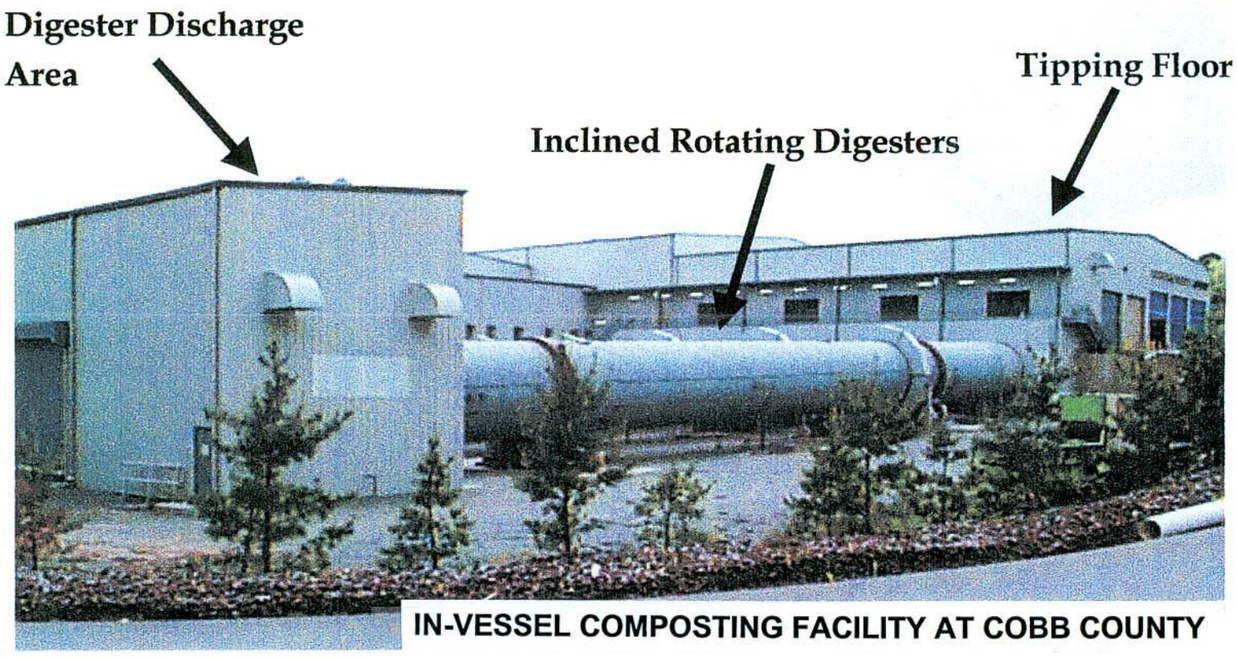
98110

ALAN TINGAY & ASSOCIATES

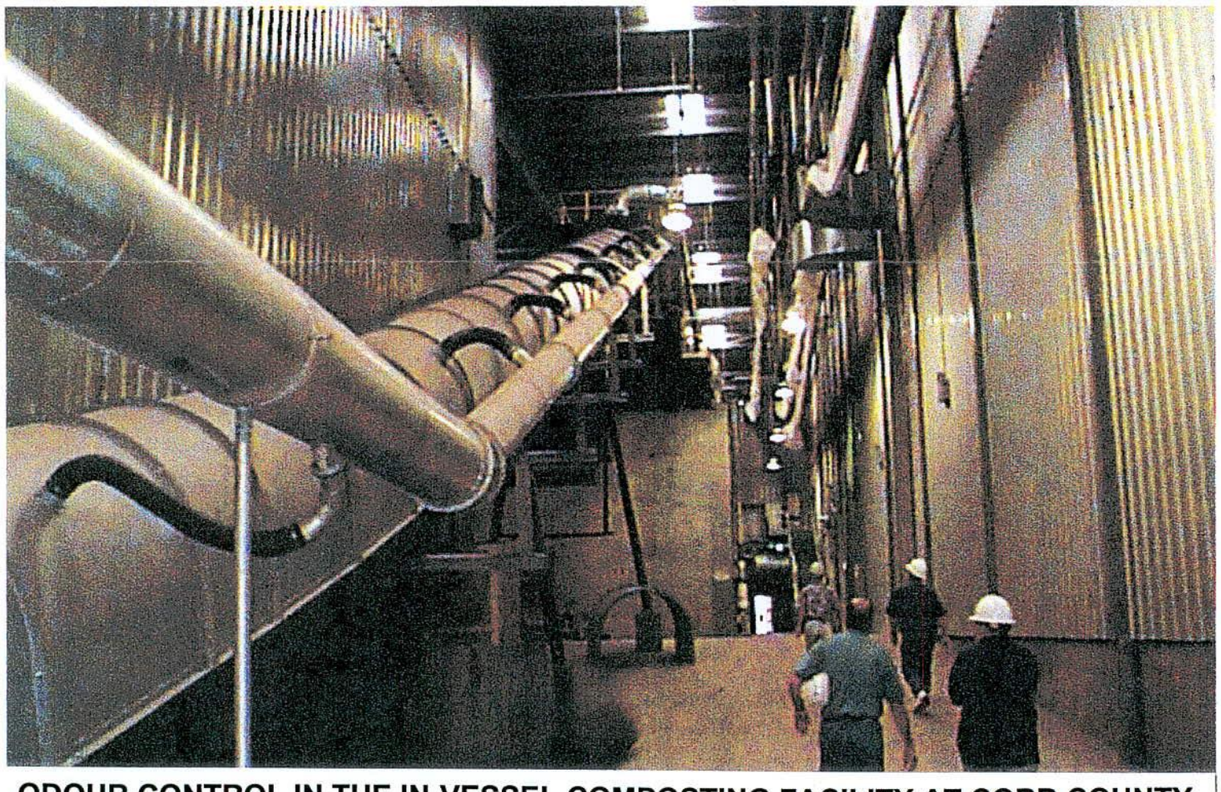
ALAN TINGAY & ASSOCIATES



DIAGRAMATIC VIEW OF
A MATERIAL RECYCLING FACILITY

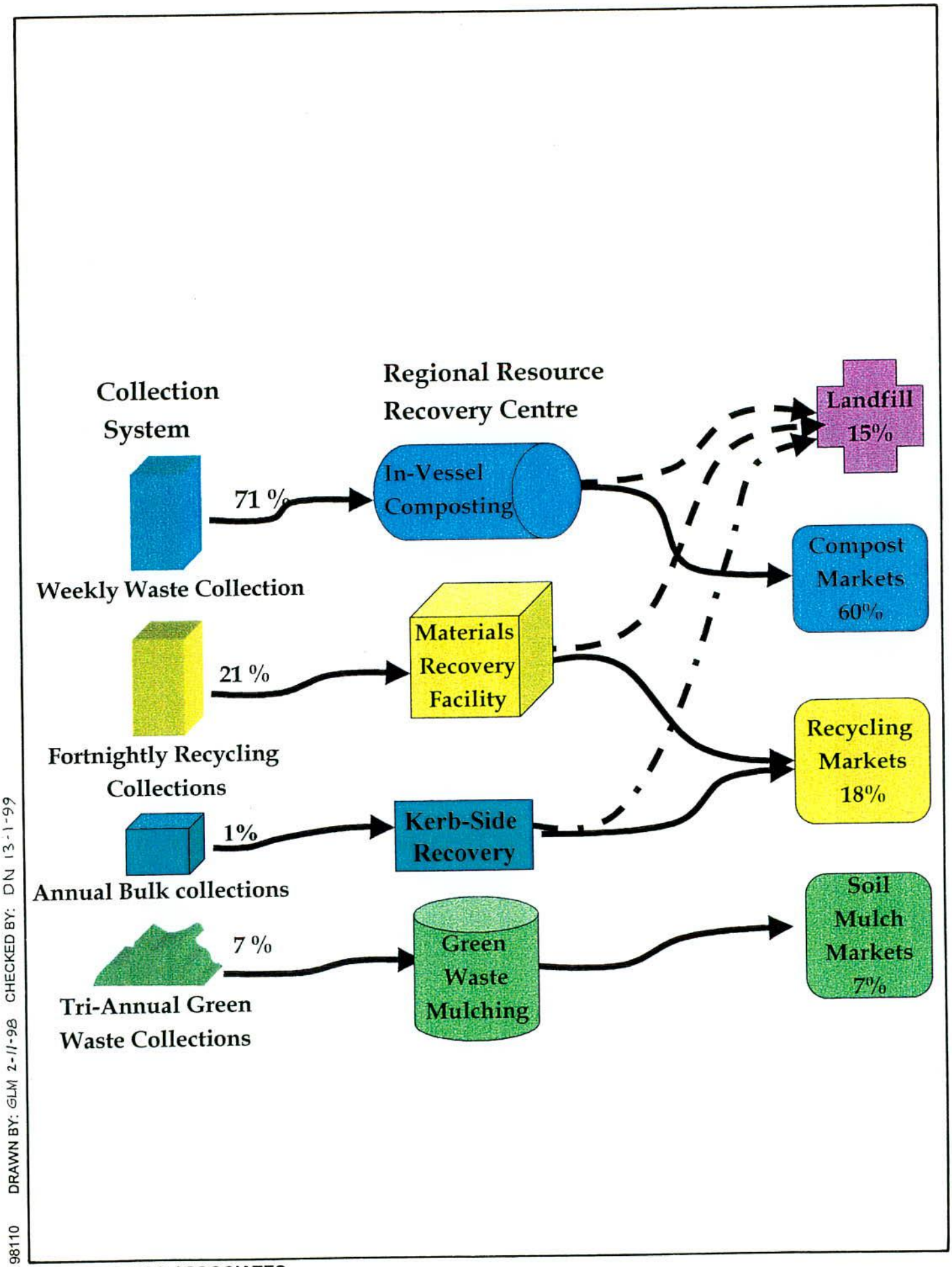


IN-VESSEL COMPOSTING FACILITY AT COBB COUNTY



ODOUR CONTROL IN THE IN-VESSEL COMPOSTING FACILITY AT COBB COUNTY

CANNING VALE REGIONAL
RESOURCE RECOVERY CENTRE
EXAMPLES OF
WASTE PROCESSING FACILITIES
FIGURE 7



98110 DRAWN BY: GLM 2-11-98 CHECKED BY: DN 13-1-99

ALAN TINGAY & ASSOCIATES

CANNING VALE
REGIONAL RESOURCE RECOVERY CENTRE
PROCESS FLOW
FIGURE 8

LEGEND

BaAf	*Banksia attenuata/Allocasuuarina fraseriana* Low Open Woodland
BaAfEm	*Banksia attenuata/Allocasuuarina fraseriana/ Eucalyptus marginata* Low Open Woodland
Mp	*Melaleuca preissiana* Low Woodland
BiRiPe	*Banksia iliciplium/Regelea inops/ Pericalymma ellipticum* Low Open Woodland
Si	*Scholtzia involucrata* Low Heath

Boundary of Site

metres
0 50 100
SCALE 1:2000

CANNING VALE REGIONAL RESOURCE RECOVERY CENTRE VEGETATION MAP FIGURE 9

98110 DRAWN BY: EM 11-11-98 CHECKED BY: DN 13-1-99

ALAN TINGAY & ASSOCIATES

FUTURE ROE HIGHWAY EXTENSION

Pt 85

1

ROAD

BANNISTER

Access to Ranford Road

30.2

Pt79

LIMIT

MATURE COMPOST STORAGE

Pt 78

IN VESSEL COMPOSTING (ENCLOSED FACILITY)

LEASE

BIOFILTER

ADMIN

GREEN WASTE GRINDING

MATERIALS RECOVERY FACILITY (ENCLOSED FACILITY)

TRANSFER STATION

CLIFTON ROAD

RESERVE

451

RAILWAY

Pt 77

LEGEND

Boundary of Site

Predicted $2.5OU_{QDEH-M6}$ 99.5 percentile 3-minute average odour contour

Measurement Reference Points

metres

0 50 100

Scale 1: 2000

CANNING VALE REGIONAL RESOURCE RECOVERY CENTRE ODOUR CONTOUR FIGURE 10

DRAWN BY: EM 11-1-98 CHECKED BY: DN 13-1-99

98110

ALAN TINGAY & ASSOCIATES

metres

0 100 200

SCALE 1:5000

LEGEND

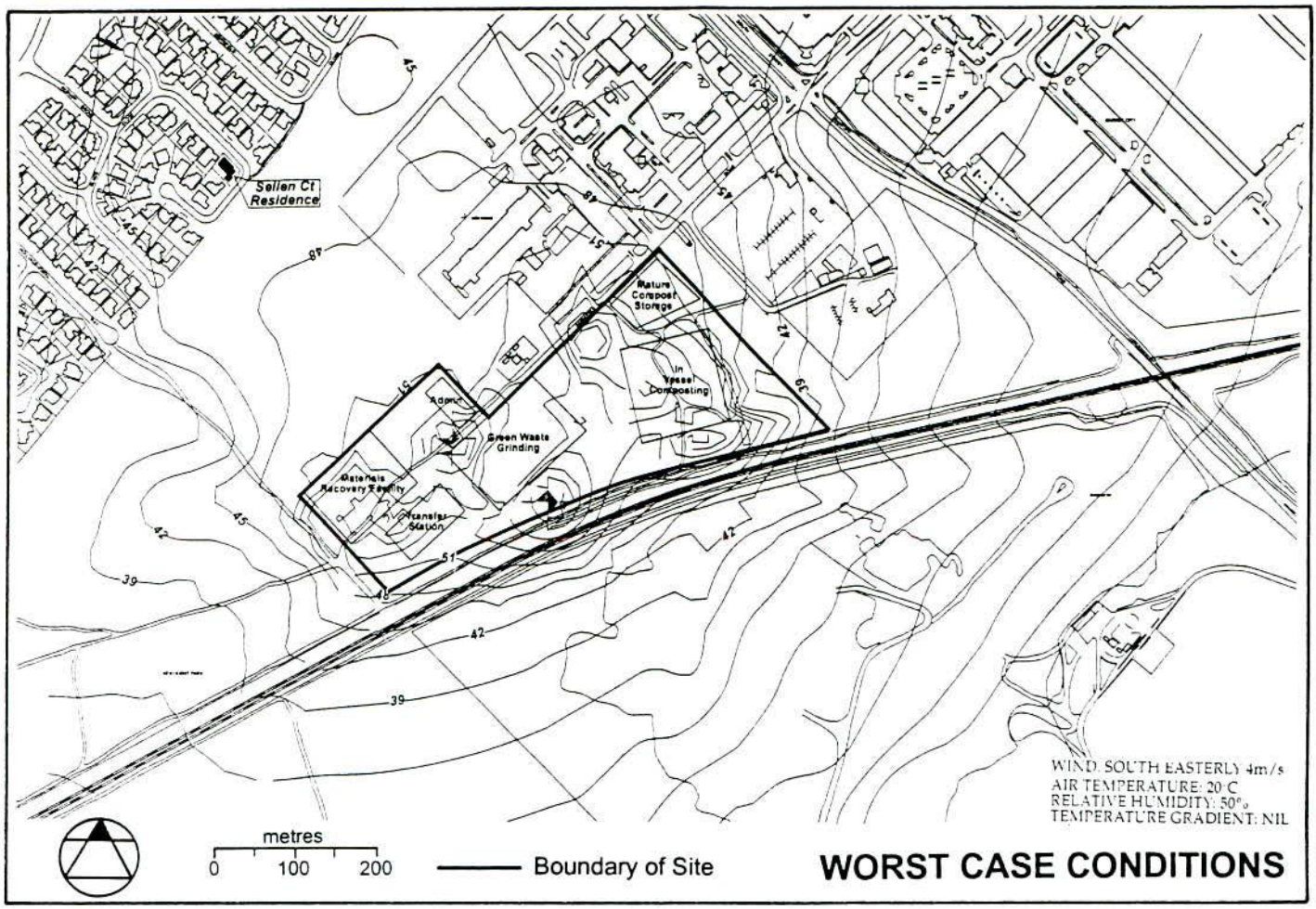
- Boundary of Site
- Buffer distance from Site Boundary
- Predicted $2.5OU_{QDEH-M6}$ 99.5 percentile 3-minute average odour contour

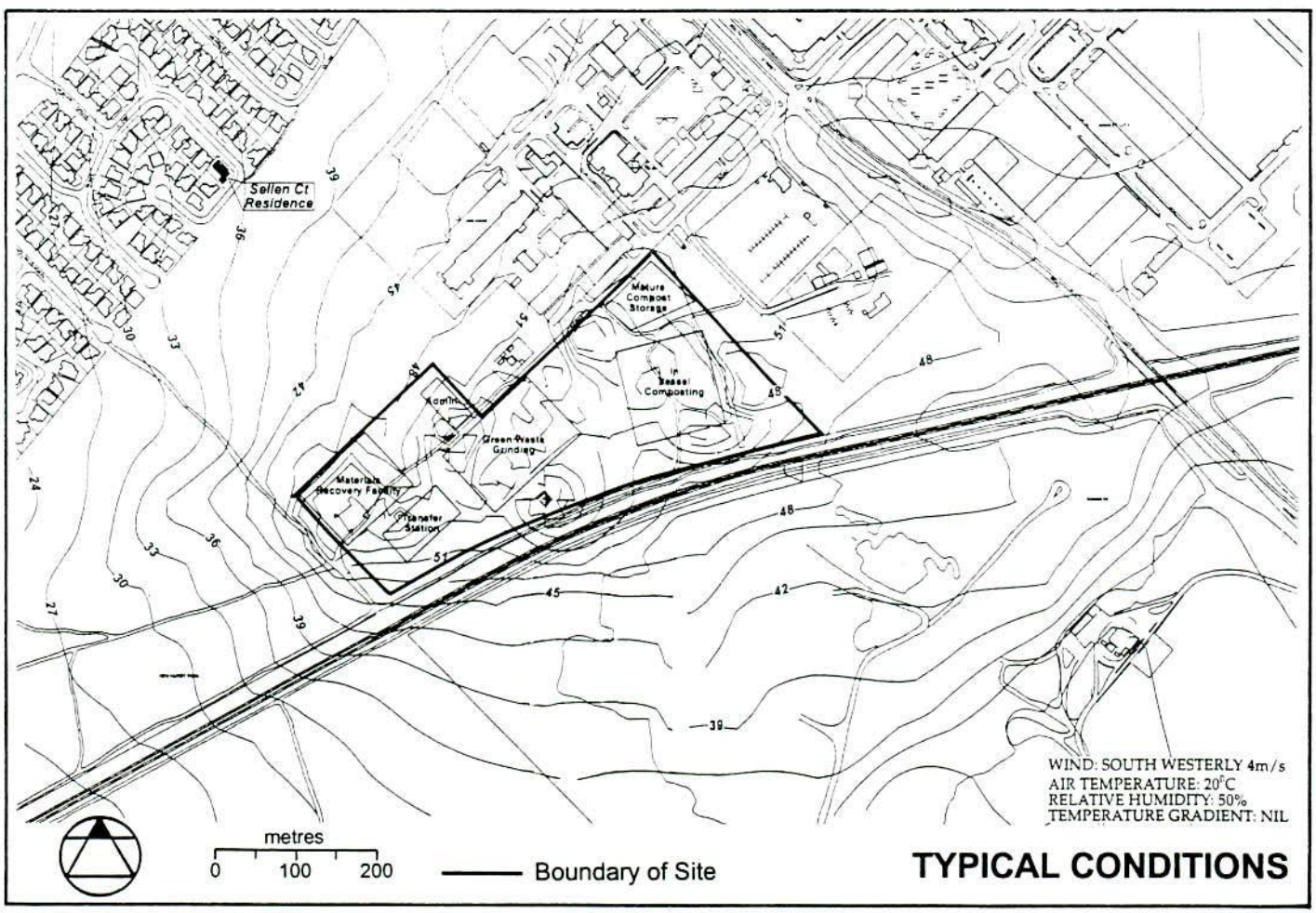
CANNING VALE REGIONAL RESOURCE RECOVERY CENTRE BUFFER ZONES FIGURE 11

DRAWN BY: GLM 13-1-99 CHECKED BY: DN 13-1-99

98110

ALAN TINGAY & ASSOCIATES





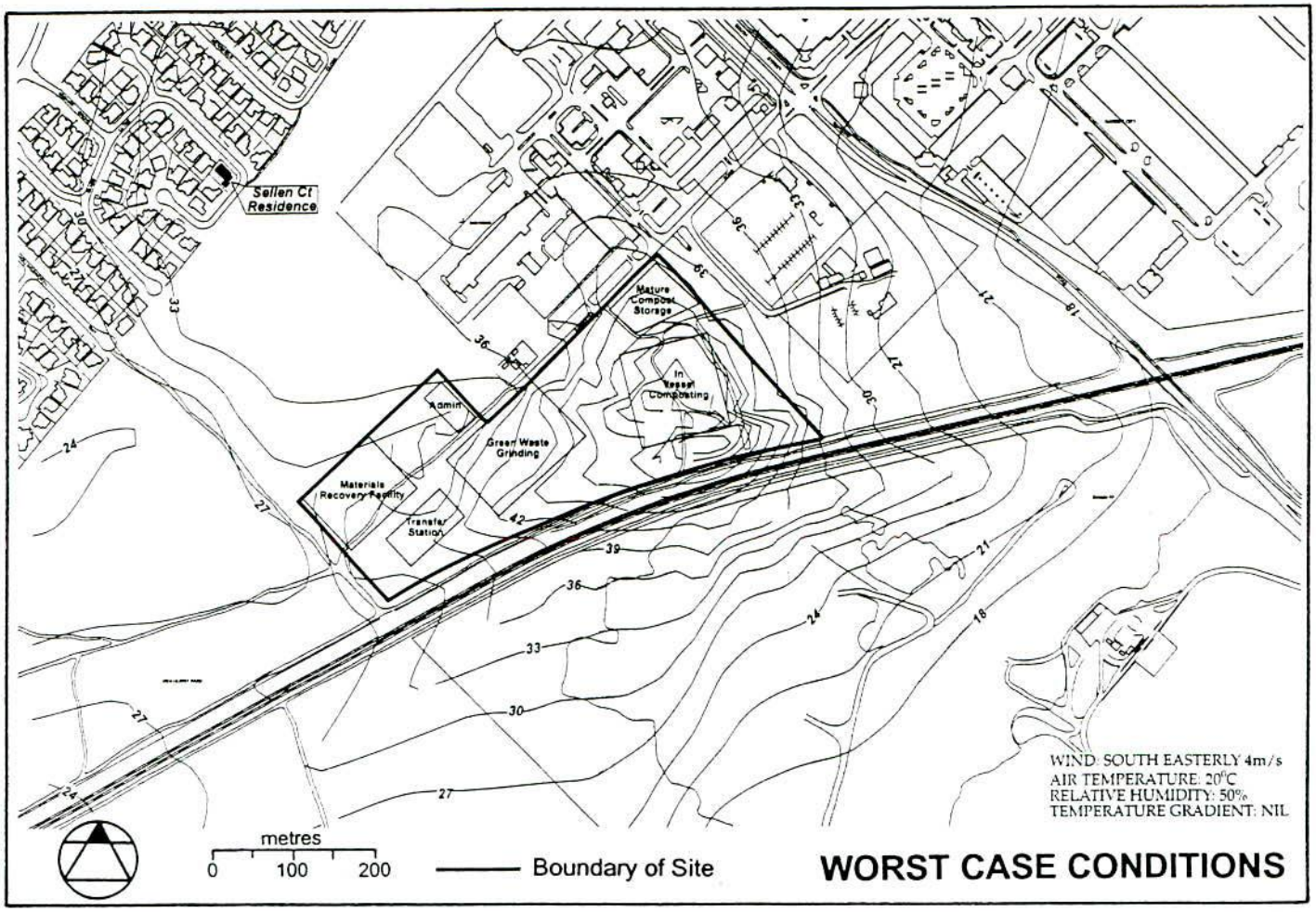
DRAWN BY: GLM 13-1-99 CHECKED BY: DN 13-1-99

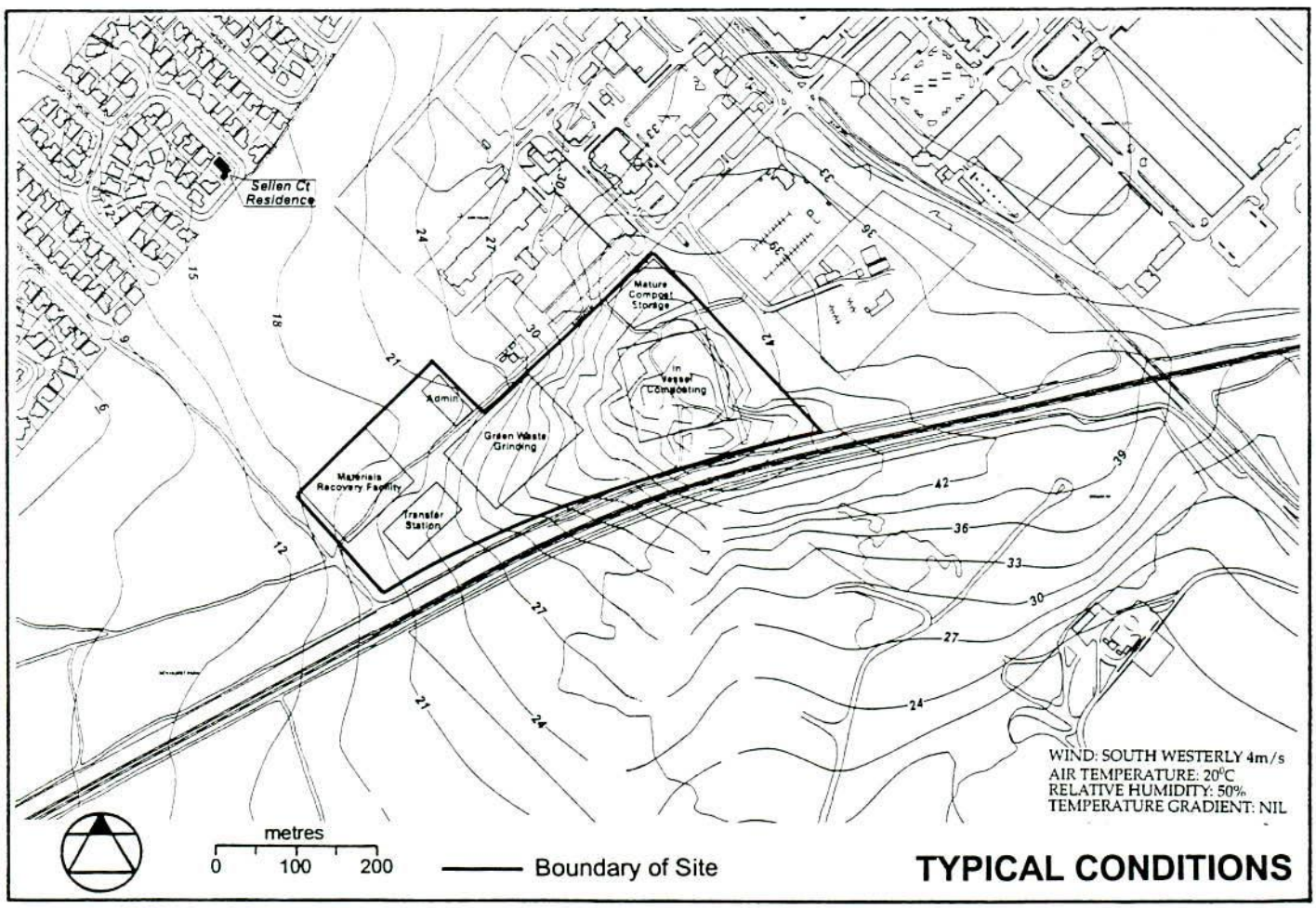
98110

ALAN TINGAY & ASSOCIATES

CANNING VALE RRRC, MONDAY TO SATURDAY
NOISE CONTOURS dB(A), FOR 0700 - 1900 HOURS
FIGURE 12A

SOURCE: ERM, MITCHELL McCOTTER





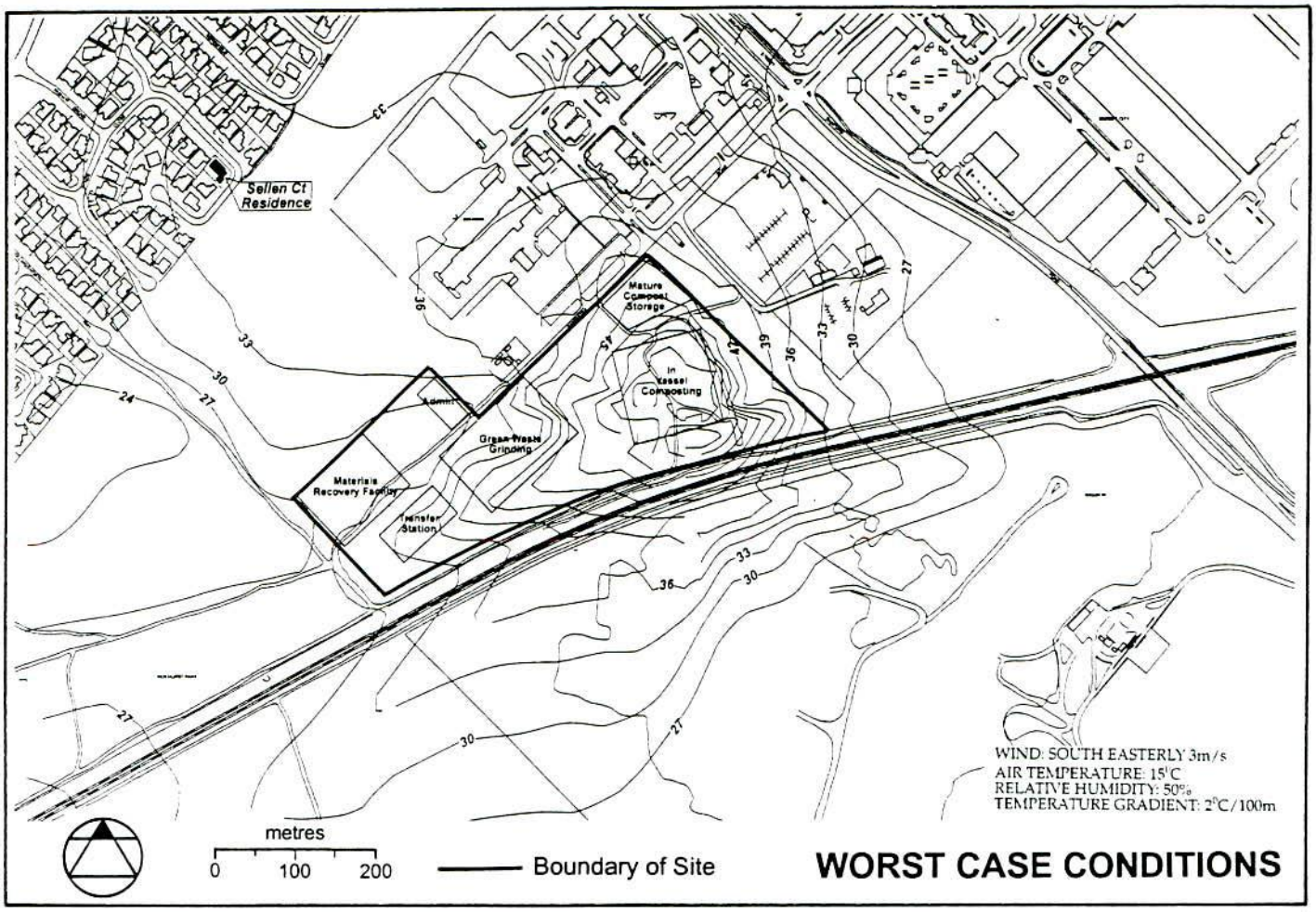
DRAWN BY: GLM 13-1-99 CHECKED BY: DN 13-1-99

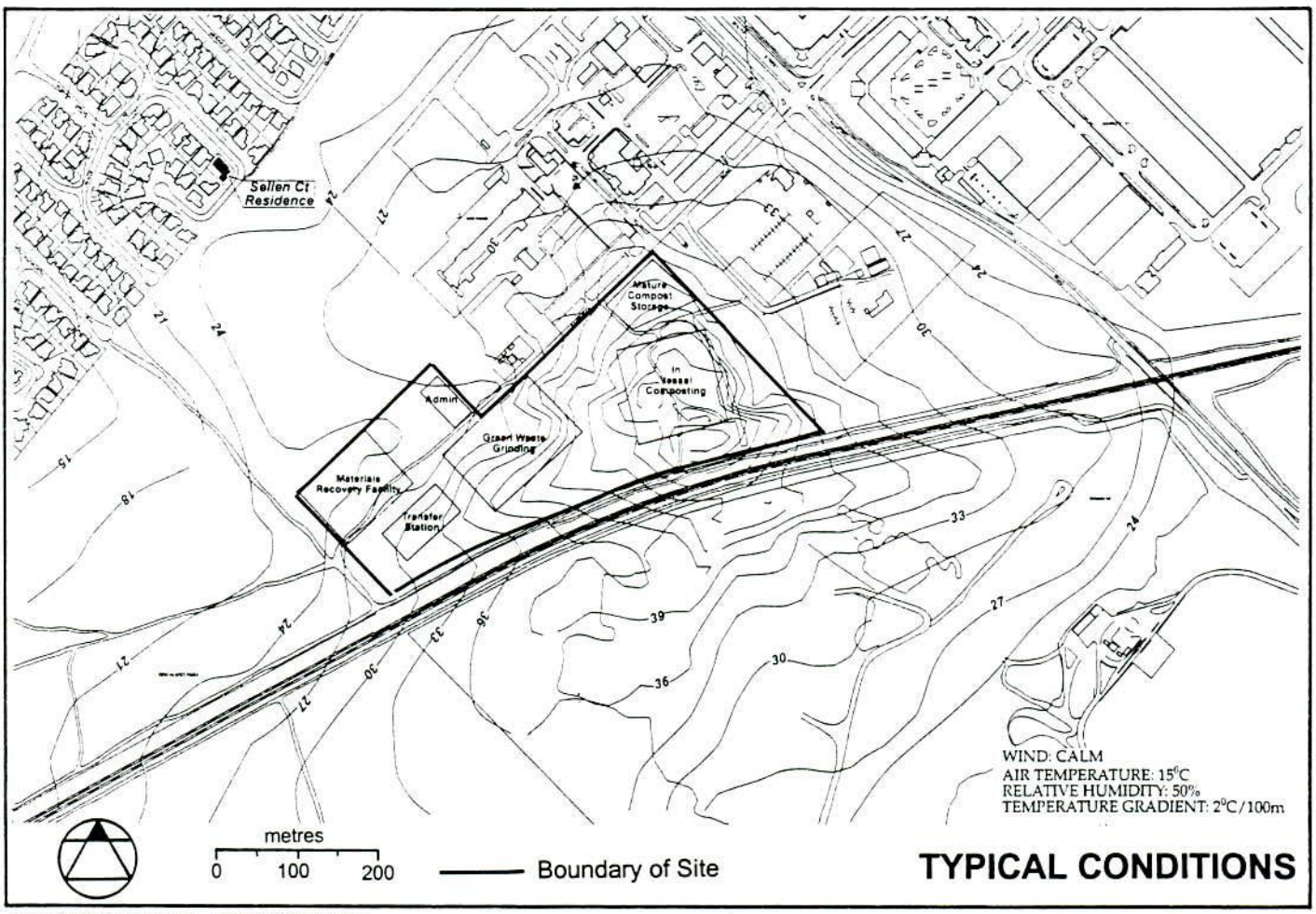
98110

ALAN TINGAY & ASSOCIATES

CANNING VALE RRRC, SUNDAYS & PUBLIC HOLIDAYS
NOISE CONTOURS dB(A), FOR 0700 - 1900 HOURS
FIGURE 12B

SOURCE: ERM, MITCHELL McCOTTER





DRAWN BY: GLM 18-1-99 CHECKED BY: DN 18-1-99

98110

ALAN TINGAY & ASSOCIATES

CANNING VALE RRRC, ALL DAYS
NOISE CONTOURS dB(A), FOR 1900 – 0700 HOURS
FIGURE 13

SOURCE: ERM, MITCHELL McCOTTER

APPENDICES

APPENDIX 1

ENVIRONMENTAL PROTECTION AUTHORITY ASSESSMENT GUIDELINES

Environmental Protection Authority

Guidelines

INTEGRATED REGIONAL WASTE PROCESSING FACILITY, CANNING VALE.

(Pt Lots 75 and 85 Bannister Road, Canning Vale)

(Assessment Number 1221)

These guidelines are provided for the preparation of the proponent's environmental review document. The specific environmental factors to be addressed are identified in Part A. The generic guidelines for the format of an environmental review document are provided in Part B.

The environmental review document must address all elements of Part 'A' and Part 'B' of these guidelines prior to approval being given to commence the public review.

Part A: Specific Guidelines for the preparation of the Consultative Environmental Review

1. The proposal

The South West Metropolitan Regional Waste Management Council (SWRWMC) (the proponent) intends to build a Integrated Regional Waste Processing Facility at Pt Lot 78 and 85 Bannister Road Canning Vale. The proposed layout of the facility is indicated on the attached plan (Attachment 3).

The three putrescible landfills (Canning, Henderson and Millar Road) operating within the boundaries of the regional council have only limited capacity remaining and the SWRWMC has resolved to develop a whole of waste processing facility which will be capable of recycling between 50% and 85% of the waste stream and serve the population of the region into the next century.

The proposed regional resource recovery center would be designed to cater for a segregated domestic wastestream. The processing facility will initially consist of the following elements:

- a materials recycling facility for the sorting of co-mingled recyclables;
- a greenwaste receivable and processing facility;
- a waste receival and in-vessel composting facility for the mixed organic waste stream; and
- an area for storage of mature compost.

The facility may eventually include an on-site transfer station to cater for domestic trailer and car traffic.

The majority of the waste would be processed through the in-vessel composting plant. This plant would be entirely enclosed within a building which is maintained under negative pressure at all times with the extracted air being directed to a biological filter to remove odours.

Could you please supply the project officer with an electronic copy of the document for use on Macintosh, Microsoft Word Version 6, and any scanned figures. Where possible, figures should be reproducible in a black and white format.

2. Environmental factors relevant to this proposal

At this preliminary stage, the Environmental Protection Authority (EPA) believes the relevant environmental factors, objectives and work required is as detailed in the table below:

CONTENT		SCOPE OF WORK	
Factor	**Site specific factor**	**EPA objective**	**Work required for the environmental review**
BIOPHYSICAL			
Vegetation	Clearing of remnant vegetation.	To maintain the abundance, species diversity, geographic distribution and productivity of vegetation communities.	Description of the plant communities present and a flora survey with specific searches for rare and priority flora species. It would be desirable for this to be carried out in spring. Assessment of the vegetation and flora conservation significance of the site. The conservation significance for vegetation should be assessed for the block by itself (in relation to the conservation status of the Bassendean Central and South Vegetation Complex and the floristic community types present) and as an area adjoining Ken Hurst Park, which is regionally significant bushland. The flora section should include comment on species of interest (DRF, Priority Flora) for which suitable habitat is present but which could not be searched for if the survey is carried out before spring and any other flora of conservation significance recorded during the survey. It should also comment on the diversity of the flora in relation to the size of the block.
Fauna	Clearing of remnant vegetation.	To maintain the abundance, species diversity and geographic distribution of native fauna.	Assessment of the fauna conservation value by an experienced zoologist.
POLLUTION MANAGEMENT			
Water	Groundwater quality	Quality of groundwater is maintained in accordance with the requirements of the draft Western Australian Water Quality Guidelines for fresh and Marine Waters (EPA Bulletin 711).	Details of groundwater monitoring program including locations of bores, baseline and on-going monitoring. Details of vessels, tanks, receival wells, leachate ponds and storage areas. Details of measures such as bunds, liners etc used to protect against groundwater contamination. Details of truck washdown facilities. Details of stormwater and drainage management.

POLLUTION MANAGEMENT			
Air	Odour	To ensure that odour emissions do not cause nuisance to surrounding land users.	Quantify the odour source using dynamic olfactometry analysis. Predict the downwind odour impacts using dispersion modelling and compare with recognised environmental odour criterion. Design of the odour control system including the type of biofilter (open bed or enclosed), media type, pretreatment system and irrigation system. The flow rate and temperature of the odorous gas stream. Flow rate loading of the biofilter media. The monitoring, control and notification system (degree of automation) for parameters such as temperature, humidity, pressure, flow rate and pH etc, that are critical to correct operation. Redundancy of biofilter components such as fans, biofilter cells and power supply. Management/contingency plan during the biofilter acclimation period. The useful life of the filter media and the changeout/replacement procedure.
	Particulates/ Dust	To ensure that dust does not adversely impact on the health or amenity of nearby residents.	The dust prevention measures to be applied to waste grinding and storage areas in order to demonstrate compliance with the NEPM for Ambient Air Quality. The dust prevention measures to be applied during construction.
	Greenhouse gases	To ensure the emission of greenhouse gases is minimised.	Details of greenhouse gas emissions.
Non-chemical emissions	Noise	To protect the amenity of nearby residents from noise by ensuring that noise levels meet the Environmental Protection (Noise) Regulations 1997.	Noise emissions to be examined in accordance with the Draft "Guidance for the Assessment of Environmental Factors No 8 - Environmental Noise". Details (including sound power levels) of plant such as drive motors, extraction fans/blowers and compressors. Hours of operation and truck delivery/pick up times.

POLLUTION MANAGEMENT			
Wastes	Waste minimisation	To reduce as far as practicable the generation of solid and liquid wastes and to dispose of wastes in a manner that is environmentally acceptable and meets statutory standards.	The types and quantities of waste to be processed. The types and quantities of recovered product and waste produced. The disposal sites for the waste produced. Contingency plan to handle wastes during major breakdown/maintenance. Management of waste received which is not compatible with the process (ie hazardous wastes).
SOCIAL SURROUNDINGS			
Public Health and Safety	Road traffic Flammable/ explosive gases.	To ensure the public is not exposed to unreasonable risk from the facility.	The numbers and types of vehicles using the facility and the proposed routes. Details of methane management.
Communication	Public Consultation	To provide the public with ample opportunity to fully understand the environmental aspects of the proposed facility.	Undertake a community information program using a suitably qualified consultant. As part of the program establish appropriate mechanisms to respond to the concerns.

These factors should be addressed within the environmental review document for the public to consider and make comment to the EPA. The EPA expects to address these factors in its report to the Minister for the Environment.

The EPA expects the proponent to take due care in ensuring any other relevant environmental factors which may be of interest to the public are addressed.

3. Availability of the environmental review

3.1 Copies for distribution free of charge

Supplied to DEP:

- Library/Information Centre.....9
- EPA members.....6
- Officers of the DEP (Perth) 6

Distributed by the proponent to:

Government departments	• Water and Rivers Commission .....2 • Agriculture Western Australia.....2 • Conservation and Land Management 2
Local government authorities	• City of Canning.....2 • City of Melville 2
Libraries	• J S Battye Library .....3 • The Environment Centre.....2 • Willetton Library .....2 • Bullcreek Library.....2
Other	• Conservation Council of WA .....1 • Canning Vale Progress Association.....1 • Bannister Creek Catchment Group.....1

3.2 Available for public viewing

- J S Battye Library;
- Willetton Library;
- Bullcreek Library; and
- Department of Environmental Protection Library.

Part B: Generic Guidelines for the preparation of an environmental review document

1. Overview

All environmental reviews have the objective of protecting the environment. Environmental impact assessment is deliberately a public process in order to obtain broad ranging advice. The review requires the proponent to describe:

- the proposal;
- receiving environment;
- potential impacts of the proposal on factors of the environment; and
- proposed management strategies to ensure those environmental factors are appropriately protected.

Throughout the assessment process it is the objective of the Environmental Protection Authority (EPA) to help the proponent to improve the proposal so the environment is protected. The DEP will co-ordinate, on behalf of the EPA, relevant government agencies and the public in providing advice about environmental matters during the assessment of the environmental review for this proposal.

The primary purpose of the environmental review is to provide information on the proposal within the local and regional framework to the EPA, with the aim of emphasising how the proposal may impact the relevant environmental factors and how those impacts may be mitigated and managed.

The language used in the body of the environmental review should be kept simple and concise, considering the audience includes non-technical people, and any extensive, technical detail should either be referenced or appended to the environmental review. It should be noted that the environmental review will form the legal basis of the Minister for the Environment's approval of the proposal and therefore the environmental review should include a description of all the main and ancillary components of the proposal, including options where relevant.

Information used to reach conclusions should be properly referenced, including personal communications. Assessments of the significance of an impact should be soundly based rather than unsubstantiated opinion, and each assessment should lead to a discussion of the management of the environmental factor.

2. Objectives of the environmental review

The objectives of the environmental review are to:

- place this proposal in the context of the local and regional environment;
- adequately describe all components of the proposal, so that the Minister for the Environment can consider approval of a well-defined project;
- provide the basis of the proponent's environmental management program, which shows that the environmental impacts resulting from the proposal, including cumulative impact, can be acceptably managed; and
- communicate clearly with the public (including government agencies), so that the EPA can obtain informed public comment to assist in providing advice to government.

3. Environmental management

The EPA expects the proponent to develop and implement an Environmental Management System (EMS) appropriate to the proposal consistent with the principles outlined in the AS/NZS ISO 14000 series, including provisions for performance review and a commitment to continuous improvement.

The key components which should be included in environmental review documentation, depending on the scale of the proposal, are environmental management:

- policy;
- environmental management program;
- structure and responsibility (resources);
- training program;
- monitoring and measurement program;
- corrective and preventative action;
- EMS audit; and
- management review (with feedback).

Documentation on the relevant components should be proportional with the scale of the proposal and the potential environmental impacts. If appropriate, the documentation can be incorporated into a formal environmental management system and provision made for periodic performance review. Public accountability should be incorporated into the approach on environmental management.

The environmental management program (EMP) is the key document that should be appropriately defined in an environmental review document. The EMP should provide plans to manage the relevant environmental factors, define the performance objectives, outline the operational procedures and outline the monitoring and reporting procedures which would demonstrate the achievement of the objectives.

4. Format of the environmental review document

The environmental review should be provided to the DEP officer for comment. At this stage the document should have all figures produced in the final format and colours.

Following approval to release the review for public comment, the final document should also be provided to the DEP in an electronic format.

The proponent is requested to supply the project officer with an electronic copy of the environmental review document for use on Macintosh, Microsoft Word Version 6, and any scanned figures. Where possible, figures should be reproducible in a black and white format.

5. Contents of the environmental review document

The contents of the environmental review should include an executive summary, introduction and at least the following:

5.1 The proposal

A comprehensive description of the proposal including its location (address and certificate of title details where relevant) is required.

Justification and alternatives

- justification and objectives for the proposed development;
- the legal framework, including existing zoning and environmental approvals, and decision making authorities and involved agencies; and
- consideration of alternative options.

Key characteristics

The Minister's statement will bind the proponent to implementing the proposal in accordance with any technical specifications and key characteristics[1] in the environmental review document. It is important therefore, that the level of technical detail in the environmental review, while sufficient for environmental assessment, does not bind the proponent in areas where the project is likely to change in ways that have no environmental significance.

Include a description of the components of the proposal, including the nature and extent of works proposed. This information must be summarised in the form of a table as follows:

[1] Changes to the key characteristics of the proposal following final approval, would require assessment of the change and can be treated as non-substantial and approved by the Minister, if the environmental impacts are not significant. If the change is significant, it would require assessment under section 38 or section 46. Changes to other aspects of the proposal are generally inconsequential and can be implemented without further assessment. It is prudent to consult with the Department of Environmental Protection about changes to the proposal.

Table 1: Key characteristics (example only)

Element	Description
Life of project (mine production)	< 5 yrs (continual operation)
Size of ore body	682 000 tonnes (upper limit)
Area of disturbance (including access)	100 hectares
List of major components • pit • waste dump • infrastructure (water supply, roads, etc)	refer plans, specifications, charts section immediately below for details of map requirements
Ore mining rate • maximum	 • 200 000 tonnes per year
Solid waste materials • maximum	 • 800,000 tonnes per year
Water supply • source • maximum hourly requirement • maximum annual requirement	 • XYZ borefield, ABC aquifer • 180 cubic metres • 1 000 000 cubic metres
Fuel storage capacity and quantity used	litres; litres per year
Heavy mineral concentrate transport • truck movements (maximum)	 • 75 return truck loads per week

Plans, Specifications, Charts

Adequately dimensioned plans showing clearly the location and elements of the proposal which are significant from the point of view of environmental protection, should be included. The location and dimensions (for progressive stages of development, if relevant) of plant, amenities buildings, accessways, stockpile areas, dredge areas, waste product disposal and treatment areas, all dams and water storage areas, mining areas, storage areas including fuel storage, landscaped areas etc.

Only those elements of plans, specifications and charts that are significant from the point of view of environmental protection are of relevance here.

Figures that should always be included are:

- a map showing the proposal in the local context - an overlay of the proposal on a base map of the main environmental constraints;
- a map showing the proposal in the regional context; and, if appropriate,
- a process chart / mass balance diagram showing inputs, outputs and waste streams.

The plan/s should include contours, a north arrow, a scale bar, a legend, grid co-ordinates, the source of the data, and a title. If the data is overlaid on an aerial photo then the date of the aerial photo should be shown.

Other logistics

- timing and staging of project; and
- ownership and liability for waste during transport, disposal operations and long-term disposal (where appropriate to the proposal).

5.2 Environmental factors

The environmental review should focus on the relevant environmental factors for the proposal, and these should be agreed in consultation with the EPA and DEP and relevant public and government agencies. Preliminary environmental factors identified for the proposal are shown in Part A of these guidelines.

Further environmental factors may be identified during the preparation of the environmental review, therefore on-going consultation with the EPA, DEP and other relevant agencies is recommended. The DEP can advise the proponent on the recommended EPA objective for any new environmental factors raised. Minor matters which can be readily managed as part of normal operations for the existing operations or similar projects may be briefly described.

Items that should be discussed under each environmental factor are:

- a clear definition of the area of assessment for this factor;
- the EPA objective for this factor;
- a description of what is being affected - why this factor is relevant to the proposal;
- a description of how this factor is being affected by the proposal - the predicted extent of impact;
- a description of where this factor fits into the broader environmental / ecological context (only if relevant - this may not be applicable to all factors);
- a straightforward description or explanation of any relevant standards / regulations / policy;
- environmental evaluation - does the proposal meet the EPA's objective as defined above;
- if not, environmental management proposed to ensure the EPA's objective is met;
- predicted outcome.

The proponent should provide a summary table of the above information for all environmental factors, under the three categories of biophysical, pollution management and social surroundings:

Table 2: Environmental factors and management (example only)

Environ-mental Factor	EPA Objective	Existing environment	Potential impact	Environ-mental management	Predicted outcome
BIOPHYSICAL					
vegetation community types 3b and 20b	Maintain the abundance, species diversity, geographic distribution and productivity of vegetation community types 3b and 20b	Reserve 34587 contains 45 ha of community type 20b and 34 ha of community type 3b	Proposal avoids all areas of community types 20b and 3b	Surrounding area will be fully rehabilitated following construction	Community types 20b and 3b will remain untouched Area surrounding will be revegetated with seed stock of 20b and 3b community types
POLLUTION MANAGEMENT					
Dust	Ensure that the dust levels generated by the proposal do not adversely impact upon welfare and amenity or cause health problems by meeting statutory requirements and acceptable standards	Light industrial area - three other dust producing industries in close vicinity Nearest residential area is 800 metres	Proposal may generate dust on two days of each working week.	Dust Control Plan will be implemented	Dust can be managed to meet EPA's objective
SOCIAL SURROUNDINGS					
Visual amenity	Visual amenity of the area adjacent to the project should not be unduly affected by the proposal	Area already built-up	This proposal will contribute negligibly to the overall visual amenity of the area	Main building will be in 'forest colours' and screening trees will be planted on road	Proposal will blend well with existing visual amenity and the EPA's objective can be met

5.3 Environmental management commitments

The implementation of the key characteristics of the proposal and the consolidated environmental management commitments made by the proponent become legally enforceable under the conditions of environmental approval issued in the statement by the Minister for the Environment. All the key environmental management commitments should be consolidated in the public review document in a list (usually in an Appendix). This list is attached to the Minister's statement and becomes part of the conditions of approval.

The proponent's compliance with the consolidated environmental management commitments will be audited by the DEP, so they must be expressed in a way which enables them to be audited.

A commitment needs to contain most of the following elements to be auditable:

- who (eg. the proponent)

- will do what (eg. prepare a plan, take action)
- why (to meet an environmental objective)
- where/how (detail the action and where it applies)
- when (in which phase, eg. before construction starts)
- to what standard (recognised standard or agency to be satisfied)
- on advice from (agency to be consulted).

The proponent may make other 'commitments', which address less significant or non-environmental matters, to show an intention to good general management of the project. Such 'commitments' would not be included in the consolidated list of environmental management commitments appended to the statement.

Continuous improvement during the implementation of the consolidated commitments may necessitate changes, which can be made in updates to the environmental management plan, whilst ensuring the environmental objective is still achieved. Additional proponent commitments arising from the fulfilment of environmental conditions will be audited by the DEP.

Once the proposal is approved, changes to the consolidated commitments constitute a change to the proposal and should be referred to the EPA.

Examples of the preferred format for typical commitments are shown in the following table:

Table 3: Summary of proponent's commitments (example only)

Commitment (Who/What)	Objective (Why)	Action (How/Where)	Timing (When)	Whose advice	Measurement/ Compliance criteria
1. XYZ Mining will develop a rehabilitation plan	to protect the abundance, species diversity, geographic distribution and productivity of the vegetation community types 3b and 20b	by limiting construction to a small area (10 ha) of Reserve 34587 and rehabilitating the area	before construction	CALM, NPNCA	fences built; species distribution and density consistent with vegetation community types 3b and 20b
2. XYZ Mining will minimise dust generation	to maintain the amenity of nearby land owners	by preparing and implementing a Dust Control Plan which meets EPA Dust Control criteria	before the start of construction phase	preparation: DEP; implementation: Shire	Letter from Shire submitted with Performance and Compliance Report.

Commitments should be written in tabular form, preferably with some specification of ways in which the commitment can be measured, or how compliance can be demonstrated.

Draft commitments which are not in a format that can be audited will not be accepted by project officers for public review documentation. Proponents will be assisted to revise inadequate commitments.

5.4 Public consultation

A description should be provided of the public participation and consultation activities undertaken by the proponent in preparing the environmental review. It should describe the activities undertaken, the dates, the groups/individuals involved and the objectives of the activities. Cross reference should be made with the description of environmental management of the factors which should clearly indicate how community concerns have been addressed. Those concerns which are dealt with outside the EPA process can be noted and referenced.

5.5 Other information

Additional detail and description of the proposal, if provided, should go in a separate section.

Attachment 1

The first page of the proponent's environmental review document must be the following invitation to make a submission, with the parts in square brackets amended to apply to each specific proposal. Its purpose is to explain what submissions are used for and to detail why and how to make a submission.

Invitation to make a submission

The Environmental Protection Authority (EPA) invites people to make a submission on this proposal.

[the proponent] proposes [the rezoning of land and the development of a Marina Complex in the City of Bunbury]. In accordance with the Environmental Protection Act, a [PER] has been prepared which describes this proposal and its likely effects on the environment. The [PER] is available for a public review period of [8] weeks from **[date]** closing on **[date]**.

Comments from government agencies and from the public will help the EPA to prepare an assessment report in which it will make recommendations to government.

Why write a submission?

A submission is a way to provide information, express your opinion and put forward your suggested course of action - including any alternative approach. It is useful if you indicate any suggestions you have to improve the proposal.

All submissions received by the EPA will be acknowledged. Submissions will be treated as public documents unless provided and received in confidence subject to the requirements of the Freedom of Information Act, and may be quoted in full or in part in the EPA's report.

Why not join a group?

If you prefer not to write your own comments, it may be worthwhile joining with a group interested in making a submission on similar issues. Joint submissions may help to reduce the workload for an individual or group, as well as increase the pool of ideas and information. If you form a small group (up to 10 people) please indicate all the names of the participants. If your group is larger, please indicate how many people your submission represents.

Developing a submission

You may agree or disagree with, or comment on, the general issues discussed in the [PER] or the specific proposals. It helps if you give reasons for your conclusions, supported by relevant data. You may make an important contribution by suggesting ways to make the proposal more environmentally acceptable.

When making comments on specific elements of the [PER]:

- clearly state your point of view;
- indicate the source of your information or argument if this is applicable;
- suggest recommendations, safeguards or alternatives.

Points to keep in mind

By keeping the following points in mind, you will make it easier for your submission to be analysed:

- attempt to list points so that issues raised are clear. A summary of your submission is helpful;
- refer each point to the appropriate section, chapter or recommendation in the [PER];
- if you discuss different sections of the [PER], keep them distinct and separate, so there is no confusion as to which section you are considering;
- attach any factual information you may wish to provide and give details of the source. Make sure your information is accurate.

Remember to include:

- your name;
- address;
- date; and
- whether you want your submission to be confidential.

The closing date for submissions is: [**date**]

Submissions should be addressed to:

The Environmental Protection Authority
Westralia Square
141 St George's Terrace
PERTH WA 6000

Attention: **[Project Officer name]**

Attachment 2

Advertising the environmental review

The proponent is responsible for advertising the release and arranging the availability of the environmental review document in accordance with the following guidelines:

Format and content

The format and content of the advertisement should be approved by the DEP before appearing in the media. For joint State-Commonwealth assessments, the Commonwealth also has to approve the advertisement. The advertisement should be consistent with the attached example.

Note that the DEP officer's name should appear in the advertisement.

Size

The size of the advertisement should be two newspaper columns (about 10 cm) wide by about 14 cm long. Dimensions less than these would be difficult to read.

Location

The approved advertisement should, for CER's, appear in the news section of the main local newspaper and, for PER's and ERMP's, appear in the news section of the main daily paper's ("The West Australian") Saturday edition, and in the news section of the main local paper at the commencement of the public review period and again two weeks prior to the closure of the public review period.

Timing

Within the guidelines already given, it is the proponent's prerogative to set the time of release, although the DEP should be informed. The advertisement should not go out before the report is actually available, or the review period may need to be extended.

Example of the newspaper advertisement

SCM CHEMICALS LTD

Consultative Environmental Review

EXTENSION TO DALYELLUP RESIDUE DISPOSAL PROGRAM

(Public Review Period: **[date]** to **[date]**)

SCM Chemicals Ltd is planning to extend the company's existing residue disposal program at Dalyellup, south of Bunbury, from March 1992 to March 1993.

A Consultative Environmental Review (CER) has been prepared by the company to examine the environmental effects associated with the proposed development, in accordance with Western Australian Government procedures. The CER describes the proposal, examines the likely environmental effects and the proposed environmental management procedures.

SCM has prepared a project summary which is available free of charge from the company's office on Old Coast Road, Australind.

Copies of the CER may be purchased for $5 from:

SCM Chemicals Ltd
Old Coast Road
AUSTRALIND WA 6230
Telephone: (08) 9467 2356

Copies of the complete Consultative Environmental Review will be available for examination at:

- Environmental Protection Authority
  Library Information Centre
  8th Floor, Westralia Square
  38 Mounts Bay Road
  PERTH WA 6000
- Environmental Protection Authority
  65 Wittenoom Street
  BUNBURY WA 6230
- City of Bunbury public libraries
- Shire of Capel libraries
- Shire of Harvey library (Australind)
- Shire of Dardanup (Eaton)

Submissions on this proposal are invited by **[closing date]**. Please address your submission to:

Chairman
Environmental Protection Authority
8th Floor, Westralia Square
38 Mounts Bay Road
PERTH WA 6000
Attention: **[Project Officer name]**

If you have any questions on how to make a submission, please ring the project officer, **[Project Officer name]**, on (08) 9222 7xxx.

APPENDIX 2

PROJECTED NUMBER OF HOUSEHOLDS AND WASTE PROJECTIONS FOR SELECTED SMRC MEMBER COUNCILS

APPENDIX 2

Population Projections

PROJECTED POPULATION GROWTH

(Figures supplied by the Ministry of Planning; Medium Scenario Assumptions, July 1995).

	YEAR 2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
Fremantle	24,348	24,348	24,348	24,348	23,995	23,995	23,995	23,995	23,995	23,987	23,987	23,987	23,987
Canning	75,828	76,791	77,754	78,717	79,680	80,643	81,606	82,566	84,415	86,265	88,115	89,357	90,599
Melville	94,000	93,400	93,000	92,850	92,634	91,500	91,300	91,200	91,000	90,896	90,750	90,600	90,400
E. Fremantle	6,080	6,070	6,050	6,040	6,038	6,038	6,038	6,038	6,038	6,069	6,069	6,069	6,069
Cockburn	76,750	80,050	83,350	86,650	89,950	93,250	96,550	99,850	103,150	106,450	109,750	112,937	116,124
TOTAL	277,006	280,659	284,502	288,605	292,297	295,426	299,489	303,649	308,598	313,667	318,671	322,950	327,179

PROJECTED NUMBER OF HOUSEHOLDS

(Based on Per Capita Growth (assume no density change).

	YEAR 2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
Fremantle	10,296	10,296	10,296	10,296	10,147	10,147	10,147	10,147	10,147	10,143	10,143	10,143	10,143
Canning	26,681	27,020	27,359	27,698	28,036	28,540	28,881	29,221	29,875	30,530	31,184	31,624	32,063
Melville	33,610	33,395	33,252	33,199	33,121	32,716	32,645	32,609	32,537	32,500	32,448	32,394	32,323
E. Fremantle	2,782	2,777	2,768	2,763	2,762	2,762	2,762	2,762	2,762	2,777	2,777	2,777	2,777
Cockburn	23,790	24,813	25,836	26,858	27,881	28,904	29,927	30,950	31,973	32,996	34,019	35,006	35,994
TOTAL	97,159	98,301	99,511	100,814	101,947	103,069	104,362	105,689	107,294	108,946	110,571	111,944	113,300

APPENDIX 2

Waste Projections for the SMRC

MGB waste per Council (tonnes)

	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
Fremantle	8187	8187	8187	8187	8069	8069	8069	8069	8069	8066	8066	8066	8066
Canning	21217	21487	21756	22026	22295	22696	22967	23237	23757	24278	24799	25148	25498
Melville	26727	26557	26443	26400	26339	26017	25960	25931	25874	25845	25803	25761	25704
E. Fremantle	2212	2208	2201	2198	2197	2197	2197	2197	2197	2208	2208	2208	2208
Cockburn	18918	19732	20545	21358	22172	22985	23799	24612	25426	26239	27052	27838	28624
TOTAL	77261	78171	79132	80169	81072	81964	82992	84046	85323	86636	87928	89021	90100

Recyclables per Council (tonnes)

	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
Fremantle	2388	2388	2388	2388	2353	2353	2353	2353	2353	2353	2353	2353	2353
Canning	6188	6267	6346	6424	6503	6620	6699	6777	6929	7081	7233	7335	7437
Melville	7796	7746	7713	7700	7682	7588	7572	7563	7547	7538	7526	7514	7497
E. Fremantle	645	644	642	641	641	641	641	641	641	644	644	644	644
Cockburn	5518	5755	5992	6230	6467	6704	6941	7179	7416	7653	7890	8119	8349
TOTAL	22535	22800	23081	23383	23646	23906	24206	24513	24886	25269	25646	25965	26280

Greenwaste per Council (tonnes)

	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
Fremantle	796	796	796	796	784	784	784	784	784	784	784	784	784
Canning	2063	2089	2115	2141	2168	2207	2233	2259	2310	2360	2411	2445	2479
Melville	2599	2582	2571	2567	2561	2529	2524	2521	2516	2513	2509	2505	2499
Fremantle	215	215	214	214	214	214	214	214	214	215	215	215	215
Cockburn	1839	1918	1997	2077	2156	2235	2314	2393	2472	2550	2630	2706	2783
TOTAL	7512	7600	7693	7795	7883	7969	8069	8171	8296	8422	8549	8655	8760

APPENDIX 2

Waste Projections for the SMRC cont.

Bulk Waste per Council (tonnes)

	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
Fremantle	159	159	159	159	157	157	157	157	157	157	157	157	157
Canning	413	418	423	428	434	441	447	452	462	472	482	489	496
Melville	520	516	514	513	512	506	505	504	503	503	502	501	500
E. Fremantle	43	43	43	43	43	43	43	43	43	43	43	43	43
Cockburn	368	384	399	415	431	447	463	479	494	510	526	541	557
TOTAL	1503	1520	1538	1558	1577	1594	1615	1635	1659	1685	1710	1731	1753

	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
TOTAL WASTE	108811	110091	111444	112905	114178	115433	116882	118365	120164	122012	123833	125372	126893

	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
MGB	77261	78171	79132	80169	81072	81964	82992	84046	85323	86636	87928	89021	90100
Recyclable	22535	22800	23081	23383	23646	23906	24206	24513	24886	25269	25646	25965	26280
Green	7512	7600	7693	7795	7883	7969	8069	8171	8296	8422	8549	8655	8760
Bulk	1503	1520	1538	1558	1577	1594	1615	1635	1659	1685	1710	1730	1753
	108811	110091	111444	112905	114178	115433	116882	118365	120164	122012	123833	125372	126893

APPENDIX 3

FLORA AND FAUNA SURVEY RESULTS

CANNING VALE RRRC NATIVE FLORA LIST

GYMNOSPERMAE		
	CYCADACEAE	Macrozamia riedlei
MONOCOTYLEDONAE		
	ANTHERICACEAE	Chamaescilla corymbosa Corynotheca micrantha Laxmannia squarrosa Thysanotus arenarius Thysanotus patersonii
	COLCHICACEAE	Burchardia umbellata
	CYPERACEAE	Isolepis marginata Lepidosperma angustatum Lepidosperma leptostachyum Lepidosperma longitudinale Lepidosperma squamatum Mesomelaena pseudostygia Schoenus asperocarpus Schoenus curvifolius
	DASYPOGONACEAE	Dasypogon bromeliifolius Lomandra preissii
	HAEMODORACEAE	Anigozanthos humilis Anigozanthos manglesii Conostylis aculeata Conostylis juncea Conostylis setigera Haemodorum spicatum Phlebocarya ciliata
	IRIDACEAE	Patersonia occidentalis
	ORCHIDACEAE	Burnettia nigricans Caladenia flava Diuris corymbosa Pterostylis nana Pterostylis vittata Leporella fimbriata
	PHORMIACEAE	Dianella divaricata
	POACEAE	Amphipogon turbinatus
	RESTIONACEAE	Hypolaena exsulca Loxocarya pubescens Lyginia barbata Meeboldina fasciculata Meeboldina flexuosa
	XANTHORRHOEACEAE	Xanthorrhoea brunonsis Xanthorrhoea preissii
DICOTYLEDONAE		
	APIACEAE	Homalosciadium homalocarpum Platysace compressa Trachymene pilosa
	ASTERACEAE	Helipterum roseum Millotia tenuifolia Quinetia urvillei

	CASUARINACEAE	Allocasuarina fraseriana Allocasuarina humilis
	CRASSULACEAE	Crassula colorata
	DILLENIACEAE	Hibbertia huegelii Hibbertia hypericoides Hibbertia racemosa Hibbertia subvaginata
	DROSERACEAE	Drosera erythrorhiza Drosera macrantha Drosera pallida
	EPACRIDACEAE	Astroloma pallidum Conostephium pendulum Conostephium preissii Leucopogon australis Leucopogon sprengelioides Lysinema ciliatum
	EUPHORBIACEAE	Phyllanthus calycinus
	GOODENIACEAE	Dampiera linearis Scaevola paludosa
	LAMIACEAE	Hemiandra pungens
	LORANTHACEAE	Nuytsia floribunda
	MIMOSACEAE	Acacia pulchella Acacia huegelii Acacia saligna Acacia stenoptera
	MYRTACEAE	Astartea fascicularis Calythrix fraseri Corymbia calophylla Eucalyptus marginata Eucalyptus todtiana Hypocalymma angustifolium Hypocalymma robustum Kunzea ericifolia Melaleuca preissiana Melaleuca scabra Melaleuca thymoides Pericalymma ellipticum Regelia inops Scholtzia involucrata Verticordia drummondii
	PAPILIONACEAE	Bossiaea eriocarpa Daviesia preissii Daviesia triflora Euchilopsis linearis Gompholobium tomentosum Hardenbergia comptoniana Hovea trisperma Jacksonia furcellata
	PROTEACEAE	Adenanthos cygnorum Adenanthos obovatus Banksia attenuata Banksia grandis Banksia ilicifolia

		Banksia littoralis Banksia menziesii Beaufortia elegans Dryandra nivea Persoonia saccata Petrophile linearis Stirlingia latifolia
	RUBIACEAE	Opercularia hispidula Opercularia vaginata
	RUTACEAE	Boronia ramosa Eriostemon spicatus
	STACKHOUSIACEAE	Stackhousia huegelii
	STYLIDIACEAE	Stylidium brunonianum Stylidium piliferum Stylidium repens
	THYMELEACEAE	Pimelea leucantha
	VIOLACEAE	Hybanthus calycinus

CANNING VALE IWRPF NATIVE FLORA LIST
SEPTEMBER 1998

GYMNOSPERMAE
CYCADACEAE
Macrozamia riedlei

MONOCOTYLEDONAE
ANTHERICACEAE
Chamaescilla corymbosa
Thysanotus arenarius
Thysanotus patersonii

COLCHICACEAE
Burchardia umbellata

CYPERACEAE
Isolepis marginata
Lepidosperma angustatum
Lepidosperma leptostachyum
Schoenus asperocarpus
Schoenus curvifolius

DASYPOGONACEAE
Dasypogon bromeliifolius
Lomandra preissii

HAEMODORACEAE
Anigozanthos humilis
Anigozanthos manglesii
Conostylis aculeata
Conostylis juncea
Conostylis setigera
Phlebocarya ciliata

IRIDACEAE
Patersonia occidentalis

ORCHIDACEAE
Burnettia nigricans
Caladenia flava
Diuris corymbosa
Pterostylis nana
Pterostylis vittata
Leporella fimbriata

POACEAE
Amphipogon turbinatus

RESTIONACEAE
Hypolaena exsulca
Loxocarya pubescens
Lyginia barbata
Meeboldina fasciculata
Meeboldina flexuosa

XANTHORRHOEACEAE
Xanthorrhoea brunonsis
Xanthorrhoea preissii

DICOTYLEDONAE
APIACEAE
Homalosciadium homalocarpum
Trachymene pilosa

ASTERACEAE
Helipterum roseum
Millotia tenuifolia
Quinetia urvillei

CASUARINACEAE
Allocasuarina fraseriana
Allocasuarina humilis

CRASSULACEAE
Crassula colorata

DILLENIACEAE
Hibbertia huegelii
Hibbertia hypericoides
Hibbertia racemosa

DROSERACEAE
Drosera erythrorhiza
Drosera macrantha
Drosera pallida

EPACRIDACEAE
Astroloma pallidum
Conostephium pendulum
Conostephium preissii
Leucopogon sprengelioides
Lysinema ciliatum

CANNING VALE IWRPF NATIVE FLORA LIST cont.
SEPTEMBER 1998

GOODENIACEAE
Dampiera linearis
Scaevola paludosa

LAMIACEAE
Hemiandra pungens

LORANTHACEAE
Nuytsia floribunda

MIMOSACEAE
Acacia pulchella
Acacia huegelii
Acacia saligna
Acacia stenoptera

MYRTACEAE
Calythrix fraseri
Eucalyptus calophylla
Eucalyptus marginata
Eucalyptus todtiana
Hypocalymma angustifolium
Kunzea ericifolia
Melaleuca preissiana
Melaleuca scabra
Melaleuca thymoides
Pericalymma ellipticum
Regelia inops
Scholtzia involucrata

PAPILIONACEAE
Bossiaea eriocarpa
Daviesia preissii
Daviesia triflora
Euchilopsis linearis
Gompholobium capitatum
Hovea trisperma
Jacksonia furcellata

PROTEACEAE
Adenanthos cygnorum
Adenanthos obovatus
Banksia attenuata
Banksia grandis
Banksia ilicifolium
Banksia menziesii
Dryandra nivea
Persoonia saccata
Petrophile linearis
Stirlingia latifolia

RUBIACEAE
Opercularia hispidula
Opercularia vaginata

RUTACEAE
Boronia ramosa
Eriostemon spicatus

STACKHOUSIACEAE
Stackhousia huegelii

STYLIDIACEAE
Stylidium brunonianum
Stylidium piliferum
Stylidium repens

THYMELEACEAE
Pimelea leucantha

VIOLACEAE
Hybanthus calycinus

Canning Vale, Bannister Road
proposed regional resource recovery centre

March 1998

Dear Noel,

As requested, I have visited the Canning Vale site on March 7, 1998. The site is dominated by Banksia woodland with few scattered Jarrah trees and small areas of seasonal damplands located along the southern boundary adjacent to the railway line. The general condition of the vegetation is good, and ranges from slightly disturbed (some slight signs of damage caused by the activities of man including tracks and non-aggressive weeds) to obviously disturbed where the impact from man is more severe (partial clearing, many tracks, rubbish dumping, aggressive weeds, etc). As with all remnant metropolitan bushland, the site has conservation value especially as seasonally waterlogged damplands occur.

There is a possibility that rare orchids may occur on the site.
Caladenia huegelii and *Diuris purdiei*, listed by CALM, have been recorded in similar vegetation types within this region.

Caladenia huegelii is typically found in Jarrah-Banksia woodlands along the Swan Coastal Plain and *Diuris purdiei* (Purdie's Donkey Orchid) flowers only after summer fires and occurs exclusively in winter-wet depressions on the coastal plain. Urban development and clearing has led to increasing destruction of the habitat of both orchids. Due to this, they are now regarded as an endangered species (Hoffman and Brown, 1992).

It is recommended that a spring survey is conducted during the orchids flowering period (late September / October) to determine the current status of these taxon on this site. However the possibility of recording *Diuris purdiei* would be slim, due to the lack of a summer fire that would stimulate flowering during spring this year.

The CALM database needs to be checked to determine if any past recordings, of rare or priority species, have been documented for this site.

Reference:
Hoffman, Noel and Brown, Andrew (1992). Orchids of South-west Australia, University of Western Australia Press.

Yours sincerely
Patricia Wenham

PS: Species most common on the site and recorded on March 7, 1998 are listed.

Most common species at Canning Vale site
recorded during site visit - March 7, 1998

genus	species	seasonal wetland species
Acacia	pulchella	
Acacia	saligna	
Acacia	stenoptera	
Adenanthos	cygnorum	
Adenanthos	obovata	•
Allocasuarina	fraseriana	
Allocasuarina	humilis	
Amphipogon	turbinatus	
Anigozanthos	manglesii	
Astartea	fascicularis	•
Banksia	attenuata	
Banksia	ilicifolia	
Banksia	littoralis	•
Banksia	menziesii	
Beaufortia	elegans	•
Burchardia	umbellata	
Calytrix	fraseri	
Conostephium	preissii	
Conostylis	aculeata	
Corynotheca	micrantha	
Dampiera	linearis	
Dasypogon	bromeliifolius	
Daviesia	preissii	
Daviesia	triflora	
Dianella	divaricata	
Dryandra	nivea	
Eucalyptus	marginata	
Gompholobium	tomentosum	
Haemodorum	spicatum	
Hardenbergia	comptoniana	
Hibbertia	hypericoides	
Hibbertia	subvaginata	
Hypocalymma	robustum	
Hypolaena	exsulca	•
Jacksonia	furcellata	
Kunzea	ericifolia	•
Laxmannia	squarrosa	
Lepidosperma	squamatum	
Lepidosperma	longitudinale	•
Leucopogon	australis	
Loxocarya	flexuosa	
Lyginia	barbata	
Macrozamia	riedlei	
Melaleuca	preissiana	•
Melaleuca	thymoides	•
Mesomelaena	pseudostygia	
Nuytsia	floribunda	
Patersonia	occidentalis	
Pericalymma	ellipticum	•
Persoonia	saccata	
Petrophile	linearis	
Phlebocarya	ciliata	
Phyllanthus	calycinus	
Platysace	compressa	
Regelia	inops	•
Scholtzia	involucrata	
Stirlingia	latifolia	
Verticordia	drummondii	
Xanthorrhoea	preissii	

DEPARTMENT OF CONSERVATION AND LAND MANAGEMENT

HEAD OFFICE
HACKETT DRIVE CRAWLEY
WESTERN AUSTRALIA
Phone (08) 9442 0300
Facsimile (08) 9386 1578

STATE OPERATIONS HEADQUARTERS
50 HAYMAN ROAD COMO
WESTERN AUSTRALIA
Phone (08) 9334 0333
Facsimile (08) 9334 0466
Teletype (08) 9334 0546

Please address all correspondence to Executive Director, Locked Bag 104, Bentley Delivery Centre W.A. 6983

Your Ref:
Our Ref: 041996F0801
Enquiries: Dr Atkins
Phone: (08) 9334 0425

Alan Tingay & Associates
21 Howard Street
PERTH WA 6000

Attention: Sarah Maxwell

Dear Ms Maxwell

REQUEST FOR RARE FLORA INFORMATION

I refer to your request of 5 March 1998 for information on rare flora in the Canning Vale area.

A search was undertaken for this area of the Department's *Threatened Flora* database (TF), the *Priority Species List* [this list contains species that are declared rare (R and/or T, or X for those presumed to be extinct), poorly known (1 - 3), or require monitoring (4)], and the *WA Herbarium Specimen* database for priority species collected in that area. Attached are printouts from these databases where records *were* found.

Attached also are the conditions under which this information has been supplied. Your attention is specifically drawn to the seventh point which refers to the requirement to undertake field investigations for the accurate determination of rare flora occurrence at a site. The information supplied should be regarded as an indication only of the rare flora that may be present.

An invoice for $150, being the set charge for the supply of this information, will be forwarded.

It would be appreciated if any populations of rare flora encountered by you in the area could be reported to this Department to ensure their ongoing management.

If you require any further details, or wish to discuss rare flora management, please contact my Principal Botanist, Dr Ken Atkins, on (08) 93340425.

Yours faithfully

J. R Shea

.....
for Syd Shea
EXECUTIVE DIRECTOR

9 March, 1998

Attached

ATTACHMENT

DEPARTMENT OF CONSERVATION AND LAND MANAGEMENT

RARE FLORA INFORMATION

CONDITIONS IN RESPECT OF SUPPLY OF INFORMATION

1. All requests for data to be made in writing to the Executive Director, Department of Conservation and Land Management, Attention: Administrative Officer Flora, Wildlife Branch.

2. The data supplied may not be supplied to other organisations, nor be used for any purpose other than for the project for which they have been provided, without the prior written consent of the Executive Director, Department of Conservation and Land Management.

3. Specific locality information for Declared Rare Flora is regarded as confidential, and should be treated as such by receiving organisations. Specific locality information for DRF may not be used in reports without the written permission of the Executive Director, Department of Conservation and Land Management. Reports may only show generalised locations or, where necessary, show specific locations without identifying species. The Administrative Officer Flora is to be contacted for guidance on the presentation of rare flora information.

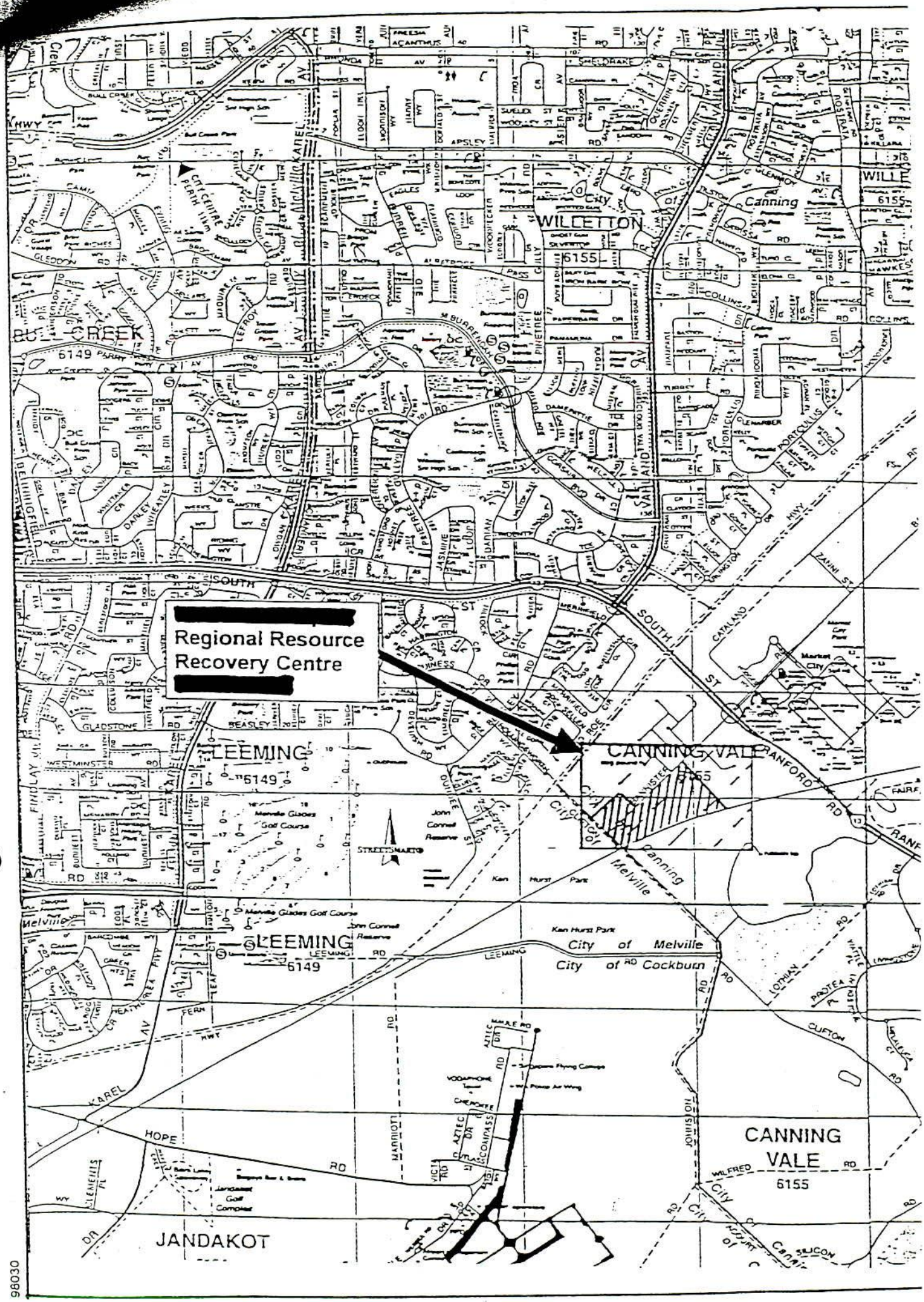
4. Note that the Department of Conservation and Land Management respects the privacy of private landowners who may have rare flora on their property. Rare flora locations identified in the data as being on private property should be treated in confidence, and contact with property owners made through the Department of Conservation and Land Management.

5. Receiving organisations should note that while every effort has been made to prevent errors and omissions in the data provided, they may be present. The Department of Conservation and Land Management accepts no responsibility for this.

6. Receiving organisations must also recognise that the database is subject to continual updating and amendment, and such considerations should be taken into account by the user.

7. It should be noted that the supplied data do not necessarily represent a comprehensive listing of the rare flora of the area in question. Its comprehensiveness is dependant on the amount of survey carried out within the specified area. The receiving organisation should employ a botanist, if required, to undertake a survey of the area under consideration.

8. Acknowledgment of the Department of Conservation and Land Management as source of the data is to be made in any published material. Copies of all such publications are to be forwarded to the Department of Conservation and Land Management, Attention: Principal Botanist, Wildlife Branch.



98030

ALAN TINGAY & ASSOCIATES

Taxon Name	Cons.	Pop ID	Latitude	Longitude	Purpose	Vest
Caladenia huegelii	T	1	32^05'26"	115^54'54"		PRI
Caladenia huegelii	T	3	32^04'39"	115^51'19"		PRI
Caladenia huegelii	T	4	32^04'56"	115^51'30"		PRI
Caladenia huegelii	T	6	32^04'39"	115^52'58"		FRE
Caladenia huegelii	T	6	32^04'39"	115^52'58"		FRE
Caladenia huegelii	T	16A	32^05'11"	115^54'47"	VER	SHI
Caladenia huegelii	T	16B	32^05'11"	115^54'47"		PRI
Caladenia huegelii	T	18	32^04'36"	115^54'12"		FRE
Caladenia huegelii	T	20	32^04'58"	115^52'39"		FRE
Caladenia huegelii	T	21A	32^04'59"	115^53'23"		FRE
Caladenia huegelii	T	21B	32^04'52"	115^53'20"	RUB	SHI
Caladenia huegelii	T	28	32^04'02"	115^51'04"	VER	MRD
Diuris purdiei	T	1A	32^05'25"	115^54'55"		PRI
Diuris purdiei	T	1B	32^05'25"	115^54'52"		PRI
Diuris purdiei	T	1C	32^05'30"	115^54'58"		PRI
Diuris purdiei	T	1D	32^05'30"	115^54'58"		PRI
Diuris purdiei	T	1E	32^05'30"	115^54'58"		PRI
Diuris purdiei	T	1F	32^05'30"	115^54'58"	VER	SHI
Diuris purdiei	T	1G	32^05'25"	115^54'38"		PRI
Diuris purdiei	T	1H	32^05'25"	115^54'38"	VER	SHI
Diuris purdiei	T	1I	32^05'27"	115^54'55"		PRI
Diuris purdiei	T	1J	32^05'27"	115^54'56"		PRI
Lysinema elegans	2	5A	32^05'25"	115^51'27"	VER	SHI
Lysinema elegans	2	5B	32^05'33"	115^51'26"	VER	SHI
Lysinema elegans	2	5C	32^05'33"	115^51'26"	AER	PRI
Lysinema elegans	2	5D	32^05'39"	115^51'27"		PRI
Lysinema elegans	2	5E	32^05'33"	115^51'26"		SHI
Lysinema elegans	2	5F	32^05'47"	115^51'23"	VER	SHI
Lysinema elegans	2	5G	32^05'47"	115^51'23"		PRI
Lysinema elegans	2	5H	32^05'55"	115^51'23"		PRI
Lysinema elegans	2	5I	32^05'51"	115^51'23"	VER	SHI
Lysinema elegans	2	5J	32^05'55"	115^51'20"		PRI
Lysinema elegans	2	5K	32^05'55"	115^51'20"		PRI
Lysinema elegans	2	5L	32^05'51"	115^51'20"		PRI
Lysinema elegans	2	5M	32^05'51"	115^51'20"		PRI
Lysinema elegans	2	5N	32^05'33"	115^51'26"		PRI

Lysinema elegans	2	5W	32^06'00"	115^51'23"	PRI
Lysinema elegans	2	5X	32^06'00"	115^51'20"	PRI
Lysinema elegans	2	5Y	32^06'00"	115^51'18"	UNK
Lysinema elegans	2	5Z	32^06'00"	115^51'23"	PRI
Lysinema elegans	2	7A	32^05'24"	115^51'43"	PRI
Lysinema elegans	2	7B	32^05'35"	115^52'03"	PRI
Lysinema elegans	2	7C	32^05'05"	115^52'10"	SHI
Lysinema elegans	2	10	32^05'00"	115^52'30"	FRE
Lysinema elegans	2	11A	32^04'38"	115^54'18"	SHI
Lysinema elegans	2	11B	32^04'38"	115^54'18"	SHI
Tripterococcus sp.Cannington(A.S.George 16201) pn	1	3	32^05'23"	115^54'50"	PRI
Tripterococcus sp.Cannington(A.S.George 16201) pn	1	4	32^05'20"	115^54'58"	PRI
Tripterococcus sp.Cannington(A.S.George 16201) pn	1	5	32^05'30"	115^55'00"	PRI
Tripterococcus sp.Cannington(A.S.George 16201) pn	1	6	32^05'43"	115^55'00"	PRI
Tripterococcus sp.Cannington(A.S.George 16201) pn	1	7	32^03'48"	115^53'35"	UNK

A total of 51 records were printed.

DEPARTMENT OF CONSERVATION AND LAND MANAGEMENT
DECLARED RARE AND PRIORITY FLORA LIST

SPECIES/TAXON	CONS CODE	CALM REGION	DISTRIBUTION	FLOWER PERIOD
Tripterococcus paniculatus ms	1	SW	Cannington, Armadale, Leeming, Forrestfield, Upper Swan, Willeton, Forrestdale	Nov

WAHERB SPECIMEN DATABASE
GENERAL ENQUIRY

Aotus cordifolia Benth. (Papilionaceae)
CONSERVATION STATUS: P3
Coll.: C.A. Gardner s.n. Date: 08 1939 (PERTH 677361)
LOCALITY Jandakot WA
Lat.: 32^ 6 ' 0 " S Long.: 115^ 52' 0 " E

Aotus cordifolia Benth. (Papilionaceae)
CONSERVATION STATUS: P3
Coll.: W.E. Blackall s.n. Date: 08 1939 (PERTH 676837)
LOCALITY Jandakot, SW of Perth WA
Lat.: 32^ 6 ' 0 " S Long.: 115^ 52' 0 " E
Flowers yellow.

Lysinema elegans Sond. (Epacridaceae)
CONSERVATION STATUS: P2
Coll.: A. Kelly 90/141 Date: 13 12 1990 (PERTH 02242168)
LOCALITY N of Prinsep road - Hope road junction, Jandakot. On track S of railway and W of airport fence WA
Lat.: 32^ 05' 24" S Long.: 115^ 51' 47" E
Low shrub with effuse slender branchlets, to more or less 0.5 m high. Late flowe
r.
Gradual slope, grey white sand. Banksia menziesii, B. attenuata open low woo
dland B over low heath C.
Abundance: occasional.

Lysinema elegans Sond. (Epacridaceae)
CONSERVATION STATUS: P2
Coll.: A. Kelly 90/151 Date: 23 12 1990 (PERTH 02242125)
LOCALITY Between Karel Avenue and railway, Leeming, S of sports complex and E of transmission line WA
Lat.: 32^ 05' 05" S Long.: 115^ 52' 10" E
Low erect shrub, flowers cream in dense clusters. Late flower. Flat and
slope, grey-brown sand.
Banksia attenuata, B. menziesii low woodland A/low forest A.
Abundance: 500 + plants in several populations.

Lysinema elegans Sond. (Epacridaceae)
CONSERVATION STATUS: P2
Coll.: A. Kelly 90/134 Date: 06 12 1990 (PERTH 02242192)
LOCALITY On private lots and SW boundary of Jandakot airport, both side of
Prinsep road, Jandakot, from Lakes Way (N) to Glendale Crescent (N) WA
Lat.: 32^ 06' 00" S Long.: 115^ 51' 30" E
Erect shrub with small appressed leaves. Flowers creamy white with anthers and s
tyle exserted.
Low rise, slope and flat. White sand. Mixed low heath C.
Abundance: 100 + plants scattered in remnant vegetation.

Lysinema elegans Sond. (Epacridaceae)
CONSERVATION STATUS: P2
Coll.: A. Kelly 90/139 Date: 10 12 1990 (PERTH 02242117)
LOCALITY W side of Lakes Way, Jandakot, 625 m N of Prinsep road WA
Lat.: 32^ 06' 00" S Long.: 115^ 51' 20" E
Effuse shrub with small leaves appressed against the stem and branchlets.
Gradual slope, grey-white sand.
Banksia attenuata, B. menziesii low woodland B/low forest B over low heath C.

Lysinema elegans Sond. (Epacridaceae)
CONSERVATION STATUS: P2
Coll.: A. Kelly 90.138 a Date: 10 12 1990 (PERTH 02241307)
LOCALITY Unfenced block between Prinsep road and Lakes Way, Jandakot, S boundary
is 150 m N of Glendale Corner (N) on Prinsep road WA
Lat.: 32^ 06' " S Long.: 115^ 51' 23" E
Shrub to more or less 0.5 m high, flowers creamy white in compact terminal heads
.
Flat to gradual slope, grey brown sand. Banksia attenuata, B. manziesii low
woodland B over open low scrub B.

Lysinema elegans Sond. (Epacridaceae)
CONSERVATION STATUS: P2
Coll.: M.H. Brims 72 Date: 05 12 1995 (PERTH 04365771)
LOCALITY Second block from S end of Lakes Way, Jandakot WA
Lat.: 32^ 06' " S Long.: 115^ 51' " E
Small spreading shrub to 450 mm high, 600 mm wide. On gentle slope in d
ry grey sand.
With Banksia menziesii, B. attenuata, Stirlingia latifolia, Beaufortia elegans.

Abundance: only 1 large and 1 small plant found in area where
several plants were found 6 years ago, inside firebreak on unfenced block.

Phyllota gracilis Turcz. (Papilionaceae)
CONSERVATION STATUS: P3
Coll.: G.J. Keighery 7974 Date: 16 12 1985 (PERTH 715441)
LOCALITY Jandakot airport, 16 km S of Perth WA
Lat.: 32^ 6 ' 0 " S Long.: 115^ 52' 0 " E
Low shrub 20 cm high. Grey-black sand over clay. Winter wet swamp.
Melaleuca low open woodland.
Abundance: common.
Previous det.: Latrobea sp.

Tripterococcus paniculatus W.R.Barker ms (Stackhousiaceae)
CONSERVATION STATUS: P1
Coll.: A. Kelly 90/144 Date: 18 12 1990 (PERTH 02170167)
LOCALITY S of Torres road junction with Arlington Drive, Willeton WA
Lat.: 32^ 03' 48" S Long.: 115^ 53' 35" E
Erect perennial herb, glabrous. Leaves scattered. Flowers pedicellate, in branch
ed inflorescences.
Grey sand, flat. Melaleuca preissiana open low woodland A with Adenanthos ob
ovata,
Periclaymma ellipticum, Hypocalymma angustifolium and Hakea varia.
Abundance: 2 plants recorded.
See. N. Casson Coll.9/6/1989
Previous det.: Tripterococcus sp. Cannington (A.S. George 16201)

Tripterococcus paniculatus W.R.Barker ms (Stackhousiaceae)
CONSERVATION STATUS: P1
Coll.: A. Kelly 90/146 Date: 18 12 1990 (PERTH 02170183)
LOCALITY W of Ranford road - Nicholson road junction and N of Hope road, Canning
Vale WA
Lat.: 32^ 05' 23" S Long.: 115^ 54' 50" E
Perennial herb with terete to linear leaves. Inflorescences paniculate.
Flat, grey-brown clayey sand.
Mixed low heath C with emergent Melaleuca preissiana, with
Pericalymma ellipticum, Adenanthos obovatus and Hypocalumma angustifolium.
Abundance: occasional.
Previous det.: Tripterococcus sp. Cannington (A.S. George 16201)

Tripterococcus paniculatus W.R.Barker ms (Stackhousiaceae)
CONSERVATION STATUS: P1
Coll.: A. Kelly 90/145 Date: 18 12 1990 (PERTH 02170159)
LOCALITY N of Ranford road - Nicholson road intersection, Canning Vale WA
Lat.: 32^ 05' 20" S Long.: 115^ 54' 58" E
Herb to 60 cm high. Usually with c. 6 flowering spikes but as many as 15 counted
. Grey sand, low lying.
Regenerating heath with scattered Melaleuca preissiana with Nuytsia floribunda.
Abundance: several 100 plants.
Previous det.: Tripterococcus sp. Cannington (A.S. George 16201)

Tripterococcus paniculatus W.R.Barker ms (Stackhousiaceae)
CONSERVATION STATUS: P1
Coll.: A. Kelly 90/147 Date: 18 12 1990 (PERTH 02161613)
LOCALITY East of Nicholson road, Govan Road intersection, Canning Vale WA
Lat.: 32^ 05' 43" S Long.: 115^ 55' 00" E
Glabrous herb to 50 cm high. Low lying grey sand. Along edge of tracks.
Low scrub B and Dense Low Heath C with scattered Melaleuca preissiana. In cleare
d or open patches amongst heath.
Previous det.: Tripterococcus sp. Cannington (A.S. George 16201)

DEPARTMENT OF CONSERVATION AND LAND MANAGEMENT

HEAD OFFICE
HACKETT DRIVE CRAWLEY
WESTERN AUSTRALIA
Phone (08) 9442 0300
Facsimile (08) 9386 1578

STATE OPERATIONS HEADQUARTERS
50 HAYMAN ROAD COMO
WESTERN AUSTRALIA
Phone (08) 9334 0333
Facsimile (08) 9334 0466
Teletype (08) 9334 0546

Please address all correspondence to Executive Director, Locked Bag 104, Bentley Delivery Centre W.A. 6983

Your Ref:
Our Ref: 042472F0801
Enquiries: Dr. Peter Mawson
Phone: 08 93340421

Ms Deanne Neilson
Alan Tingay and Associates
21 Howard Street
PERTH WA 6000

Dear Ms Neilson

REQUEST FOR THREATENED FAUNA INFORMATION

I refer to your request of 2 September for information on threatened fauna occuring in the Clifton Road – Bannister Road (Canning Vale) area.

A search was undertaken for this area of the Department's Threatened Fauna database, which includes species which are declared as *'Rare or likely to become extinct* (Schedule 1)', *'Birds protected under an international agreement* (Schedule 3)', and *'Other specially protected fauna* (Schedule 4)'. Attached are print outs from these databases where records were found.

Attached also are the conditions under which this information has been supplied. Your attention is specifically drawn to the sixth point that refers to the requirement to undertake field investigations for the accurate determination of threatened fauna occurrence at a site. The information supplied should be regarded as an indication only of the threatened fauna that may be present.

An invoice for $50.00, being the set charge for the supply of this information, will be forwarded.

It would be appreciated if any populations of threatened fauna encountered by you in the area could be reported to this Department to ensure their ongoing management.

If you require any further details, or wish to discuss threatened fauna management, please contact my Senior Zoologist, Dr Peter Mawson on 08 93340421.

Yours faithfully

.....
for Syd Shea
EXECUTIVE DIRECTOR

12 October, 1998.

Attachment

DEPARTMENT OF CONSERVATION AND LAND MANAGEMENT

THREATENED FAUNA INFORMATION

Conditions In Respect Of Supply Of Information

* All requests for data to be made in writing to the Executive Director, Department of Conservation and Land Management, Attention: Senior Zoologist, Wildlife Branch.

* The data supplied may not be supplied to other organisations, nor be used for any purpose other than for the project for which they have been provided without the prior consent of the Executive Director, Department of Conservation and Land Management.

* Specific locality information for Threatened Fauna is regarded as confidential, and should be treated as such by receiving organisations. Specific locality information for Threatened Fauna may not be used in reports without the written permission of the Executive Director, Department of Conservation and Land Management. Reports may only show generalised locations or, where necessary, show specific locations without identifying species. The Senior Zoologist is to be contacted for guidance on the presentation of Threatened Fauna information.

* Receiving organisations should note that while every effort has been made to prevent errors and omissions in the data, they may be present. The Department of Conservation and land Management accepts no responsibility for this.

* Receiving organisations must also recognise that the database is subject to continual updating and amendment, and such considerations should be taken into account by the user.

* It should be noted that the supplied data do not necessarily represent a comprehensive listing of the Threatened Fauna of the area in question. Its comprehensiveness is dependent of the amount of survey carried out within a specified area. The receiving organisation should employ a biologist/zoologist, if required, to undertake a survey of the area under consideration.

* Acknowledgment of the Department of Conservation and Land Management as the source of data is to be made in any published material. Copies of all such publications are to be forwarded to the Department of Conservation and Land Management, Attention; Senior Zoologist, Wildlife Branch.

The search of the database indicated that the following threatened and priority fauna occur in the area in question.

Schedule 1 (Fauna which is Rare or likely to become Extinct)

Carnaby's Cockatoo (***Calyptorhynchus latirostris***) This species is a regular seasonal inhabitant of the Swan Coastal Plain, where it feeds on *Banksia* and introduced *Pinus* sp. Most common in summer and autumn, but still present in low numbers during the winter. It does not breed at this location.

Schedule 4 (Fauna which is Otherwise Specially Protected)

Peregrine Falcon (***Falco peregrinus***) This species is an occasional visitor to those areas of open woodland and along margins with semi-rural land.

Priority Taxa

Quenda (***Isoodon obesulus fusciventer***) **P4** This species is still moderately common in the Canning Vale area. It occurs in *Banksia* woodland and dense low heath communities. It is likely that a fauna survey will be necessary to confirm its presence at the site in question.

APPENDIX 4

PROJECTED TRAFFIC FLOWS AND MASS FLOW FOR A 300 AND A 375 TONNES PER DAY IN-VESSEL COMPOSTING FACILITY

APPENDIX 4

Projected traffic flows to the RRRC for a 300 tonnes per day In-Vessel Composting Facility

YEAR	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	Vehicle Load Capacity (tonnes)
Municipal Waste														
In-Vessel	30	30	30	31	31	32	32	32	33	33	34	34	35	10
MRF	25	25	25	26	26	26	27	27	27	28	28	29	29	3.5
Green Waste	6	6	6	6	6	6	6	6	6	6	7	7	7	5
Commercial Waste														
In-Vessel	6	6	6	5	5	5	5	4	4	3	3	2	2	8
Biosolids	11	11	11	11	11	11	11	11	11	11	11	11	11	10
Green Waste	14	14	14	14	14	14	14	14	14	14	14	14	14	5
Dilution Water	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
Waste Disposal														10
In-Vessel	4	4	4	5	5	5	5	5	5	5	5	5	5	
MRF	1	1	1	1	1	1	1	1	1	1	1	1	1	
Green Waste	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
Recycled Materials														
Dry Recyclables	10	10	10	10	10	10	11	11	11	11	11	11	11	7.5
Compost	21	22	22	22	22	22	22	22	22	22	22	22	22	10
Mulch	23	23	23	23	23	23	23	23	23	23	23	23	23	5
TOTAL	151	152	152	154	154	155	157	156	157	157	159	159	160	

APPENDIX 4

Projected traffic flows to the RRRC for a 375 tonnes per day In-Vessel Composting Facility

	YEAR														Vehicle Load
	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	Capacity (tonnes)
Municipal Waste															
In-Vessel	30	30	30	31	31	32	32	32	33	33	34	34	35	35	10
MRF	25	25	25	26	26	26	27	27	27	28	28	29	29	29	3.5
Green Waste	6	6	6	6	6	6	6	6	6	6	7	7	7	7	5
Commercial Waste															
In-Vessel	15	15	15	15	15	15	15	14	14	14	14	13	13	13	8
Biosolids	14	14	14	14	14	14	15	15	15	15	15	15	15	15	10
Green Waste	14	14	14	14	14	14	14	14	14	14	14	14	14	14	
Dilution Water	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
Waste Disposal															10
In-Vessel	6	6	6	6	6	6	6	6	6	6	6	6	6	6	
MRF	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
Green Waste	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
Recycled Materials															
Dry Recyclables	10	10	10	10	10	10	11	11	11	11	11	11	11	12	7.5
Compost	27	27	27	27	27	27	28	28	28	28	28	28	28	28	10
Mulch	23	23	23	23	23	23	23	23	23	23	23	23	23	23	5
TOTAL	171	171	171	173	173	174	178	177	178	179	181	181	182	183	

APPENDIX 4

Projected Mass Flow Analysis for the RRRC for a 300 tonnes per day In-Vessel Composting Facility

YEAR	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
Municipal Waste													
In-Vessel	77,263	78,171	79,133	80,170	81,072	81,963	82,991	84,046	85,323	86,636	87,929	89,021	90,099
MRF	22,535	22,800	23,080	23,383	23,646	23,906	24,206	24,513	24,886	25,269	25,646	25,964	26,279
Green Waste	7,512	7,600	7,693	7,794	7,882	7,969	8,069	8,171	8,295	8,423	8,549	8,655	8,760
Commercial Waste													
In-Vessel	15,604	15,031	14,375	13,612	12,952	12,271	11,411	10,482	9,262	7,949	6,603	5,438	4,240
Biosolids	35,208	35,335	35,451	35,555	35,646	35,726	35,790	35,837	35,859	35,859	35,839	35,811	35,766
Green Waste	22,488	22,400	22,307	22,206	22,118	22,031	21,931	21,829	21,705	21,577	21,451	21,345	21,240
Dilution Water	11,226	11,266	11,303	11,336	11,365	11,391	11,411	11,426	11,433	11,433	11,427	11,418	11,404
Waste Disposal													
In-Vessel	13,930	13,980	14,026	14,067	14,104	14,135	14,160	14,179	14,188	14,188	14,180	14,169	14,151
MRF	3,380	3,420	3,462	3,507	3,547	3,586	3,631	3,677	3,733	3,790	3,847	3,895	3,942
Green Waste	0	0	0	0	0	0	0	0	0	0	0	0	0
Recycled Materials													
Dry Recyclables	19,155	19,380	19,618	19,875	20,099	20,320	20,575	20,836	21,153	21,479	21,799	22,070	22,337
Compost	55,720	55,921	56,105	56,269	56,414	56,540	56,641	56,717	56,751	56,751	56,719	56,675	56,604
Mulch	30,000	30,000	30,000	30,000	30,000	30,000	30,000	30,000	30,000	30,000	30,000	30,000	30,000
TOTAL MASS IN	191,836	192,603	193,342	194,056	194,681	195,257	195,809	196,304	196,763	197,146	197,444	197,652	197,788
TOTAL MASS OUT	122,185	122,701	123,211	123,718	124,164	124,581	125,007	125,409	125,825	126,208	126,545	126,809	127,034
MASS LOST	69,651	69,902	70,131	70,338	70,517	70,676	70,802	70,895	70,938	70,938	70,899	70,843	70,754
MASS IN (a)	180,610	181,337	182,039	182,720	183,316	183,866	184,398	184,878	185,330	185,713	186,017	186,234	186,384
MASS OUT (b)	17,310	17,400	17,488	17,574	17,651	17,721	17,791	17,856	17,921	17,978	18,027	18,064	18,093
% REDUCTION	90.4	90.4	90.4	90.4	90.4	90.4	90.4	90.3	90.3	90.3	90.3	90.3	90.3

Note:

(a) Mass In refers to the mass that would be sent to landfill if the RRRC was not operating, and includes both municipal and commercial waste.

(b) Mass out refers to the amount of residual waste produced by the RRRC that would be disposed of to landfill.

APPENDIX 4

Projected Mass Flow Analysis for the RRRC for a 375 tonnes per day In-Vessel Composting Facility

	YEAR 2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
Municipal Waste													
In-Vessel	77,263	78,171	79,133	80,170	81,072	81,963	82,991	84,046	85,323	86,636	87,929	89,021	90,099
MRF	22,535	22,800	23,080	23,383	23,646	23,906	24,206	24,513	24,886	25,269	25,646	25,964	26,279
Green Waste	7,512	7,600	7,693	7,794	7,882	7,969	8,069	8,171	8,295	8,423	8,549	8,655	8,760
Commercial Waste													
In-Vessel	15,604	15,031	14,375	13,612	12,952	12,271	11,411	10,482	9,262	7,949	6,603	5,438	4,240
Biosolids	35,208	35,335	35,451	35,555	35,646	35,726	35,790	35,837	35,859	35,859	35,859	35,811	35,766
Green Waste	22,488	22,400	22,307	22,206	22,118	22,031	21,931	21,829	21,705	21,577	21,451	21,345	21,240
Dilution Water	11,226	11,266	11,303	11,336	11,365	11,391	11,411	11,426	11,433	11,433	11,427	11,418	11,404
Waste Disposal													
In-Vessel	13,930	13,980	14,026	14,067	14,104	14,135	14,160	14,179	14,188	14,188	14,180	14,169	14,151
MRF	3,380	3,420	3,462	3,507	3,547	3,586	3,631	3,677	3,733	3,790	3,847	3,895	3,942
Green Waste	0	0	0	0	0	0	0	0	0	0	0	0	0
Recycled Materials													
Dry Recyclables	19,155	19,380	19,618	19,875	20,099	20,320	20,575	20,836	21,153	21,479	21,799	22,070	22,337
Compost	55,720	55,921	56,105	56,269	56,414	56,540	56,641	56,717	56,751	56,751	56,719	56,675	56,604
Mulch	30,000	30,000	30,000	30,000	30,000	30,000	30,000	30,000	30,000	30,000	30,000	30,000	30,000
TOTAL MASS IN	191,836	192,603	193,342	194,056	194,681	195,257	195,809	196,304	196,763	197,146	197,464	197,652	197,788
TOTAL MASS OUT	122,185	122,701	123,211	123,718	124,164	124,581	125,007	125,409	125,825	126,208	126,545	126,809	127,034
MASS LOST	69,651	69,902	70,131	70,338	70,517	70,676	70,802	70,895	70,938	70,938	70,919	70,843	70,754
MASS IN (a)	158,122	158,937	159,732	160,514	161,198	161,835	162,467	163,049	163,625	164,136	164,586	164,889	165,144
MASS OUT (b)	17,310	17,400	17,488	17,574	17,651	17,721	17,791	17,856	17,921	17,978	18,027	18,064	18,093
% REDUCTION	89.1	89.1	89.1	89.1	89.1	89.0	89.0	89.0	89.0	89.0	89.0	89.0	89.0

Note: (a) Mass In refers to the mass that would be sent to landfill if the RRRC was not operating, and includes both municipal and commercial waste.
(b) Mass out refers to the amount of residual waste produced by the RRRC that would be disposed of to landfill.