



Environmental Scoping Document

EMRC Resource Recovery Facility Project

Prepared for Environmental Protection Authority

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Definitions

Defined Term	Description
Acceptable Tenderers	In accordance with the <i>Local Government (Functions and General) Regulations 1996</i> , Acceptable Tenderers are individuals, organisations or joint ventures that have been pre-qualified through an Expression of Interest evaluation process.
Anaerobic Digestion (AD)	The breakdown of organic materials by naturally occurring micro organisms in the absence of oxygen to produce biogas (predominantly methane and carbon dioxide) which can be used as a fuel, compost and in some instances, liquid fertilisers.
AWT	Alternative Waste Treatment – processing waste as an alternative to disposing to landfill. The treatment processes can be categorised as biological (aerobic composting and anaerobic digestion) and thermal processes (i.e. gasification).
BOM	Bureau of Meteorology
Contract Delivery Models	The alternative methods for procurement of the project.
DEC	Department of Environment and Conservation
DEWHA	Department of Environment, Water, Heritage and the Arts
Eastern Region	The district of the EMRC, being the combined districts of its Member Councils.
Energy from Waste (EfW)	The breakdown of waste material under high temperature conditions to produce, among other things, energy.
EPA	Environmental Protection Authority
EP Act	<i>Environmental Protection Act 1986</i>
EOI	Expression of Interest
EMRC	Eastern Metropolitan Regional Council
Member Councils	The six Local Governments which form the EMRC, comprising: the Town of Bassendean, the City of Bayswater, the City of Belmont, the Shire of Kalamunda, the Shire of Mundaring, and the City of Swan.
MGB	Mobile garbage bin used to collect waste.
Municipal Solid Waste (MSW)	For the purposes of this Scoping Document, MSW is classified as household domestic waste that is set aside for kerbside collection in a MGB. MSW can also include some commercial waste such as waste from food preparation premises, supermarkets etc. which is collected as part of domestic waste collection rounds.
PER	Public Environmental Review pursuant to Part IV of the <i>Environmental Protection Act 1986</i> .
Red Hill WMF	Red Hill Waste Management Facility
Proponent	The EMRC
RRF	Resource Recovery Facility. Also known as an Alternate Waste Treatment Facility for the processing of MSW to recover useful products such as recyclables, compost, fertilisers and energy.
Scoping Document	Environmental Scoping Document (this document)
Subject Site	The preferred site (B2) for the RRF within the Red Hill WMF

1 Introduction

The Eastern Metropolitan Regional Council (EMRC), the project proponent, was formally constituted in 1983 and now includes the following Member Councils: Town of Bassendean, City of Bayswater, City of Belmont, Shire of Kalamunda, Shire of Mundaring and the City of Swan. Collectively, the EMRC's six Member Councils cover a geographic area that extends over one-third (2,100 square kilometres (km²)) of the Perth Metropolitan Area (**Figure 1**). The EMRC currently has a population of approximately 300,000 people, and this number is expected to increase to 400,000 by 2030.

The EMRC was originally established to manage the waste disposal of its six Member Councils. Although the EMRC's range of services has since expanded to include other areas such as regional development, environmental services and risk management, waste management is still considered as the Regional Council's primary role. The EMRC's operations are governed by the Council which comprises 12 Councillors (two Councillors from each Member Council), with another six Councillors (one from each Member Council) appointed to deputise in their absence. The Chairman of the Council is elected by the 12 Councillors.

Currently, all Member Councils' non-recycled waste generated within the Region is landfilled at the EMRC-owned and operated Red Hill Waste Management Facility (Red Hill WMF) (**Figure 2**). The Red Hill WMF is an approved Class III and IV landfill and is currently operated under Licence 6833/10 which was issued by the then Department of Environment. The facility accepts a range of wastes, including inert waste, putrescible waste, contaminated and hazardous wastes and also acts as a collection and storage area for dry recyclables and household hazardous waste received at the transfer station. Red Hill WMF accepts waste from various organisations within and outside the region including the general public, commercial operators, and Local, Regional, State and Federal Government organisations.

Approximately 130,000 tonnes of Member Council municipal solid waste (MSW) was disposed of at the Red Hill WMF in 2008/09. Based on recent projections, the total amount of Member Council MSW is expected to increase to 185,000 tonnes per annum by the year 2034/35. The Red Hill WMF has an estimated 25 year lifespan for the landfilling of Class II/III (putrescible) materials, and an estimated lifespan of 14 years for the landfilling of Class IV (hazardous) materials (based on current and projected landfilling rates).

The EMRC proposes to develop a Resource Recovery Facility (RRF) to process Member Council kerbside MSW within the Red Hill WMF. RRFs are used to process domestic waste collected from the kerbside (excluding comingled recyclables) to produce valuable resources such as compost and/or energy and recyclables. The establishment of a RRF is intended to assist the EMRC in:

- Diverting waste from landfill and increasing the life expectancy of Red Hill;
- Reducing the environmental impacts associated with landfilling, including greenhouse gas emissions and potential contamination of soil and groundwater;
- Increasing the recovery of resources from waste by generating marketable products, such as compost and/or energy and recyclables; and
- Producing renewable energy, primarily in the form of electricity.

The Western Australian Waste Authority has proposed strategies and targets for the reduction of waste to landfill in the Draft II *Waste Strategy for Western Australia* (March 2010). The EMRC's movement towards establishing a resource recovery facility to reduce MSW to landfill is aligned with this document.

2 Purpose of Document

This Environmental Scoping Document has been prepared to satisfy the requirements under the *Environmental Impact Assessment (Part IV Division 1) Administrative Procedures 2002* (the Procedures which were current at the time the Referral was made) of the *Environmental Protection Act 1986* (EP Act) and follows a Referral made to the Environmental Protection Authority (EPA) pursuant to Section 38 of the EP Act in June 2010. This document outlines the environmental issues/factors associated with each aspect of the proposal and notes the approaches already identified as needing to be undertaken to mitigate such matters. Additional investigations and studies proposed to be completed to better understand the potential environmental issues/factors have also been identified within this document.

The EPA's *Guide to Preparing an Environmental Scoping Document (2009)* and *Guide to EIA Environmental Principles, Factors and Objectives (2009)* have been utilised in the preparation of this document to ensure that it is consistent with the requirements of these guidelines and is suitable for consideration by the EPA.

2.1 Statutory Requirements

The EP Act is the principal statute relevant to environmental protection in Western Australia. The Act makes provision for the establishment of an independent EPA, for the prevention, control and abatement of pollution and environmental harm and for the conservation, preservation, enhancement and management of the environment and for matters incidental to or connected with the foregoing.

The EPA is an independent Authority and one of its primary functions is to conduct environmental impact assessments (EIA). The EPA prepared the *Environmental Impact Assessment (Part IV Division 1) Administrative Procedures 2002* to outline the process of EIA undertaken in WA (although since the Referral was made, these procedures have been amended). These Procedures also detail requirements placed on proponents and decision-making authorities in relation to referral of proposals and on proponents once the EPA has determined that the proposal will be subject to assessment under Part IV Division 1 of the Act.

Under the 2002 Procedures, the EPA normally adopts one of five levels of assessment for assessing proposals and this sets the general form, content, timing and procedure of the environmental review to be undertaken by the proponent. The five levels of assessment are:

- Assessment on Referral Information (ARI);
- Proposal Unlikely to be Environmentally Acceptable (PUEA);
- Environmental Protection Statement (EPS);
- Public Environmental Review (PER); and
- Environmental Review and Management Programme.

Where the level of assessment of PER or ERMP is set by the EPA, proponents are required to prepare and submit to the EPA an Environmental Scoping Document. The Environmental Scoping Document should include:

- A summary description of the project;
- A summary description of the existing environment;
- A preliminary impact assessment with identification of the environmental issues/factors arising from the project;
- A Scope of Works setting out the proposed environmental surveys/investigations to be carried out as part of the EIA for preparation of the PER/ERMP;

- A list of people, if any, proposed to provide peer reviews of findings and conclusions of the environmental surveys/investigations;
- A planned programme of consultation with the public, key stakeholders and relevant government agencies; and
- A proposed timeframe for undertaking the environmental surveys/investigations and submission of the draft PER/ERMP.

The EPA will advise the proponent of its acceptance of the Environmental Scoping Document and the included Scope of Works, when that occurs. This will enable the proponent to prepare the PER or ERMP consistent with the approach and timetable agreed with the EPA.

This Scoping Document is being prepared as the EPA has set the level of assessment for this project as a PER.

In the event that it is determined that the proposal could have, or is likely to have, a significant impact on a matter of national environmental significance, it would trigger referral to the Minister for Sustainability, Environment, Water, Population and Communities (Federal Environment Minister) under the *Environmental Protection and Biodiversity Conservation Act 1999* (EPBC Act). In this instance, the EMRC would seek to have the matter assessed under provisions of the bilateral agreement between the Commonwealth of Australia and State of Western Australia. The agreement aims to minimise duplication of environmental impact assessment processes and strengthen intergovernmental cooperation. In particular, this agreement provides for the accreditation of the Western Australian environmental impact assessment process to ensure an integrated and coordinated approach for actions requiring approval under both Commonwealth and Western Australian legislation (Department of Environment, Water, Heritage and the Arts 2009).

3 Identification of the Proponent and Consultant

3.1 Proponent Details

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4 Applicable Legislation

4.1 State Government Legislation

The following State Government Legislation has been listed below to highlight the statutory requirement that the EMRC will consider during the preparation and development of this proposal:

- *Aboriginal Heritage Act 1972*
- *Bush Fires Act 1954*
- *Conservation and Land Management Act 1984*
- *Contaminated Sites Act 2003*
- *Dangerous Goods Safety Act 2004*
- *Environmental Protection Act 1986*
- *Health Act 1911*
- *Local Government Act 1995*
- *Occupational Health and Safety Act 1984*
- *Planning and Development Act 2005*
- *Rights in Water and Irrigation Act 1914*
- *Waste Avoidance and Resource Recovery Act 2007*
- *Waste Avoidance and Resource Recovery Levy Act 2007*
- *Wildlife Conservation Act 1950.*

4.2 Commonwealth Government Legislation

As noted in **Section 2.1**, where a significant impact on a matter of national environmental significance is determined, the proposal will be referred to the Federal Environment Minister under the *Environmental Protection and Biodiversity Conservation Act 1999* (EPBC Act).

A desktop search of the proposal area was undertaken of the Department Environment, Water, Heritage and the Arts (DEWHA) - Protected Matters Search Tool. The search was undertaken to determine whether matters of national environmental significance or other matters protected by the EPBC Act are likely to occur on, or close to the Subject Site. This search indicated that five threatened species, five migratory species and five listed marine species could potentially occur within a 1 km radius of the entire Red Hill site (DEWHA 2010a). These species include:

- Threatened species:
 - *Calyptorhynchus banksianus* (Forest Red-tailed Black Cockatoo)
 - *Calyptorhynchus baudinii* (Baudin's Black-Cockatoo, Long-billed Black-Cockatoo)
 - *Calyptorhynchus latirostris* (Carnaby's Black Cockatoo, Short-billed Black-Cockatoo)
 - *Dasyurus geoffroyi* (Chuditch, Western Quoll)
 - *Thelymitra stellata* (Star Sun-orchid).
- Migratory species:
 - *Haliaeetus leucogaster* (White-bellied Sea-Eagle)
 - *Merop sornatus* (Rainbow Bee-eater)
 - *Ardea alba* (Great Egret, White Egret)
 - *Ardea ibis* (Cattle Egret)
 - *Apus pacificus* (Fork-tailed Swift).
- Listed marine species:
 - *Apus pacificus* (Fork-tailed Swift)
 - *Ardea alba* (Great Egret, White Egret)
 - *Ardea ibis* (Cattle Egret)
 - *Haliaeetus leucogaster* (White-bellied Sea-Eagle)

- *Merop sornatus* (Rainbow Bee-eater).

The EMRC is of the view, based on the findings of the Flora and Vegetation Assessment (May 2010) and the Fauna Assessment (February 2010) (refer to **Section 10.1**), that there will not be an impact of national environmental significance and as such this project will not require referral to the Federal Environment Minister.

Approval to carry out a controlled activity in a Prescribed airspace is required from the Secretary of the Civil Aviation Safety Authority under the *Airports Act 1996*. A Prescribed airspace is above any part of either an Obstacle Limitation Surface (OLS) or a Procedures for Air Navigation Systems Operations (PANS-OP) surface. The Subject Site is located beneath the Perth Airport's Prescribed airspace, being a Runway 24 Approach, PAN-OPS surface (Australian Government 1996). Controlled activities, relevant to this proposal, that may trigger an approval process under the *Airports Act 1996* include:

- construction of a building or other structure that intrudes into the prescribed airspace;
- any other activity (e.g. operation of cranes) that causes a thing attached to, or in physical contact with, the ground to intrude into the prescribed airspace;
- operating a source of artificial light in a manner which interferes with the operation of an aircraft;
- operating prescribed plant, or a prescribed facility which reflects sunlight in a manner which interferes with the operation of an aircraft;
- an activity caused by an emission or stack that results in air turbulence (upward vertical velocity of 4.3 metres per second or more at the point of emission); and
- an activity that results in the emission of smoke, dust, other particulate matter, steam or other gas where the emission affects operation of an aircraft.

Discussions with the Westralian Airports Corporation (WAC), suggest that the proposed RRF would be a controlled activity and consideration would need to be given the intrusion of airspace and air turbulence. Further investigations by the EMRC and Cardno clarified that due to the Australian Height Datum (AHD) of the nominated proposed location of the RRF (including building / stack height) being less than that stipulated by WAC (368m AHD) the EMRC would likely gain approval to undertake a controlled activity in a Prescribed airspace from the Secretary through WAC.

5 Summary Description of the Proposal

To address the waste management needs of the Eastern Region in a more environmentally sustainable manner, the EMRC proposes to develop a RRF to treat domestic kerbside MSW generated in the Region. Significant research, assessment and consultation tasks have been undertaken to reach this stage of the process. Key tasks relevant to the proposal include:

- ongoing community and stakeholder engagement;
- preferred options assessment in relation to site suitability, AWT technologies, contract delivery models and waste collection systems; and
- evaluation of Expression of Interest (EOI) submissions and pre-qualification of seven (7) Acceptable Tenderers for the future tender process.

A number of potential locations within the boundary of the Red Hill WMF have been investigated for the proposed RRF. The preferred site (Subject Site) is within Lot 12 and is located on the proposed future northern boundary with the road reserve for the realigned Perth-Adelaide Highway. The size required to locate the facility will vary depending upon the technology chosen. However, the maximum area required is estimated to be 4 hectares (ha). The potential locations that were examined and the preferred site are shown in **Figure 3**.

The EMRC has yet to decide a number of key planning decisions for the project, the most significant being the selection of the waste processing technology. Other key project planning decisions that have not yet been made are the waste collection system (2 bins or three bins per household) and the contract delivery model.

The final decision on the technology is expected to be made following the evaluation of tenders, which will be invited following receipt of the environmental approvals (under Part IV of the EP Act). As such, the EMRC proposes to undertake detailed studies of each of the following technologies as part of the PER process, including:

- **Anaerobic Digestion (AD)**-to produce biogas for energy production and compost; and
- **Energy from Waste (EfW)** – gasification to produce renewable power.

The type and quantity of usable products generated out of the process, such as compost, energy and / or recyclables, will depend on the RRF technology implemented. The proposed technology options and their expected outputs are explained further in **Section 5.1** below.

The annual tonnage capacity of the proposed facility will also depend on the technology implemented, and in the case of AD technologies, the type of domestic kerbside collection system used (i.e. two-bin or three-bin kerbside collection system). However, for the purposes of the proposal, a maximum capacity of 200,000 tonnes per annum is proposed for the EfW technology and 150,000 tonnes per annum for AD.

Following the EIA process and assuming the proposal is approved by the Minister, the EMRC Council will resolve whether to proceed with a tender process. The EMRC will subsequently invite the Acceptable Tenderers (pre-qualified through the EOI process) to submit a tender for the chosen technology types (limited to the two technology types referred to above). The tenders will be assessed using environmental, technical, economic and social tender evaluation criteria. These criteria are currently being developed by the EMRC with community input.

The EMRC's currently preferred contract models are the Design and Construct (D&C) model and Design, Build, Operate and Maintain (DBOM) model. Under a D&C contract the EMRC would own the facility, while the contractor would design, construct and undertake initial operation of the facility (for

an approximate period of up to two years). Under a DBOM contract the EMRC would own the facility with the contractor designing, building, operating and maintaining the facility for the contract period. The EMRC would transfer the environmental responsibilities specified in the Ministerial Statement to the contractor for the duration of the initial operating period. The contractor would be required to obtain and comply with a Works Approval (construction) and Licence (operation) pursuant to Part V of the EP Act. After the initial operating period, the contractor would transfer operations to the EMRC, or an appropriate operator contracted by the EMRC, and as such, the Ministerial Statement, Works Approval and Licence would also be transferred to the operating party.

5.1 Proposed Technologies

The two proposed AWT technology options are explained in the subsections below.

5.1.1 Anaerobic Digestion

5.1.1.1 Process Description

Anaerobic Digestion is the breakdown of organic materials by naturally occurring micro organisms in the absence of oxygen to produce biogas (partly comprising methane and which can be used as a fuel), compost and in some instances, liquid fertilisers.

There are a number of different forms of AD technologies available in the market. These include technologies that can be separated into categories based on being:

- Wet systems (which treat suspensions and slurries and are <15% dry matter) or dry systems (to which minimal water is added and are 15-45% dry matter);
- Mesophilic AD (which operates at a temperature of approximately 35°C) or thermophilic AD (which operates at approximately 55°C); and
- Continuous process or batch process.

5.1.1.2 Facility Process Example

The nature of the technology process determines the pre treatment of the waste that is required.

In a typical AD facility, MSW is unloaded from the collection trucks into waste pits (bunkers) within a fully enclosed waste receival hall. A crane / grapple then transfer the waste into a pre-sorting/pre treatment area where plastic bags are opened (if they are present) and magnets and other separators remove items such as metals for recycling. Bulky items and hazardous materials are also removed before the waste is sorted and prepared for the biological processes. Preparation of the feedstock may be undertaken in a number of ways (e.g. shredding, pulping, mixing, and screening of the waste) depending on the AD technology type and the waste composition.

The EMRC, together with its Member Councils are considering implementing a three bin waste collection system if an AD technology is implemented. One bin, an organics bin, would be used to collect source separated food and greenwaste for treatment at the RRF. If this system was adopted, then the amount of pre treatment of the waste prior to digestion would be minimised, compared to the treatment required for waste from a two bin collection system.

The pre treated organic materials are fed into the digesters to undergo anaerobic digestion. Bacteria break down the organic material through a number of stages to produce biogas and digestate. The biogas flows into a storage vessel where it is temporarily stored before being (a) flared or (b) used to fuel gas engines to produce electricity and, in some circumstances, heat. In some cases the gas is sold to the gas grid system or third parties after suitable cleanup.

The biogas produced by most AD processes comprises mostly methane and carbon dioxide. It also contains moisture (H₂O) and hydrogen sulphide (H₂S) which need to be cleaned from the gas prior to being used either as a fuel for gas engines or sold to the grid. The gas is therefore passed through a cleaning process to remove these contaminants prior to use. Untreated biogas can cause corrosion in engines.

The digestate (the remains of the original feedstock that the microbes cannot use) is separated from the liquid by a filter press or centrifuge and matured through aerobic composting (usually in open windrows in a maturation hall) on site. The compost may be used as a soil conditioner, mulch or blending product for landscape, rehabilitation or broad acre farming applications. The liquid separated from the digestate is recirculated to the digester and in some cases may be used as a liquid fertiliser or disposed of onsite (for example into the landfill leachate system).

Odours from each stage of the process will be managed through an odour control system. The odorous air is extracted from the sealed buildings (waste receival area, sorting area and maturation halls) and pumped into an odour control plant located outside the building where it is filtered and treated before being released into the environment. The odour control unit is likely to be a biofilter comprising moistened organic matter such as woodchips and compost through which the odorous air will be pumped. Bacteria in the biofilter will consume the odorous matter in the air and so eliminate the odour.

With anaerobic digestion systems, the most odorous part of the process is undertaken within sealed digesters. Also, as air is excluded from the digesters, the quantity of odorous air generated is minimised. These factors reduce the odour management concerns with this technology, particularly when compared with aerobic composting technology.

5.1.2 Energy from Waste – Gasification

5.1.2.1 Process Description

The gasification process involves the conversion of carbon-based materials into syngas by carefully controlling the amount of oxygen that is present. Initially external heat is applied for the process to commence, but given the presence of oxygen (even though it is less than stoichiometric), partial oxidation occurs to produce sufficient heat for the process to be self sustaining. The syngas is used as a fuel to power steam turbines to generate electricity and/or heat. A bottom ash is produced that has a relatively low level of carbon (<3%).

As a consequence of the limited airflow in the gasification process, the amount of flue gas requiring cleaning is reduced compared to combustion processes. It also contains less complex substances due to the combustion of a gas (rather than solid, mixed waste materials). This results in a simplified flue gas cleaning system, compared to combustion technology.

5.1.2.2 Facility Process Example

A typical gasification plant is likely to consist of the following key elements:

- Waste reception, handling and pre treatment;
- Gasification chamber/reactor;
- Energy recovery plant;
- Flue gas clean-up; and
- Ash handling.

Waste is unloaded from trucks into waste pits (bunkers) within a fully enclosed waste receival hall. The waste is then transferred via an overhead crane into a shredder. Recyclables in the waste can be

separated before this initial treatment or screens and magnets can remove them afterwards. The shredded waste (feedstock) is then conveyed into the gasification chamber / reactor. The pre treated waste material remains within the reactor (typically fixed bed) for an extended period while the thermal conversion takes place at temperatures of approximately 650°C.

The majority of carbonaceous material is converted into a combustible gas (syngas comprising combustible gases such as carbon monoxide, hydrogen and possibly methane), while an inert residue (known as bottom ash) remains. The syngas produced in the gasification chamber is transferred to the high-temperature oxidation chamber (900°C - 1000°C) where air and re-circulated flue-gas is injected to ensure temperature control and complete oxidation of the syngas. Flue gas exiting the oxidation chamber is used to raise steam to power steam turbines for electricity production with used steam available as a source of commercial heat where possible.

Odorous air from the waste receipt area can be used in the oxidation process, to eliminate any odour emissions.

The tight control exercised over the gasification and oxidation processes is a key factor in minimising the composition and quantity of flue gases that need to be managed. The oxidation process achieves typical international standards (such as the European Union Waste Incineration Directive) of 2 seconds retention time with a temperature in excess of 850°C in order to destroy dioxins and furans. These flue gases are then rapidly cooled through the temperature range in which dioxins reform (400°C – 250°C). Typical flue gas cleaning in gasification processes involves the addition of lime and activated carbon to the flue gas followed by filtration through a bag house filter to remove particulates, acid gases, metals and volatile organic compounds (including dioxins/furans). The residue from the flue gas cleaning system is known as fly ash and requires disposal in an appropriate landfill facility. With the bottom ash from the furnace, typically, metals are recovered and the ash can be used as a road base, or disposed of to landfill.

6 Justification for the Proposal and Alternative Options Considered

6.1 Justification for the Proposal

Households in the EMRC have generally embraced recycling (such as paper, cardboard, bottles, cans etc) through yellow top kerbside bins and separate greenwaste collections as accepted community practice. As such, the EMRC is now focussed on recovering all potential resources from the domestic MSW stream to further reduce the amount of waste going to landfill. Substantial research into resource recovery has indicated that the successful operation of a RRF will greatly assist in achieving the EMRC's desired environmental outcomes and resource recovery goals, including:

- Diverting waste from landfill and increasing the life expectancy of Red Hill WMF;
- Reducing the environmental impacts associated with landfilling, including greenhouse gas emissions and potential contamination of soil and groundwater;
- Generating a marketable product, such as compost and/or energy and recyclables;
- Increasing the recovery of resources and so reduce the level of resource consumption in the community;
- Producing renewable power; and
- Complying with the Waste Authority's strategies and targets for MSW as detailed in the Draft II Waste Strategy for Western Australia (March 2010).

Market research and the EOI process undertaken by the EMRC indicate that there are a number of commercially proven RRF technologies available for the treatment of MSW. The environmental benefits of these technologies are well established and reflected in most waste management hierarchies, including that contained in the Draft II Waste Strategy for Western Australia (March 2010). The use of RRFs is also becoming necessary in some parts of the world to meet strict environmental directives such as the European Union Landfill Directive. The EMRC has therefore resolved to pursue the environmental approvals for the construction and operation of an RRF as part of an integrated resource recovery strategy for the Eastern Region.

6.2 Alternative Options Considered

The RRF Project forms part of an integrated strategy to provide resource recovery services in the region. Other aspects of this strategy include:

- A comprehensive regional waste education strategy promoting waste avoidance and reduction as well as best practice waste management. The education strategy also forms part of the community engagement associated with the resource recovery project;
- The establishment of a resource recovery park in Hazelmere. This facility currently receives and reprocesses special wastes such as timber and mattresses. Planning has commenced for it to be expanded into a comprehensive, community based resource recovery facility incorporating a reuse centre and the recovery of a range of specific materials; and
- Operating the Red Hill WMF as a best practice facility with appropriate leachate management, landfill gas capture and power generation and site rehabilitation.

The EMRC has considered a number of options during the planning process for the RRF Project for the recovery of resources from the mixed MSW collected by the Member Councils through their weekly kerbside collection systems. In addition to the option of establishing a new RRF, as covered by this Proposal, the following options were considered:

- No change to the current practice of landfill; and

- Use of existing resource recovery infrastructure available in Perth.

The 'no change' option has been compared to the option of RRF construction and operation in terms of environmental and financial implications. The 'no change' option is considered to not be as environmentally sustainable as the RRF option, as continuing to landfill kerbside MSW at projected landfilling rates:

- does not minimise the amount of waste to landfill;
- decreases the life expectancy of the Red Hill WMF;
- does not maximise gas capture and minimise the risk of other environmental impacts associated with landfilling;
- loses valuable, recoverable resources that may potentially be used instead of virgin products; and
- does not reflect State Government commitments and draft targets to reduce waste going to landfill.

Financial implications are important for the participating Member Councils as the costs for any development will ultimately impact on the ratepayers. Financial modelling suggests that the 'no change' option may well be less financially viable in the longer term, compared to the RRF option. This is attributed to the expected increases to regulatory costs (e.g. the landfill levy) associated with landfilling, as well as increases to market based expenses (e.g. electricity costs and the introduction of carbon trading).

Using local existing resource recovery infrastructure was also considered by the EMRC. While Western Australia is currently leading other states of Australia in terms of commissioning and operating RRFs, there is not capacity available to process the EMRC's MSW tonnes. The other facilities that have been built or are being planned are committed to treat waste from other local and regional governments.

On this basis, the EMRC decided to proceed with the planning to provide its own RRF. A number of project specific options have also been considered by the EMRC during the planning process for the RRF project. This process began in 2004, with preliminary assessments made on potential sites, AWT technologies, contract delivery models, and waste (bin) collection systems. In terms of this proposal, site options and technology options are considered relevant and are explained further in the following sections.

6.2.1 Technology Options

Preliminary assessments of potential technologies were undertaken at the beginning of the planning process for the RRF Project, including assessment of:

- Bioreactor Landfill;
- Anaerobic digestion;
- Aerobic composting; and
- EfW technologies including combustion; gasification; pyrolysis and thermal depolymerisation.

The EMRC rejected the Bioreactor Landfill technology option as a viable treatment option for the RRF. Although it had the lowest cost, the recovery of a quality organic and recyclable resource from bioreactor landfills has yet to be demonstrated at a commercial scale.

The EMRC also resolved that aerobic composting be excluded from further investigation. This exclusion was primarily based on the technology's inability to produce energy and its high energy consumption characteristics. Other concerns such as the quality and value of the compost produced from the technology, odour management as well as public perception issues contributed to the Council's decision.

The EMRC has undertaken an extensive information gathering process relating to determining the preferred technology to be used in the RRF Project. Information was gathered via:

- Comprehensive research of available published material related to the technologies;
- National and international tours to inspect facilities and to meet with facility operators, regulatory agencies and community representatives;
- Attendance at conferences relating to the technologies and meetings with international AWT technology experts;
- Request for information from technology suppliers;
- The receipt and evaluation of EOIs in 2009 from companies interested in establishing the RRF for the EMRC; and
- Subsequent surveys of the Acceptable Tenderers to gather additional technical data relating to their technologies.

The Council adopted a set of preliminary recommendations in September 2009 which formed the basis for discussion with the community and Member Councils. In May 2010, Council resolved as follows:

“The RRF technology options include anaerobic digestion, gasification, pyrolysis and combustion. Plasma technology will only be considered if it is an integral part of one of these technologies”

Following this, in August 2011, the council considered a further reduction in the number of proposed technologies. The outcome of the council's discussion was to reduce the technologies from four options to two options. The two technologies to be considered within the PER are anaerobic digestion and gasification. A key evaluation criterion for assessing the tenders received for this project will be the proven performance of the technologies proposed, within these two categories. Both categories have examples of commercially operating proprietary facilities with in excess of 5 years of operating performance. The EMRC will use a waste industry procurement standard when setting the criterion for the proveness of the technology, which is typically three years of continuous performance at a reference site.

6.2.2 Site Options

Six potential sites were considered for the location of the RRF during preliminary assessments, including:

- **Red Hill:** Lot 12, 1204 Toodyay Road, Red Hill, which is part of the EMRC's Red Hill WMF;
- **Airport:** Perth Airport Development Precinct 3A, bounded by the Great Eastern Highway Bypass, Abernethy Road and Kalamunda Road;
- **Lakes Road (Hazelmere):** Lot 100, 77 Lakes Road Hazelmere and Lot 201, 91 Lakes Road (Hazelmere) owned by the EMRC;
- **Stratton:** Lot 427, Stratton, located between Roe Highway and Farrell Road; and
- **Bayswater:** Lot 10, Railway Parade, Bayswater bounded by Tonkin Highway and Railway Parade
- **Roe Highway (Hazelmere):** Lot 20, Adelaide Street and Lot 196, 196 Adelaide Street (Hazelmere), intercepted by Roe Highway.

These sites are shown below in **Diagram 1**.

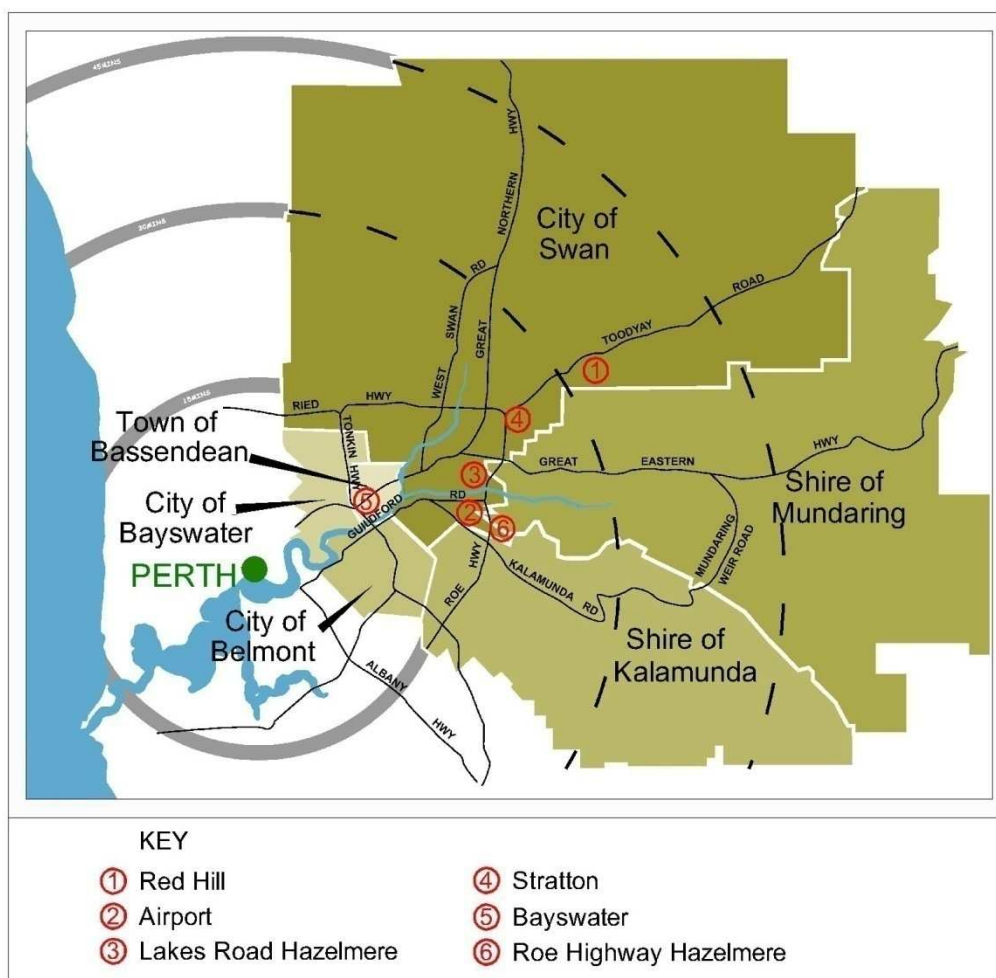


Diagram 1: Locations of the six RRF site options in the Eastern Metropolitan Region

As a result of the preliminary assessments the Stratton and Roe Highway (Hazelmere) sites were determined by the EMRC as being unsuitable due to issues such as zoning, proximity to housing and likelihood of obtaining Government approvals.

Further investigations of the remaining four sites indicated that the Airport Site and Bayswater Site were no longer available options for the RRF project. The Bayswater site was proposed to be subdivided into smaller blocks, while the Westralian Airports Corporation was not supportive of the use of the Airport site. The remaining two sites, Red Hill and Lakes Road, Hazelmere, are both owned by the EMRC and were considered to be potentially suitable.

Community consultation and market research indicated that the community supported Red Hill WMF as the preferred site for all RRF technology options, when compared to the Lakes Road, Hazelmere site. The reason for this is primarily due to the Hazelmere site’s proximity to major population centres, while the Red Hill WMF is well buffered and already a Waste Management Facility.

As such, the May 2010 Council resolved that:

Red Hill Waste Management Facility is the preferred site for the RRF.

A subsequent investigation was then undertaken to determine the preferred location of the RRF within the Red Hill WMF. The EMRC shortlisted five potential sites for the RRF within Red Hill WMF for further investigation (**Figure 3**) including the:

- Red Hill Farm west of the proposed Hills Spine Road in Lot 12 (Site A);
- Green waste facility footprint in the north east corner of Lot 1 (Site B1);
- North west corner of Lot 12 (Site B2);
- Community Drop Off Waste Transfer Station within Lot 2 and intruding onto the adjoining completed putrescible landfill cell in Lot 11 (Site C); and
- Completed putrescible landfill cell in the south west corner of Lot 11 (Site D).

A qualitative assessment undertaken of the economic, social, environmental, technical, operational and regulatory attributes of each proposed location suggested that, within the current Red Hill WMF operations, Site B2 (the Subject Site) is the preferred site for the location of the RRF. The location of this Subject Site, within Red Hill WMF is highlighted in the **Figure 3**.

7 Planning Context

The lots located within the Red Hill WMF are situated within the City of Swan (Lots 1, 2, 11 and 12) and the Shire of Mundaring (Lots 81 and 501), and are all owned by the EMRC. However, as the proposed development locations are only located within the City of Swan, this proposal will only be subject to the City of Swan's town planning requirements. The two lots situated within the Shire of Mundaring are currently not zoned under the Shire of Mundaring's Town Planning Scheme No. 3 (amended March 2010).

Under the City of Swan's Local Planning Scheme No. 17 (amended March 2010) the proposal sites are located within a 'Special Use' zone (**Figure 4**). The 'Special Uses' permitted under the Scheme for the proposal sites, include: waste management, receipt, recovery, treatment, processing and disposal, as well as extractive industry and radio communications.

The Conditions listed in the Local Planning Scheme which relate to the site (Special Use Zone No. 9) indicate that, prior to determining an application for development, the City of Swan shall:

1. *consult with the Department of Environment, Department of Conservation and Land Management [now the DEC], and Main Roads WA*
2. *have regard to the interface with John Forrest National Park, surface and groundwater quality, vegetative buffers from surrounding land, existing remnant vegetation on site and fire management.*

The proposed Perth to Adelaide Highway road reserve cuts through the northern portion of the site (through Lots 1, 2, 11 and 12), while the proposed Hills Spine Road runs north to south through Lot 12 to connect the residential areas south of Red Hill to the Perth – Adelaide Highway. These proposed roads are 'Primary Regional Roads' under the Metropolitan Region Scheme. Primary Regional Roads are the most important of the roads of regional significance in the planned road network, and are currently or proposed to be declared under the *Main Roads Act 1930* (WAPC 2004). The proposed site locations will not intrude on these Regional Reserves.

The eastern portion of Lot 12 (i.e. east of the proposed Hills Spine Road) is zoned as 'Rural – Resource', while the western portion is zoned as 'Special Use' under the City of Swan's Local Planning Scheme.

With the exception of the Primary Regional Roads, the entire Red Hill WMF is zoned as 'Rural' under the Metropolitan Region Scheme. This zoning includes land in which a range of agricultural, extractive and conservation uses are undertaken (WAPC 2004).

Aside from some permitted developments, uses or advertisements identified in Schedule 5 and Schedule 5A of the City of Swan's Local Planning Scheme, all development on land zoned and reserved under the Scheme requires the prior approval from the City of Swan. A person must not commence or carry out any development without first having applied for and obtained the planning approval of the Local Government. Approval to commence development on the Red Hill WMF is not required from the WA Planning Commission under the Metropolitan Region Scheme (amended November 2007) (WAPC 2007).

To gain approval for the proposed development at the Red Hill WMF, a development application is required to be lodged with the City of Swan for consideration. When considering the application for planning approval the City of Swan may consult with any other statutory, public or planning authority it considers appropriate.

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Both the City of Swan and the Shire of Mundaring are aware of the proposed development as both Local Governments are Member Councils of the EMRC and have been involved in the planning phase of the project.

8 Existing Environment

This section of the Scoping Document outlines both the regional context of the proposal as well as the details specific to Red Hill WMF and the Subject Site.

8.1 Site Location and Identification

The Subject Site is located within the Red Hill WMF, which is located on Toodyay Road, approximately 26km north-east of Perth, Western Australia (**Figure 1**). The Red Hill WMF covers a total area of approximately 315 hectares(ha) and covers several cadastral lots within the localities of Red Hill, Gidgegannup and Parkerville, including:

Table 8-1: Site identification details

Lot / Plan Details	Certificate of Title (Volume / Folio) Details	Street Address	Approximate Size (ha)
Lot 1 on Diagram 15239	Vol.1128 / Folio 23	1094 Toodyay Road, Red Hill	48.4 ha
Lot 2 on Diagram 68630	Vol. 1717 / Folio 585	2 Toodyay Road, Red Hill	21.4 ha
Lot 11 on Diagram 69105	Vol. 1783 / Folio 671	1072 Toodyay Road, Red Hill	25.7 ha
Lot 12 on Plan 26468	Vol. 1672 / Folio 829	1204 Toodyay Road, Gidgegannup	166.4 ha
Lot81 on Diagram14276	Vol. 1131 / Folio 63	2925 Roland Road, Parkerville	8.7 ha
Lot 501 on Plan 40105	Vol. 2227 / Folio 692	501 Highlands Drive, Parkerville	34.8 ha

The waste management operations are currently located in the western half of the Red Hill WMF predominantly covering Lots 1, 2 and 11; however some operations also extend into the western side of Lot 12. The Subject Site for the RRF is in the north west corner of Lot 12

The majority of Lot 12 has been cleared for grazing, although 13.5 ha of bushland have been retained as remnant native vegetation. The Subject Site is not located in this patch of remnant vegetation. The EMRC has also retained bushland in the two southern lots of the Red Hill WMF (Lots 81 and 501) to provide a buffer in excess of 500m for the landfill operations.

8.2 Red Hill Waste Management Facility

The EMRC operates the Red Hill WMF in accordance with the environmental and operating conditions outlined in the Licence No. 6833/10 issued by the DEC pursuant to Part V of the EP Act. The licence period commenced on 5 May 2006, and is due for renewal on 4 May 2011. Red Hill WMF is an approved Class III and IV landfill and accepts a range of wastes, including inert waste, putrescible waste, contaminated waste, type 1 and type 2 special wastes, in accordance with the facility's Conditions of Licence. The facility also acts as a collection and storage area for dry recyclables and household hazardous waste which are received at the transfer station.

Red Hill WMF accepts waste from various organisations within and outside the region including the general public, commercial operators, and Local, Regional, State and Federal Government organisations. In 2009 / 2010 the facility accepted approximately 309,300 tonnes of waste, including Member Council waste, commercial waste and other wastes (Class IV and greenwaste).

Prior to the Red Hill WMF development into a waste management facility, the former Department of Main Roads used the land as a borrow pit for the excavation of pisolitic laterite gravel (for use in road construction). Landfilling operations commenced in 1981 in Lot 11, which was filled to capacity in

1992, and subsequently capped and rehabilitated. In total there are 14 completed landfill stages on site. Landfill operations are currently undertaken in Lots 1 and 2 within the active Class III and Class IV cells. Another Class III cell has recently been constructed in the northwest corner of Lot 12 however landfilling has not yet commenced.

Modern sanitary landfill design and operation techniques are used at the Red Hill WMF, including cell membrane lining systems, leachate collection, methane gas capture and power generation. There are eight ponds located on the site to collect the leachate produced from the breakdown of putrescible waste in the active and completed landfill cells. The Landfill Gas and Power Pty Ltd (LGP) Station, which extracts and converts the landfill gas produced in cells 1 to 10 into renewable energy, is located in the northwest corner of the site (within Lot 11) adjacent to Toodyay Road. The LGP facility was upgraded during 2006/2007, which increased the capacity of the plant to 3.65MW. During the upgrade, the latest monitoring and switching equipment was installed, along with replacing the mufflers on the engine exhausts to reduce noise from the plant.

A green waste processing facility was developed in 2003, located on Lot 1 of the Red Hill WMF, and includes open windrow composting and mulching of source separated greenwaste. The greenwaste facility recycles greenwaste collected from Council verge collections, greenwaste bins, transfer stations and commercial customers. Australian Standard AS4454 composts, soil conditioners and mulches are produced from the composting process and are often made available to residents disposing of waste at the transfer station.

A 6,400L capacity 'multistore' dangerous goods unit was also constructed at the Red Hill WMF in 1997, to store low hazard household waste or household hazardous waste. Fitted with a range of safety features, the unit allows different classes of dangerous goods to be stored in individual compartments within the one facility. The unit is located in the northern portion of Lot 11. As the aggregate total of these types of dangerous goods is below the Manifest Quantity threshold (10,000kg or litres), storage of these goods are not required to be covered by a Dangerous Goods Site Licence. The EMRC has a Dangerous Goods Site Licence (No# DGS010844) for the following storage units:

- One 10,000L unleaded petrol underground storage tank; and
- One 25,000L diesel aboveground storage tank.

The Red Hill WMF also has a 5,200L mobile diesel trailer and a 1,300L mobile diesel trailer on site, however these are not required to be licensed.

Other infrastructure on site includes a transfer station, weighbridge, administration office, Environmental Education Centre, as well as both sealed and unsealed access roads. The weighbridge, administration office and Environmental Education Centre are located in the northern portion of Lot 11, adjacent to Toodyay Road. The transfer station accepts a range of wastes from residents including: general household waste, recyclable items, greenwaste, car bodies, household hazardous wastes, asbestos, tyres, e-waste and mattresses, and is located on the boundaries across Lots 2 and 11.

In accordance with the Conditions of Licence (No. 6833/10), Red Hill WMF is enclosed by a 1.8m high mesh-wire security fence. The fence has three-barbed extensions using 40mm galvanised tube posts. Access into the site is through the main gate located along the northern boundary of Lot 11 from Toodyay Road. The site is locked outside of commercial operating hours.

8.2.1 Future Landfill Expansion

The EMRC currently holds an Approval to Commence Development in relation Lots 1 and 2 for the purposes of excavation of lateritic clay and filling of excavation with waste. This approval nominates

Lot 11 as the site access, with Lot 12 being the site to contain spoil from the excavation. The approval is valid until 19 October 2016.

An Extractive Industry Approval is also current for Lots 1 and 2, and this is also valid until 19 October 2016. The Extractive Industry Approval allows for the excavation and sale of lateritic caprock and clay from a portion of Lot 12.

The entire development of Lots 1, 2, and 11 for landfill is anticipated to be completed in mid 2012. As such, the landfill will need to expand into Lot 12. To accommodate this expansion, the excavation of rock and soil from parts of Lot 12 required for landfill expansion has been undertaken and a liner and leachate system installed ready for the acceptance of waste.

8.2.2 Buffer Zones and Closest Residents

Under the DEC Conditions of Licence (No. 6833/10), an internal buffer of 35m is required to exist between an active landfill cell and the property boundary. In addition, the EPA’s Guidance Statement No. 3: Separation Distances between Industrial and Sensitive Land Uses (EPA 2005) indicates that a separation distance of 150m for single residences, and 500m for sensitive uses (subdivision) is suitable for Class II and Class III landfills. Red Hill WMF complies with these recommended distances.

Lots 81 and 501 (located to the south of the Class IV cell, in the Shire of Mundaring) were purchased by the EMRC to secure a buffer from the Hidden Valley Estate. Barbarich Estate exists to the east of the Lot 12 and is buffered from the active landfill cells by the road reserve for the future Hills Spine Road and the eastern portion of Lot 12. The John Forrest National Park provides a buffer to the south and southwest of the active cells, while the adjacent quarry sites provide a buffer to the west and to the northwest of the site.

A number of residences are located adjacent to the Red Hill WMF. The proposed Subject Site nominated by the EMRC for the RRF, Site B2 is approximately 400 metres from the nearest residence. There are four residences within 1 kilometre of Site B2 (**Figure 3**).

8.3 Climate

The Subject Site is located within the South-West region of Western Australia and experiences a typical Mediterranean climate with warm, dry summers and cool, wet winters.

8.3.1 Rainfall

While there are a number of weather stations located within the same sub-catchment as the Subject Site, the Mundaring Weather Station (No.009030) is the closest registered station to the Red Hill WMF. The Mundaring Weather Station is located within the Jane Brook Catchment approximately 8km southeast of the Subject Site.

Mean monthly rainfall data from the Mundaring Weather Station is summarised in **Table 8-2** below.

Table 8-2: Mundaring Mean Monthly Rainfall data from January 1888 – June 2010

Average Monthly Rainfall (mm)												
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
12.4	17.2	22.6	52.0	137.8	211.1	216.1	171.4	113.0	70.2	32.9	16.7	1076.9

(Bureau of Meteorology (BOM) 2010a)

Monthly rainfall data for the past year is summarised in **Table 8-3** below.

Table 8-3: Mundaring Monthly Rainfall from July 2009 – June 2010

Monthly Rainfall (mm)												
Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Total
242.8	226.8	209.8	17.8	56.0	0.2	0.2	2.0	22.2	34.4	116.0	61.8	990.0

(BOM 2010a)

The rainfall data indicates that the highest monthly rainfall occurs from May through to September, with approximately 79% of the annual rainfall occurring in these months.

8.3.2 Temperature

Monthly temperature readings have been taken from the Perth Airport Weather Station which is located approximately 17km southwest of the Subject Site. This Weather Station data has been used due to reliability and completeness of the data. The mean monthly maximum and minimum temperatures are summarised in **Table 8-4** below.

Table 8-4: Perth Airport Mean Monthly Temperature from June 1944 – May 2010

Average Monthly Temperature (°C)												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Max.¹	31.6	31.8	29.7	25.5	21.7	18.9	17.9	18.4	20.1	22.5	25.8	28.9
Min.²	16.9	17.4	15.9	12.9	10.4	9.0	8.1	8.0	8.9	10.2	12.6	14.8

((1) BOM 2010b and (2) BOM 2010c)

8.4 Topography, Geology and Soils

Red Hill WMF is located amongst rolling hills east of the Darling Escarpment. The topography of Red Hill WMF is naturally undulating with some considerable height differentials in areas that have been landfilled or used for overburden stockpiles. The highest point of elevation is approximately 305 metres Australian Height Datum (mAHD) located beneath the patch of remnant vegetation in Lot 12. The lowest point of the entire Red Hill WMF is 241 mAHD, also in Lot 12, demonstrating the undulating (and in some cases steep) nature of the site (**Figure 5**).

Geomorphic classification of Red Hill WMF reported in the Perth Metropolitan Area 1:50,000 Geological Mapping Series published by the Department of Mines and Petroleum (DMP 2006) indicates that the Red Hill WMF is predominantly underlain by granites and gravel distributed unevenly throughout the site. The underlying granites are characterised by fine to coarse-grained, occasionally porphyritic rocks of granite, granodiorite and adamellite composition. The gravels are characterised by yellow-brown to reddish brown, loose, fine to coarse, ferruginous pisolites, poorly sorted; variable amounts of sand and silt in matrix, minor recementation; colluvial origin (**Figure 6**).

The EMRC conducted soil borings across the Red Hill WMF in 1994 and 1999 to ascertain the geological profile underlying the site (EMRC 1999). Generally the soil profile is as follows:

- Gravel (0 - 0.5m)
- Lateritic Caprock (0.5 - 1.5m)
- Sand (1.5 – 2m)
- Clays (2m - 10m)
- Granite Bedrock (10m+).

8.4.1 Acid Sulfate Soils

Acid Sulfate Soils (ASS) are naturally occurring soils that contain iron sulphide (iron pyrite) minerals. If disturbed by dewatering, drainage or soil excavation, the pyrite can oxidise thereby releasing acidity and potentially causing environmental impacts, damage to infrastructure and affects to human health. There is no known occurrence of ASS on, or adjacent to Red Hill WMF (DOW 2010a).

8.5 Hydrology

8.5.1 Catchment

Red Hill WMF is located on the divide of three surface water sub-catchments –Jane Brook, Susannah Brook, and Strelley Brook. It should be noted that Strelley Brook Catchment is recognised by the Swan River Trust as being part of the wider Jane Brook Catchment, and is therefore described in this section as part of the Jane Brook Catchment. The sub-catchments form part of the greater Southwest Catchment, which in turn is located within the Swan Coastal Basin (DOW 2010b). Refer to **Figure 7** for the sub-catchment locations.

Susannah Brook Catchment covers approximately 55 km² in area, with agriculture (including broad acre farming, viticulture and grazing) being the dominant land use. Remnant vegetation exists in the centre of the sub-catchment, however extensive clearing of native vegetation has occurred in the upper catchment, and in the lower coastal plain section of the catchment (Swan River Trust 2007a).

Susannah Brook is an ephemeral stream (in flow between June and November) that drains from the Darling Scarp, and flows in a westerly direction into the upper Swan River. It is relatively unmodified with exception to a few small dams located in upper reaches of the stream (SRT 2007a). At its closest point Susannah Brook is located 400 metres north of Red Hill WMF (from the northern boundary of Lot 12).

Jane Brook Catchment covers a total area of approximately 137 km² with agriculture being the dominant land use in the catchment. The upper catchment is generally used for grazing, while the lower catchment principally supports viticulture and poultry farming. Native bushland, including the northern section of John Forrest National Park, exists in the middle of the catchment, with patchy areas of bushland also remaining amongst the rural and urban land uses in the upper catchment above the Darling Scarp. Few areas of native vegetation remain in the lower catchment below the scarp due to the expansion of new housing developments (SRT 2007b).

Similarly to Susannah Brook, Jane Brook is an ephemeral water body (in flow June to December) that drains from the Darling Scarp across the coastal plain before converging with the upper Swan River(SRT 2007b). Christmas Tree Creek, a tributary of Jane Brook, flows in a westerly direction adjacent to the southern boundary of the site (below Lot 501), before flowing in a south-westerly direction into Jane Brook. Strelley Brook, a small tributary of Jane Brook, flows in a southwest direction through the coastal plain portion of the catchment into Jane Brook.

8.5.2 Surface Water Monitoring

Several siltation ponds are located within Red Hill WMF. These ponds are designed to trap and settle out suspended solids and sediment from roads and active working areas within the site. During storm events, the siltation ponds may overflow, discharging water to the surrounding environment. Christmas Tree Creek and Strelley Brook are the two main receiving surface water bodies, and as such, these two environments are monitored quarterly to identify any impact from activities at the Red Hill WMF (EMRC 2009). Results of surface water testing is summarised in **Section 10.1**.

8.5.3 Public Drinking Water Source Area

To protect the State's drinking water resources the DOW has defined certain areas of the State as Public Drinking Water Source Areas (PDWSAs). These areas are given one of the following classifications:

- Priority 1 – managed with the principle of risk avoidance to ensure there is no degradation of the water resource. They cover land where the prime land use value is providing the highest quality drinking water;
- Priority 2 – managed with the principle of risk minimisation to ensure that there is no increase in the risk of pollution to the resource. They are declared over land where low intensity development (such as rural development) already exists; and
- Priority 3 – managed to limit the risk of pollution to the water source. They are declared over land where water supply sources need to co-exist with other land uses.

There are no PDWSAs within 5 kilometres of the site (DoW 2010a). A Priority 3 site which forms part of the Middle Helena Catchment Area is the geographically closest PDWSA, located approximately 7.5 km south of the site (at the closet point).

8.5.4 Proclaimed Surface Water Areas

Under the *Rights in Water and Irrigation Act 1914* (RIWI Act) it is illegal to take water from a watercourse in proclaimed surface water areas without a licence. There are 22 surface water management areas proclaimed under the RIWI Act in Western Australia. New licenses are only issued by the DOW when the allocation limit has not been reached to ensure the protection of the interests of existing users and the environment. Conditions are also placed on the licence to define how and when water may be taken and to specify obligations the licence holder must meet when using the water (DOW 2010b).

A search of the DOW's database has indicated that the Subject Site is not located in a proclaimed surface water area under the RIWI Act.

8.6 Hydrogeology

Previous groundwater and soil boring investigations at Red Hill WMF have indicated that the location and extent of groundwater beneath Red Hill WMF is extremely variable. This variation is attributed to the site's elevated location in the catchment and the lack of any defined groundwater aquifer. There are however two prevalent water tables identified beneath the site, including a perched aquifer in the upper or ferruginous zone above a relatively impermeable layer of kaolinitic clays, and a deep aquifer in the saprolitic zone (EMRC 2010). Groundwater in the lower zone is largely protected from pollution from the layer of low permeability kaolinite.

The depth to the perched aquifer under Site B2 is approximately 10 metres. Overall, groundwater at the Red Hill WMF flows in a south westerly direction.

There are currently 37 monitoring wells installed across Red Hill WMF. Quarterly groundwater monitoring is undertaken in accordance with Environmental Conditions imposed by the Minister for the Environment and Conservation's (Ministerial Statement), and with the requirements of the landfill site's Conditions of Licence.

During a routine monitoring event, groundwater contamination was detected at downgradient locations of the Class IV landfill cell, and also the southern boundary of Lot 11. While the contamination from the Class IV cell was considered localised, the contaminated groundwater plume

is not fully delineated from Lot 11. Monitoring and remediation is currently being taken to manage the contamination (EMRC 2010). Further results of groundwater monitoring are summarised in **Section 10.1**.

8.6.1 Potential Groundwater Receptors

A search of the DOW Registered Groundwater Bore database identified one registered bore (#23020548) located within the boundary of the Red Hill WMF (along the eastern boundary of Lot 12). The search also identified an additional 24 registered bores located within a 2 km radius from the centre of the Red Hill WMF. These bores are predominantly located in adjacent properties to the north and east of Lot 12.

Six bores, located in the rural / residential property to the north of Lot 12, are identified as being used for domestic, garden irrigation and/or livestock watering purposes, while an additional bore, located to the southeast of the Subject Site, is identified as a livestock watering well. Two project bores, owned by the Waters and Rivers Commission are located to the northeast of the site, while the uses of the remaining 15 bores are not provided in the search data (likely residential personal use).

8.6.2 Proclaimed Groundwater Areas

Under the RIWI Act it is illegal to take water from a groundwater aquifer in proclaimed groundwater areas without a licence. RIWI licensing is active in all proclaimed areas and for all artesian groundwater wells throughout the State. There are currently 45 groundwater management areas proclaimed under the RIWI Act (DOW 2010c). A search of the DOW's database (2010a) has indicated that the Red Hill WMF is not located in a proclaimed groundwater area under the RIWI Act.

8.7 Terrestrial Vegetation and Flora

8.7.1 Vegetation Mapping

Havel, Heddle and Loneragan (1978) mapped the vegetation of the Darling System in Western Australia at a vegetation complex level, which are broad vegetation units based on landform units and landform mapping. The vegetation complex mapping was at a scale of 1:250,000 and the vegetation complexes for the Red Hill WMF are shown on the 'Perth 1:250,000 sheet' (Havel et al 1978). The Red Hill WMF corresponds with three vegetation complexes:

- Dwellingup complex in medium to high rainfall (Darling Plateau): open forest of *Eucalyptus (E.) marginata* – *E. calophylla*
- Murray and Bindoon complex in low to medium rainfall (Darling Plateau): vegetation ranges from open forest of *E. marginata* – *E. calophylla* to woodland of *E. rudis* and *E. patens* on the valley floors
- Yarragil complex (Minimum Development Swamps) in medium to high rainfall (Darling Plateau): open forest of *E. marginata* – *E. calophylla* on upper slopes with mixtures of *E. patens* and *E. megacarpa* on valley floors.

The Red Hill WMF predominantly lies within the Dwellingup complex, with some northern sections of the site (in Lots 1, 2 and 12), and southern sections (in Lots 81 and 501) mapped within the Murray and Bindoon complex. A section of Lot 501 is also mapped within the Yarragil complex. **Figure 8** illustrates the vegetation complex mapping across the site and its surrounds.

Broad mapping for the Interim Biogeographic Regionalisation for Australia (IBRA) program placed the site within the Northern Jarrah Forest Subregion of the Bioregion 2 (Jarrah Forest) (DEWHA 2005).

8.7.2 Site Vegetation

Patches of native remnant vegetation exist across parts of the Red Hill WMF, while southern 'buffer' Lots 81 and 501 remain covered by native vegetation. Intentionally planted native vegetation to assist in the rehabilitation of the capped, former landfill cells is also present on site and located within Lot 11, and northern areas of Lots 1 and 2.

According to a recent Flora and Vegetation assessment undertaken by Helena Holdings WA Pty Ltd, the condition of the 13.5 ha fragment of remnant bushland in Lot 12 varies from Good (i.e. vegetation structure significantly altered by very obvious signs of multiple disturbances) to Degraded (i.e. basic vegetation structure severely impacted to disturbances) (Helena Holdings 2010). Results of this survey and other assessments are summarised in **Section 10.1**.

8.7.3 Clearing Permit

According to the DEC's Native Vegetation Map Viewer tool, two applications for Clearing Permits have been applied for by the EMRC for two separate areas of vegetation. Works in accordance with expired Clearing Permit No. 2277/1 were undertaken in 2008 for the construction of the new landfill cell in Lot 12. Clearing Permit No. 1516/1 was withdrawn by the EMRC, in 2007, as it was discovered that clearing permits had already been obtained for Lots 1 and 2.

8.7.4 Threatened or Priority Ecological Communities

Ecological Communities are defined as 'naturally occurring biological assemblages that occur in a particular type of habitat' (Department of Environmental Protection 2000). Threatened ecological communities (TECs) are those that have been assessed and assigned to one of four categories related to the status of the threat to the community, with the categories being:

- 'Presumed Totally Destroyed';
- 'Critically Endangered';
- 'Endangered'; and
- 'Vulnerable'.

Priority Ecological Communities (PECs), Priorities 1, 2 and 3, include 'Possible threatened ecological communities that do not meet survey criteria or are not adequately defined' (DEC unpublished). Priority 4 PEC's include 'Ecological Communities that are adequately known, and are rare but not threatened or meet criteria for Near Threatened, or that have been recently removed from the threatened list'. Conservation Dependent ecological communities are placed in Priority 5 PEC's (DEC unpublished).

A search of the DEC's TEC and PEC database found that there are no known occurrences of TEC or PEC's within the boundary of the Red Hill WMF. However there are occurrences of the following ecological communities within approximately 5km of the Red Hill WMF:

- **'Critically Endangered' TEC:** 'Eucalyptus calophylla - Xanthorrhoea preissii woodlands and shrublands' (Swan Coastal Plain Community Type 3c)
- **'Critically Endangered' TEC:** 'Shrublands and woodlands of the eastern side of the Swan Coastal Plain' (Swan Coastal Plain Community Type 20c)
- **'Priority 4' ecological community:** 'Central Granite Shrublands.'

8.8 Declared Rare and Priority Flora

A search of the DEC’s Threatened (Declared Rare) Flora database, the Western Australian Herbarium Specimen database and the DEC’s Declared Rare and Priority Flora List was undertaken for the site and the surrounding area. The database records showed that 13 species of Declared Rare and Priority Flora have been identified within a 5km radius of the Red Hill WMF. These species, their conservation codes and registered source are listed in **Table 8-5** below.

Table 8-5: Declared Rare and Priority Flora identified within 5km of the site

Species	Conservation Code	Source
<i>Acacia oncinophylla</i> subsp. <i>oncinophylla</i>	3	WAHERB
<i>Anthocercis gracilis</i>	R	WAHERB
<i>Calothamnus rupestris</i>	4	WAHERB, DEFL
<i>Darwinia pimelioides</i>	4	WAHERB, DEFL
<i>Diplolaena andrewsii</i>	R	WAHERB, DEFL
<i>Grevillea pimeleoides</i>	4	WAHERB
<i>Halgania corymbosa</i>	3	WAHERB, DEFL
<i>Lepyrodia heleocharoides</i>	3	DP List
<i>Pithocarpa corymbulosa</i>	3	WAHERB, DEFL
<i>Tetrathe capilifera</i>	3	WAHERB, DEFL
<i>Templetonia drummondii</i>	4	WAHERB
<i>Thysanotus anceps</i>	3	WAHERB
<i>Verticordia lindleyi</i> subsp. <i>lindleyi</i>	4	WAHERB

Source: WA Herbarium Specimen Database (WAHERB), DEC Threatened (Declared Rare) Flora database (DEFL), and DEC Declared Rare and Priority Flora List (DP List).

Populations of two Declared Rare Flora species, *Anthocercis gracilis* and *Diplolaena andrewsii*, have been identified approximately 4.5 – 5km southwest of the Red Hill WMF within John Forrest National Park. All other species have been identified as Priority Three (Poorly Known Taxa) or Priority Four (Rare Taxa) species. Priority Three species are taxa which are known from several populations, and the taxa are not believed to be under immediate threat, though are in need of further survey. Priority Four species are taxa which are considered to have been adequately surveyed and which, whilst being rare are not currently threatened by any identifiable factors.

8.8.1 Bush Forever

Bush Forever is a Western Australian Government initiative that identifies regionally significant bushland to be retained and protected forever. The land that has been nominated for Bush Forever sites covers a wide range of different tenures and land use types. Following guidelines set by the World Conservation Union, Bush Forever aims to protect a target figure of at least 10 per cent of the 26 original vegetation complexes within the Swan Coastal Plain portion of metropolitan Perth, and to conserve threatened ecological communities. Bush Forever sites have been nominated as part of an overall planning process that was undertaken over many years and is now overseen by the WAPC.

A search the DEC’s Native Vegetation Map Viewer found that the proposal is not located within or adjacent to a known Bush Forever site (DEC 2010).

8.8.2 Environmentally Sensitive Areas

Environmentally Sensitive Areas (ESAs) are areas prescribed and regulated under the *Environmental Protection (Clearing of Native Vegetation) Regulations 2004*. These areas have been identified in order to protect the native vegetation values of areas surrounding significant, threatened or scheduled ecosystems or communities. Where a clearing permit is required for an area that is situated within an ESA, then none of the exemptions pursuant to the Regulations apply.

A search of the DEC’s Native Vegetation Map Viewer found that the proposal is not located within or immediately adjacent to an ESA. The closest ESA, which covers riparian vegetation for Susannah Brook, is located approximately 400 metres north of the Red Hill WMF (at the nearest point from Lot 12) (DEC 2010) (**Figure 9**).

8.8.3 Nationally Threatened Flora Species

The EPBC Act also provides a listing of nationally threatened native species and ecological communities. Listed threatened species and ecological communities are recognized as a matter of national environmental significance. Therefore in the event that the proposal is likely to have a significant impact on listed threatened species and ecological communities, the proposal must be referred to the Federal Environmental Minister under the EPBC Act and undergo an environmental assessment and approval process.

As noted in **Section 4.2**, a search of the EPBC Protected Matters Search Tool indicated that one flora species, *Thelymitra stellata* (Star Sun-orchid), listed under Federal Legislation as a Threatened Species may potentially occur within a 1km radius of the Red Hill WMF.

8.9 Fauna

Searches of the DEC’s Threatened and Priority Fauna Database, the DEC’s NatureMap database, and the EPBC Protected Matters were undertaken to identify conservation significant fauna species that potentially occur within the survey area. The search results are summarized in **Table 8-6** below.

Table 8-6: Significant fauna species identified within a 5km radius of the site

Species	Conservation Code	Source
<i>Apus pacificus</i> (Fork-tailed Swift)	Migratory / Listed - overfly marine area	EPBC
<i>Ardea alba</i> (Great Egret, White Egret)	Migratory / Listed - overfly marine area	EPBC
<i>Ardea ibis</i> (Cattle Egret)	Migratory / Listed - overfly marine area	EPBC
<i>Calyptorhynchus banksianus</i> (Forest Red-tailed Black Cockatoo)	Vulnerable / Schedule 1	EPBC, DEC TPFDF
<i>Calyptorhynchus baudinii</i> (Baudin’s Black-Cockatoo, Long-billed Black-Cockatoo)	Vulnerable / Schedule 1 / T	EPBC, DEC TPFDF, NatureMap
<i>Calyptorhynchus latirostris</i> (Carnaby’s Black Cockatoo, Short-billed Black-Cockatoo)	Endangered / Schedule 1	EPBC, DEC TPFDF
<i>Calyptorhynchus sp</i> (White-tailed Black Cockatoo)	Schedule 1	DEC TPFDF
<i>Dasyurus geoffroyi</i> (Chuditch, Western Quoll)	Vulnerable / Schedule 1 / T	EPBC, DEC TPFDF, NatureMap
<i>Falco peregrinus</i> (Peregrine Falcon)	S	NatureMap

Species	Conservation Code	Source
<i>Haliaeetus leucogaster</i> (White-bellied Sea-Eagle)	Migratory / Listed - overfly marine area	EPBC
<i>Isodonobesulus fusciventer</i> (Quenda)	Priority Five	DEC TPFDF
<i>Macropus irma</i> (Western Brush Wallaby)	Priority Four	DEC TPFDF
<i>Merop sornatus</i> (Rainbow Bee-eater)	Migratory / Listed - overfly marine area	EPBC

Source: EPBC Protected Matters Search (EPBC), DEC Threatened and Priority Fauna Database (DEC TPFDF), and DEC NatureMap Species Report (NatureMap).

8.10 Site Contamination and Pollution Complaints

This section details the results of relevant investigations to ascertain if the Red Hill WMF has any registered historical contamination or pollution complaints.

8.10.1 DEC Contaminated Sites Database

According to a search of the DEC's Contaminated Sites Database, the Red Hill WMF is not registered as a Contaminated Site under the *Contaminated Sites Act 2003*. The database also indicates that no other sites in the vicinity of the Red Hill WMF have been reported to the DEC and considered as a contaminated site.

8.10.2 DEC Reported Sites Register

A request for a Basic Summary of Records Search for the Red Hill WMF was submitted to the DEC in August 2009. The DEC's records indicate that a memorial has been registered against Lots 1, 2, 11 and 12 of the Red Hill WMF with a site classification of "12/12/2008 - Possibly contaminated - investigation required".

The reason for this classification is stated as being due to the Red Hill WMF use as a putrescible and secure landfill site (since 1981), a land use that has the potential to cause contamination. It is further noted that at the time of classification (December 2008), the latest monitoring report indicated that hydrocarbons, metals and nutrients were present in groundwater at concentrations exceeding Australian Drinking Water Guidelines, Irrigation Guidelines and Freshwater Aquatic Ecosystem Guidelines. No soil sampling to determine the extent of contamination in the soil profile had been undertaken, and the contaminated groundwater plume has not been fully delineated. Further investigation is required to determine the extent of groundwater contamination. It is understood that this statement relates to the leachate contamination from Lot 11 as referred to in **Section 8.6**.

8.10.3 EMRC Complaints Register

The EMRC maintains a register of complaints in relation to the current operations of the Red Hill WMF, as required by the DEC under the Red Hill WMF Landfill Licence. Since January 2005, 20 registered complaints have been received from local community members, particularly in relation to odour emanating from the Red Hill WMF and litter along Toodyay Road. The EMRC has endeavoured to respond to each complaint with advice on what action the EMRC is taking on the reported issue, if applicable. **Table 8-7** below summarises the complaints received at the site since 2005.

Table 8-7: Registered complaints regarding operations at the Red Hill site since 2005

Issue	Complaint (date and issue)
Odour	25 January 2010 – offensive odour detected along Toodyay Road
	28 January 2010 – offensive odour detected along Toodyay Road (due west)
	15 December 2009 – offensive odour reported from eastern boundary neighbour
	11 March 2009 – offensive odour detected along Toodyay Road
	10 April 2008 – offensive odour detected along Toodyay Road in the evening
	30 July 2007 - offensive odour detected along Toodyay Road particularly in the evening
	29 November 2006 – offensive odour detected by neighbour
	20 November 2006 – offensive odour detected by local resident
Litter	2 June 2010 – litter along Toodyay Road
	11 July 2008 – litter along Toodyay Road
	12 February 2008 – litter along Toodyay Road
	14 August 2007 – litter along Toodyay Road
Noise	2 June 2010 – reversing beepers on heavy machinery
	8 August 2007 – noise emanating from LGP Station during the evening
	11 July 2005 – noise emanating from LGP Station
Other	28 January 2010 – dust from clay stockpile blowing off site onto neighbouring properties
	30 November 2009 – debris falling out of empty collection truck as driver had left rear door open
	23 October 2008 – visual amenity issue in relation to clay stockpile
	28 October 2008 – objection to installation of security fence along Lot 12
	2 February 2007 – concern in relation to proposed blasting (vibrations) on site

Source: EMRC Complaints Register 2005 – present

8.10.4 City of Swan Freedom of Information Search

A Freedom of Information (FOI) request was submitted to the City of Swanon 13 August 2010 to request documents relating to soil/groundwater contamination (confirmed, under investigation or previously investigated), pollution complaints, Notices or any other document relating to contamination or pollution of the environment within the Red Hill WMF. The City of Swan’s records indicate that there are no documents or reports regarding contamination issues on the Red Hill WMF existing on departmental files.

8.10.5 Department of Environment and Conservation Freedom of Information Search

A FOI request was submitted to the DEC on 13 August 2010 to search for documents relating to soil/groundwater contamination (confirmed, under investigation or previously investigated), pollution complaints, notices or any other document relating to complaints, contamination or pollution of the environment within the Red Hill WMF. Due to the volume of information in regards to the Red Hill WMF, it was agreed that only information not currently in possession of the EMRC be sourced. The following information was sourced from the DEC.

- Incident Report (dying trees) (April 2010): Dieback suspected;
- Concern with current Red Hill WMF operational practices (January 2009): The DEC noted (from EMRC monitoring results) that there is low level contamination (elevated nutrients) of ground and surface water, but the levels are not considered to pose a risk to the local environment or community. The EMRC have since undertaken a number of measures to prevent contamination offsite. The DEC also confirmed that the site was operating to best practice guidelines;
- Class IV load with no tracking form (June 2006): Was investigated and source found; and

- Noise Complaint (June 2005): Was investigated and source found. Management measures implemented by LGP.

There has been open communication between the DEC and the EMRC in regard to some groundwater contamination issues onsite, in relation the Class IV landfill and in proximity to the Class III and IV leachate ponds. Management and remediation measures have been implemented by the EMRC and extensive monitoring is ongoing. The DEC has been kept informed during this process.

8.10.6 Department of Mines and Petroleum Freedom of Information Search

A FOI request was submitted to the Department of Mines and Petroleum (DMP) on 13 August 2010 to request documents from the past five years (2005 – 2010) relating to licenses to store flammable liquids/dangerous goods / liquefied petroleum gas, underground tanks, fuel pumps, inspection / testing reports, contamination / pollution or spills that have occurred on site, or any Notices that have been issued to the EMRC in relation to the Red Hill WMF.

The DMP only provided a confirmation letter that explosives, dangerous goods and tanks had been removed from the Red Hill WMF in 2007. The current dangerous good infrastructure on site is outlined in **Section 8.2**.

8.10.7 Department of Water Freedom of Information Search

A FOI request was submitted to the DOW on 13 August 2010 to request documents for the past five years (2005 to 2010) relating to details of any pollution complaints received, any pollution / contamination that has been reported on site, and / or any Notices issued to the EMRC by the DOW.

The DOW communicated that they transferred the request to the DEC.

8.10.8 Department of Commerce Freedom of Information Search

A FOI request was submitted to the Department of Commerce (the Consumer Protection Division) on 13 August 2010 to request documents for the last five years (2005 to 2010) relating to complaints received, incidents that have occurred, or any Notices that have been issued to the EMRC in relation to the Red Hill WMF.

The search of the Consumer Protection Division's records resulted in a number of work safe investigations and enquiries. The investigations and enquires mostly revolved around minor incidents at the community drop off transfer station, appropriate management of asbestos and general operational procedures at the Red Hill WMF and other waste transfer stations operated by the EMRC in the region.

8.11 Social Context

8.11.1 Aboriginal Heritage

An online search for relevant Aboriginal Heritage information was performed using the Department of Indigenous Affairs (DIA) Aboriginal Heritage Inquiry System (DIA 2010). The online inquiry system incorporates both the Heritage Site Register and the Heritage Survey Database. The Heritage Site Register is held pursuant to Section 38 of the *Aboriginal Heritage Act 1972* and contains information on over 22,000 Aboriginal sites throughout Western Australia. The Heritage Survey Database is a catalogue of the heritage survey reports held by the DIA. It holds a description of each survey, its boundaries, proponent and participants. Table 8-8 summarises the registered Aboriginal sites and

survey reports in the immediate vicinity of the site as indentified from the Aboriginal Heritage Inquiry System search results.

Table 8-8: Previously Recorded Sites in the Vicinity of the Red Hill WMF

Site ID	Site No.	NAME	Status / Access / Restriction	Type	Location and Extent
640	S02890	Susannah Brook (whole extent mythological)	P / O / N	Mythological	414334E6478 836N
3656	S02278	Susannah Brook Waugal	P / C / N	Mythological	Not available for Closed Sites
3721	S02221	Red Hill	P / C / N	Mythological Quarry	Not available for Closed Sites
3188	S00546	Darling Range	Not a site	Not a site	415137E6475 750N
17696		Red Hill #1	P / O / N	Artefacts / scatter	413957E6477 364N
17697		Red Hill#2	P / O / N	Artefacts / scatter	413606E6477 559N
21077		Gidgegannup Petroglyph	P / O / N	Engraving	414487E6478 709N
21078		Gidgegannup Scarred Tree	P / O / N	Modified Tree	414495E6478 573N
21079		Gidgegannup Rockshelter	Interim / O / N	Rock shelter	414626E6478 498N
21080		Gidgegannup Gnamma Hole	P / O / N	Water source	414572E6478 709N
3433	S02735	Herne Hill Ochre	P / O / N	Mythological	413019E6477 779N
21170		Red/01	P / O / N	Engraving	414460E6478 575N
24883		Wirdarchi Sleeping Spot	L / O / N	Mythological	414128E6478 410N

(DIA 2010)

Notes:

Status – Lodged (L), Permanent (P), Interim

Access – Open (O), Closed (C)

Restriction – No restrictions (N)

Australian Interaction Consultants (AIC) undertook an archaeological and ethnographic survey of the site, and consultation with representatives of the Noongar Community in May 2008. A summary of AIC’s conclusions are summarised in **Section 10.1**. Indigenous Heritage sites are illustrated in **Figure 10**.

8.11.2 Native Title

The Government of Western Australia’s Office of Native Title was established in 2002 with the primary objective to:

- To resolve native title determination applications and native title compensation applications by agreement;
- To resolve native title matters in accordance with the requirements of the *Native Title Act 1993* (Cth) and relevant case law;
- To ensure valid 'future acts', that minimise the extinguishment or impairment of native title and minimise the State's exposure to compensation liability;
- To develop, implement and monitor policies, procedures and practices across Government that ensure native title matters are administered efficiently and consistently;
- To conclude agreements that deal in a comprehensive way with the determination of native title, compensation and arrangements for future acts; and
- To negotiate and participate in the implementation of project agreements.

Currently, there are 10 native title claims in the South West of Western Australia, nine of which are represented by the South West Aboriginal Land and Sea Council (SWALSC). There has been one native title determination in this area, which involved the determination that the Perth Airport is not subject to native title. There are two claims under active management in this region, the Single Noongar Claim (Area 1) and Gnaala Karla Booja. The Single Noongar Claim (SNC) was created to represent the interests of all the native title claimants in the South West region (Office of Native Title 2010).

The Metropolitan portion of the SNC was heard as a separate proceeding in 2006, and was ruled that, except for extinguishment, native title exists in relation to the whole of the Perth Metropolitan Area and that native title is held by the Noongar People (Office of Native Title 2010).

Red Hill WMF is freehold land owned by the EMRC, and therefore is not subject to native title claims.

8.11.3 European Heritage

8.11.3.1 Australian Heritage

In order to determine the actual or potential presence of sites or features of European Heritage significance in the vicinity of Red Hill WMF, a search of the Australian Heritage Database (Department of Environment and Heritage 2010) was undertaken. The Australian Heritage database contains information about more than 20,000 natural, historic and indigenous places throughout Australia and includes:

- World Heritage Sites
- National Heritage Sites
- Commonwealth Heritage Sites
- Sites listed on the Register of the National Estate.

The search indicated that there are no sites listed on the Australian Heritage Database on, or within the vicinity of Red Hill WMF.

8.11.3.2 Local Government Heritage

An online search for places considered to have cultural heritage significance within the City of Swan and Shire of Mundaring was performed using the Heritage Council of Western Australia's (HCWA's) database (Heritage Council of Western Australia 2010). The online system incorporates The State Register of Heritage Places which recognises places of value and importance to Western Australia, and also includes places listed in The State Register, Local Government Municipal Inventory, Commonwealth Register of National Estate and The National Trust List of Classified Places.

The search indicated that no sites of cultural significant are located within the boundary of Red Hill WMF. However one listed site on the HCWA's database, Twelve Mile Well (Place No. 14459), was identified 700m east of Red Hill WMF (Lot 12) at 1352 Toodyay Rd, Gidgegannup. Further information sought from the City of Swan in relation to this site indicated it was not listed on the City's Local Government Inventory as a heritage site. Anecdotal information suggests that the well was covered over during a reconstruction of Toodyay Road.

9 Summary of Potential Environmental Impacts and Possible Management Responses

The following section identifies the key potential impacts which may result from the construction and / or operation of the RRF, and management measures to prevent or mitigate these impacts. A priority assessment of each relevant environmental factor has also been undertaken to identify the environmental issues associated with the project that warrant further examination through the PER process. The PER will also provide a comparison of the environmental risks and benefits of the existing disposal method (landfill) versus the proposed technologies on a lifecycle basis.

9.1 Pollution

Potential sources of pollution arising from the construction and operation of the RRF include:

- Air/dust emissions;
- Solid and liquid residues;
- Noise emissions; and
- Artificial light pollution.

Each of these issues, their potential impacts and management measures to be implemented are discussed in the following subsections.

9.1.1 Air / Dust Emissions

Three key types of emissions associated with construction and / or operation of the RRF which may impact on air quality, include:

- Point source emissions;
- Fugitive emissions; and
- Dust emissions.

9.1.1.1 Point Source Emissions

Potential Impacts

The largest potential risk to air quality relates to chemical gases, greenhouse gases and / or particulate matter from the facility being emitted from particular parts of the facility (e.g. stack) at levels above the environmental and health regulatory standards defined in the Ministerial Statement. The potential impacts associated with the occurrence of an air or particulate matter emission breach include:

- Human health issues arising from direct exposure (e.g. air inhalation and incidental ingestion of soil or rainwater from tanks) or indirect exposure (food-chain exposures such as human consumption of produce, beef, fish, and milk);
- Deterioration of the health of surface water ecosystems from exposure to airborne pollution (locally and downstream);
- Deterioration of the health of terrestrial (including migratory species) flora and fauna, and disruption of terrestrial ecosystems from exposure to airborne pollution;
- Biomagnification of contaminants through different trophic levels, and / or bioaccumulation of contaminants within trophic levels, in surrounding terrestrial and / or aquatic ecosystems;
- Degradation of buildings and structures over time through chemical erosion; and
- Regional impacts, such as depletion of ozone, increase of pollution in the wider Perth Airshed and contribution to global warming.

It should be noted that gasification technologies have a higher risk than Anaerobic Digestion (AD) technologies to produce air and or particulate matter emissions above the set guidelines, due to the process involved. While AD technologies do produce some greenhouse gases during the process (e.g. maturation process of digestate), the actual biogas produced (CH₄ and CO₂) is converted to energy, with only CO₂ and H₂O (biogenic) released to the environment.

The RRF technologies under consideration will, if implemented, have a net reduction in CO₂ or CO₂ equivalent emissions compared to landfill. This is due to the offsetting of fossil fuel powered electricity and also preventing the generation of landfill gas (CH₄) through landfill diversion.

Management

To mitigate and manage the risk of point source air emissions, the EMRC will:

- undertake baseline monitoring of existing air quality to provide a context of the results of future monitoring of emissions;
- model the expected emissions and plume dispersion from the facility. Air emissions to be addressed include volatile organic compounds (VOCs), particulates (PM₁₀ and PM_{2.5}), metals, chlorinated organics, dioxins and furans and nano particles;
- employ cleaning, filtering, scrubbing devices to remove contaminants (e.g. acids, heavy metals, total organic carbons and dioxins) from flue gases prior to emission to the atmosphere;
- outline management processes in regards to air emissions for plant start-up, shut down and in case of plant failure;
- install an appropriate stack to minimise plume dispersion impacts where practicable;
- undertake regular monitoring of emissions for the life of the project, and make this information publicly available;
- select a contractor and associated technology that has a proven track record in a number of other facilities and meets the regulatory standards in these applications;
- prepare and implement an Air Quality Management Plan detailing all management measures; and comply with licensed emission limits.

Details of the pollution control equipment typically used for the proposed technologies along with the removal efficiency and expected down time will be provided in the PER.

9.1.1.2 Fugitive Emissions

Potential Impacts

Fugitive emissions (including gas or vapour leaks) may impact the surrounding environment if emitted in excessive quantities. Potential impacts on the surrounding environment from fugitive emissions of gases and / or particulates at levels above the environmental and health regulatory standards are expected to be the same as those listed in **Section 9.1.1.1** above (for point source emissions).

Management

To mitigate and manage the risk of fugitive air emissions, the EMRC will:

- select a contractor and associated technology that has a proven track record in a number of other facilities and meets the regulatory standards in these applications;
- prepare and implement an Air Quality Management Plan detailing all management measures; and
- undertake regular equipment monitoring and testing for leaks, and repair equipment immediately if leaks are detected.

9.1.1.3 Dust Emissions

Potential Impacts

Dust emitted from site at excessive levels during construction and operation of the facility may potentially cause:

- human and fauna health problems from direct exposure (e.g. respiratory issues, skin or eye irritations, and dust allergies);
- deterioration of the health of surface water ecosystems, due to dust settling on the surface water, causing:
 - decrease in water quality
 - sedimentation and eutrophication
 - loss of aquatic plants and animals;
- reduction in the condition of terrestrial vegetation, due to: shading of leaves reducing photosynthesis and plant performance, and encouraging the growth of epiphylls on leaves; and
- amenity and nuisance issues associated with dust deposits on neighbouring properties and passing vehicles.

Management

- seal roads for high traffic areas on site (where possible) to avoid dust creation;
- continue to use dust suppression processes on Red Hill WMF particularly during the construction period; and
- prepare and implement a Dust Management Plan detailing all dust management measures.

9.1.2 Solid and Liquid Residues

Due to the processes involved in each technology a solid and/or liquid residue will be produced. As discussed in **Section 5.1.2**, the gasification process results in both bottom ash and fly ash. Fly ash contains the residues from the bag house filter which forms a key part of the flue gas cleaning process. Lime and activated carbon are added to the flue gas prior to the bag house filter, which removes particulates, acid gases, metals and volatile organic compounds (including dioxin/furans). Fly ash is to be treated as hazardous material requiring to be handled appropriately and disposed of into a suitable class of landfill. Bottom ash is the solid residue from the furnace/gasification chamber and is comprised of ash with some metals residues. Metals can be recovered from the bottom ash using magnetic separators and other techniques and the remaining ash potentially used in road base or disposed of into an appropriate class of landfill. The PER will provide information relating to typical concentrations of contaminants in the bottom and fly ashes based on similar operating facilities, testing of the ashes to determine the appropriate class of landfill to be used for disposal, removal of metals and handling procedures.

The process of AD results in a residual solid (digestate) and residual liquid (see **Section 5.1.1**). The residual solid is separated from the digestate by a filter press or centrifuge and matured through aerobic composting. The liquid is either recirculated to the digester or disposed of onsite through the landfill leachate management system.

Potential Impacts

Due to the potentially hazardous nature of bottom ash and fly ash, these solid residues may have health and environmental impacts if not handled and disposed of safely and correctly. The solid and liquid residues resulting from the AD process may also have human health impacts due to the biological constituents and therefore, require appropriate management.

Management

To mitigate the potential health impacts associated with solid and/or liquid residues, the EMRC will:

- Implement appropriate safe handling and disposal processes;
- Dispose residual bottom ash and fly ash in the appropriate class of landfill located at the Red Hill WMF;
- Dispose of the residual liquid waste (from AD) to landfill or recirculate the liquid to the digester; and
- Ensure that the residual digestate solid meet an appropriate standard such as AS-4454-2003 Australian Standards for Compost, Soils Conditioners and Mulches, depending on the use of that material.

9.1.3 Noise Emissions

Potential Impacts

The amenity of residents living in proximity to the RRF may be impacted if noise levels exceed regulatory guidelines during construction and operation of the facility. Incoming and outgoing traffic to the site and machinery on site (including reversing beepers etc.) may also cause intrusive noise.

Prolonged exposure to excessive noise levels may lead to human health issues, for example hearing loss, increased stress levels and hypertension, aggression, sleep disturbances and depression. Faunal behaviours, including migration, breeding, feeding and general communication, may also be disrupted by excessive noise levels.

Management

To mitigate and manage the risk of excessive noise emissions, the EMRC will:

- undertake baseline noise monitoring of the site;
- model potential noise impacts of each technology's operations;
- implement noise control measures on site (e.g. using noise barriers through landscaping), and within the facility building;
- Equipment design to meet the *Environmental Protection (Noise) Regulations 1997*;
- undertake ongoing noise monitoring;
- respond to noise complaints immediately by undertaking steps to investigate and manage the issue; and
- prepare and implement a Noise Management Plan detailing all management measures during construction and operation.

9.1.4 Artificial Light Pollution

Potential Impacts

Potential adverse impacts associated with excessive artificial light generated from the facility at night may include:

- Light intrusion into the prescribed airspace of Perth Airport, affecting the operation of approaching aircraft;
- human health issues from light spillage into neighbouring homes, for example residents suffering fatigue, stress, headaches etc;
- reduced amenity from light spillage onto a neighbour's property;
- impacts on flora and fauna physiology and local ecosystems, for example, by confusing faunal navigation (in particular migratory birds), and confusing natural diurnal patterns of light and dark

- increasing occurrence of pests that are attracted to light;
- blinding or confusing pilots of aircraft operating in the prescribed airspace; and
- wasting energy due to instances of unnecessary lighting.

Management

To mitigate and manage impacts arising from artificial light pollution, the EMRC will:

- Design and install lighting to the approval from CASA (through the WAC) to ensure lights will not intrude on prescribed airspace;
- use minimum intensity light sources necessary to accomplish the lighting requirements and still uphold Occupation Health and Safety requirements for the site;
- install light motion sensors or timers in appropriate areas of the facility, and train staff to manually switch off lights when not needed;
- ensure light fixtures direct light to where it is required to reduce light spillage effects; and
- design the facility and landscape to help protect neighbouring properties from light spillages.

9.2 Impacts on Social Surrounds

9.2.1 Odour Emissions

Potential Impacts

The amenity of residents living in proximity to the RRF may be impacted if nuisance odours are emitted from the RRF. There is a greater risk of odour emissions from AD than for gasification due to the odorous nature of the waste pre-treatment, aerobic maturation of solid digestate and separation processes for the liquid digestate following the anaerobic digestion process. As the anaerobic decomposition takes place within a sealed vessel, there is only a low risk of odour emission from this phase of the AD process. The separation process for the liquid digestate following the anaerobic digestion process can lead to odours within the process building. With AD technologies, odours may also be generated through the maturation phase of composting, although as the organic material has already been digested, the odour will be less offensive than the earlier stages of biological decomposition.

The risk of odorous emissions from a gasification facility is limited to the waste receipt and pre-treatment areas. Air from these sections of the facility can be fed into the oxidation reactor of the facility to neutralise the odours.

The establishment of a RRF on site may improve the odour profile at the Red Hill WMF as the RRF will treat most of the waste received (not all waste will be processed through the RRF depending on RRF capacity and ramp up, some waste will continue to be landfilled) and treat the odour prior to release.

Management

To mitigate and manage the risk of nuisance odour emissions, the EMRC will:

- undertake baseline odour monitoring of the site;
- model the potential odour impacts of each technology;
- construct and operate within sealed buildings during waste receipt and pre-treatment of waste;
- design sealed digesters for AD processes that are robust and pose little risk of breach and failure;
- install one, or a number (as required), of odour control systems, such as biofilters which extract odorous air from the sealed process areas before being filtered, treated and released to the environment;

- respond to odour complaints immediately by undertaking steps to investigate and manage the issue; and
- prepare and implement an Odour Management Plan detailing all management measures;
- prepare and implement a Biofilter Management plan to ensure this system is maintained and operates effectively.

9.2.2 Aboriginal Heritage

As discussed in **Section 8.11.1**, an online search of DIA Aboriginal Heritage Inquiry System (DIA 2010) for relevant Aboriginal Heritage information has revealed that a few aboriginal heritage sites are recorded in the immediate vicinity of the Red Hill WMF (**Table 8-8**). However, as none of these sites are within the site (see **Figure 10**), it is therefore unlikely that the construction and / or operations of the proposed RRF would disturb the surrounding aboriginal heritage sites. The site construction will be carried out in compliance to the *Aboriginal Heritage Act 1972*.

9.2.3 Change in Visual Amenity

Potential Impacts

There is potential for the RRF to impact the local residents' visual amenity, however considering that the Subject Site is within waste management facility, visual amenity of the site is already low.

Management

To mitigate and manage the visual amenity issues arising from construction of the facility, the EMRC will:

- consult the local community, determine their requirements in relation to visual amenity, and implement their recommendations if practicable;
- reduce the height of any exit stack as much as possible, whilst considering required emission controls; and
- landscape the area surrounding the RRF.

9.2.4 Increased Traffic

Potential Impacts

Population growth in the Region is expected to result in gradual increases in the amount of waste collected from the kerbside, and therefore increases in collection truck traffic to / from Red Hill WMF can be expected over the life of the project. The amount of traffic on Toodyay Road is currently a contentious issue with some local community members. Development of an RRF is not expected to increase the number of kerbside collection trucks delivering waste to the facility above the number that would enter Red Hill WMF without the RRF, as the waste would be disposed to landfill on the site. However, as RRF technologies will be producing marketable products there will be an increase in the number of trucks entering and leaving Red Hill WMF. This is likely to be limited for gasification as it will involve the transport of recovered recyclables. The number of truck movements would be greater with an AD technology which generates relatively large volumes of compost, in addition to the recyclables.

The development of the Perth - Adelaide Highway, and the Hills Spine Road, will significantly change traffic flows, and increase traffic through Red Hill and Gidgegannup. It is not known when these roads will be constructed by Main Roads; however it is not expected to be within the next 10 years. Access from Red Hill WMF will need to be reassessed during the design of the Perth – Adelaide Highway. Preliminary discussions with Main Roads propose that the main access point to Red Hill WMF will be

relocated to the Hills Spine Road. This issue was considered during the site selection study for the RRF and the chosen site will not be affected by such a change if it was to occur. Therefore this development should not impact on the assessment of this proposal.

Management

To mitigate and manage impacts arising from increased traffic in and out of the site, the EMRC will:

- Ensure that the site access roads and associated intersections are designed to safely accommodate the expected traffic volumes and turning movements of vehicles; and
- Continue to monitor traffic entering and leaving the site.

9.3 Impacts on Biophysical Factors

The existing biophysical settings such as hydrology, hydrogeology and flora and fauna of the site and surrounds may potentially be impacted by the construction and / or operations of the proposed RRF as discussed below.

9.3.1 Vegetation Clearing

Potential Impacts

The proposed location of the RRF (Site B2) will require limited to no clearing of remnant vegetation as the site has been parkland cleared in the past for grazing. Flora studies have recently been completed for the proposed lot for the RRF. These are further discussed in **Section 10.1**.

Clearing vegetation on site, if it was to occur at a significant level could result in:

- reduction in colonisation ability of the remaining plants;
- increasing the susceptibility to weed species and overall decline of existing vegetation condition;
- loss of habitat and foraging extent for native fauna;
- further reduction in the total wildlife corridor area, which exists between the Jane Brook and Susannah Brook sub-catchments; and
- disruption of faunal behaviour, for example, migration, breeding and feeding habits and / or causing fauna injury or deaths.

Management

To mitigate and manage impacts arising from clearing remnant vegetation on site, the EMRC will:

- minimise the amount of clearing undertaken for the construction of the RRF;
- undertake clearing using best practice methods to minimise damage to remaining vegetation and minimise the likelihood of faunal injury;
- re-establish fauna habitat if necessary; and
- recycle the cleared vegetation through the onsite greenwaste processing facility.

9.3.2 Liquid Emissions

Potential Impacts

A rupture or breach of the digester of an AD facility may cause leachate or contaminated liquid to be released into the surrounding environment. Flooding or a fire within the waste receival facility of any of the technology options may also cause an uncontrolled contaminated liquids flow. The gasification technology will have boiler water and cooling water blow down discharges. Both technologies will have washdown water discharges from time to time depending on housekeeping requirements.

Potential impacts from a significant breach of liquid may include soil, groundwater and surface water contamination. This has flow-on effects to the ecosystems inhabiting the aquatic ecosystems, as well as downstream or downgradient effects.

Management

To mitigate and manage the risk of fugitive liquid emissions, the EMRC will:

- select the successful tenderer based on evidence that the technology and design is proven and meets the regulatory standards in these applications;
- design the facility to minimise and contain liquid leakages;
- undertake regular equipment monitoring and testing for leaks, and repair equipment immediately if leaks are detected;
- make spill kits available on site, and train staff to manage site spills in emergencies; and
- undertake remediation of contaminated areas if spills occur.

9.4 Priority Assessment of Environmental Factors

Table 9-1 presents the priority of each environmental factor discussed above. The justification of determining the priority of each environmental factor is based on the relevant descriptions of existing environment in **Section 8** and discussions of the potential impacts and management measures to be implemented as discussed in **Section 9.1, 9.2 and 9.3**.

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Table 9-1: Priority of Environmental Factors

Environmental Factor	Risk Description	Comments
Air Quality	<ul style="list-style-type: none"> › Air emissions › Dust emissions; and › Greenhouse gases emissions during construction and / or operations 	<ul style="list-style-type: none"> › The site provides an excess of 500m buffers to the nearest sensitive land uses (i.e. residential area); › Prepare and implement an Air Quality Management Plan; › Undertake modelling of air emissions; › Implement dust control measures; and › Employ appropriate pollution control equipment to remove contaminants from flue gases or composting aeration gases prior to emission into the atmosphere.
Noise	<ul style="list-style-type: none"> › Noise emissions during constructions and / or operations affecting neighbouring properties or affecting workers and visitors to the site. 	<ul style="list-style-type: none"> › The site provides an excess of 500m buffers to the nearest sensitive land uses (i.e. residential area); › Prepare and implement a Noise Management Plan; › Comply with the <i>Environmental Protection (Noise) Regulations 1997</i>.
Odour	<ul style="list-style-type: none"> › Odour emissions to the nearest residential area during operations 	<ul style="list-style-type: none"> › The site provides an excess of 500m buffers to the nearest sensitive land uses (i.e. residential area); › Prepare and implement Odour Management Plan; › Operate within sealed buildings or in-vessel where practicable; › Maintain negative air pressure in odorous parts of the facility; and › Install appropriate Odour Control Systems to service the RRF.
Traffic	<ul style="list-style-type: none"> › Increased traffic 	<ul style="list-style-type: none"> › Prepare and implement a Traffic Management Plan; and › Continue to monitor traffic entering and leaving the site.
Aboriginal Heritage	<ul style="list-style-type: none"> › Disturbance to the surrounding aboriginal heritage sites 	<ul style="list-style-type: none"> › None of the DIA recorded sites is within the site; › Surveys have found that the archaeological potential for sub-surface materials to be uncovered is minimal, and that further archaeological and ethnographic research of Lots 12, 82 and 501 is not required; and › Comply with <i>Aboriginal Heritage Act 1972</i>.
Visual Amenity	<ul style="list-style-type: none"> › Artificial light pollution 	<ul style="list-style-type: none"> › The site provides an excess of 500m buffers to the nearest sensitive land uses (i.e. residential area); › Design the RRF and landscape in a way to protect receptors from artificial light;

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Environmental Factor	Risk Description	Comments
		<p>and</p> <ul style="list-style-type: none"> › Obtain approval from CASA (through the WAC) to ensure lights will not intrude on prescribed airspace.
Groundwater	<ul style="list-style-type: none"> › Contaminations of groundwater during construction and / or operations; and › Liquid emissions during operations; 	<ul style="list-style-type: none"> › The site is not located in a proclaimed groundwater area under the RIWI Act; › Facility to be designed to contain potential liquid spillages; › Continue groundwater monitoring and sampling; › Appropriate disposal of solid and liquid residues from the process; and › Undertake regular equipment monitoring and testing for leaks.
Surface Water	<ul style="list-style-type: none"> › Contaminations of surface water during construction and / or operations; and › Liquid emissions during operations 	<ul style="list-style-type: none"> › The site is not located in a proclaimed surface water area under the RIWI Act and there are no PDWSAs within 5 kilometres of the site; › Facility to be designed to contain potential liquid spillages; › Continue surface water monitoring and sampling; and › Undertake regular equipment monitoring and testing for leaks.
Terrestrial Vegetation / Flora	<ul style="list-style-type: none"> › Ground disturbance and vegetation clearing; and › Disturbance to Declared / Priority Flora and / or Bush Forever sites 	<ul style="list-style-type: none"> › The proposed RRF will be located within the existing Red Hill WMF and ground disturbance during construction would be minimum; › No Declared / Priority Flora and / or Bush Forever Sites in the immediate vicinity of the site; › Prepare and implement a Vegetation Clearing Management Plan; and › Comply with the conditions of the Licence 6833/10 issued by the DEC for the landfill operations at Red Hill WMF.
Terrestrial Fauna	<ul style="list-style-type: none"> › Vegetation clearing and direct removal of habitats; › Disturbance to significant fauna species; › Dust emissions; › Increased frequency of fire; and › Increased human activity and vibrations during construction and / or operations 	<ul style="list-style-type: none"> › The proposed RRF will be located within the existing Red Hill WMF and it is unlikely that direct removal of habitats would occur during site construction; › No significant fauna species were recorded in the immediate vicinity of the site; › The significance of clearing is considered to be low or low to moderate and unlikely to further fragment fauna populations in the area; › Prepare and implement a Fauna Management Plan; and › Comply with the conditions of the Licence 6833/10 issued by the DEC for the landfill operations at Red Hill WMF.
Aquatic Vegetation / Flora	<ul style="list-style-type: none"> › Disturbance to Environmentally Sensitive Areas (ESAs); 	<ul style="list-style-type: none"> › No Environmentally Sensitive Areas (ESAs) in the immediate vicinity of the site;

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Environmental Factor	Risk Description	Comments
	and › Contamination of surface water	and › Continue surface water monitoring and sampling.
Aquatic Fauna	› Disturbance to Environmentally Sensitive Areas (ESAs); › Contamination of surface water; and › Increased human activity and vibrations during construction and / or operations	› No Environmentally Sensitive Areas (ESAs) in the immediate vicinity of the site; › Continue surface water monitoring and sampling; and › Prepare and implement a Noise Management Plan.

9.5 Summary of Key Environmental Factors

The following summarises the environmental factors which may potentially be impacted by the construction and / or operations of the RRF in a sequence of priority as presented in **Table 9-1**:

- Pollution Management
 - Air quality; and
 - Noise emissions.
- Social Surrounds
 - Odour emissions;
 - Traffic;
 - Aboriginal heritage; and
 - Visual amenity.
- Biophysical Factors
 - Groundwater and surface water quality;
 - Terrestrial Vegetation / Flora and Fauna; and
 - Aquatic Vegetation / Flora and Fauna

These environmental factors are addressed further in **Section 11**.

10 Scope of Works

10.1 Previously Completed Studies

10.1.1 Six Year Environmental Performance Review 2004 – 2009 (June 2010)

The Six Year Performance Review was prepared by the EMRC in accordance with the conditions stated in *Ministerial Statement 462 Condition 7-1* and reports on the environmental performance of the Red Hill WMF for the period 2004 to 2009.

Surface water monitoring data collected quarterly over the reporting period does not indicate any decline in downstream surface water quality. Nutrient concentrations at the point of stormwater discharge have improved since the establishment of a nutrient stripping pond. Nitrogen concentrations monitored in Christmas Tree Creek downstream of the facility were below guideline levels. Biological monitoring of surface water systems surrounding the facility indicates that the biological integrity and ecological health of these systems has been maintained.

Groundwater monitoring data have shown that background monitoring bores (located upgradient of the landfill) have maintained background concentrations for all parameters throughout the reporting period.

DEC accredited auditors, OTEK, were engaged by the EMRC in August 2008 to conduct an independent review of all groundwater investigations and remediation works conducted at the Red Hill WMF.

Groundwater monitoring detected contamination in two locations downgradient from the facility. These occurred in bores surrounding the Class IV landfill cell and bores along the southern boundary of Lot 11. In response, the EMRC engaged groundwater consultants ATA Environmental to conduct extensive hydrogeological investigations to determine the extent of the leachate impacted groundwater. Subsequent remediation efforts were concentrated on the Lot 11 area due to the limited extent and localised nature of the Class IV contamination. The EMRC engaged Crsalis International to prepare and design specifications for the placement of 'pump and treat' system to recover contaminated groundwater across the Lot 11 area. This system was installed in October 2009 and recovery operations commenced in December 2009.

Revegetation of former landfill cells has been conducted progressively at the Red Hill WMF since landfilling began in 1981 with a total area of 13.7 Ha being rehabilitated during the six year reporting period. The Class IV, Stage 1 cell was filled and capped in 2007 and direct seeded in 2008.

The EMRC decided to progress the Red Hill WMF EMS to International Standards for Environmental Management Systems – ISO 14001 and seek certification to this standard. The Red Hill Environmental Policy was amended and upgraded in 2009 to better reflect the growing activities, products and services of the Red Hill WMF operations.

10.1.2 Flora and Vegetation Assessment (May 2010)

Helena Holdings Pty Ltd was engaged by the EMRC to conduct a Level 1 flora and vegetation assessment within Lot 12 of Red Hill WMF. The survey was undertaken as a requirement for a clearing permit being sought by the EMRC in order to expand its current landfill operations. The survey area comprised of two parts; Area 1 (13.5ha area of existing remnant vegetation) and Area 2

(36.5ha of grazing pasture with isolated or scattered groups of predominantly *Corymbia calophylla* (Marri trees)).

The results of the Level 1 survey undertaken in October 2009 are summarised below:

- The survey area has been subject to major disturbance (clearing, logging, grazing etc.), resulting in the remnant native vegetation becoming fragmented from the northern boundary of John Forrest National Park.
- A total of 72 taxa were recorded in the project area (including 39 native taxa from 18 Families and 33 weed taxa from 17 Families).
- Two occurrences of *Templetonia drummondii*, a Priority 4 plant, were recorded within Area 1, although the potential for clearing to adversely impact on the conservation status was determined to be low.
- No TEC were recorded during the survey.
- The regional impact of the proposed clearing on the vegetation type is considered low.
- Modification of all plant strata has occurred though the vegetation within the central portion of Area 1 was determined to be in good condition with evidence of the ability to regenerate.
- Condition of Area 2 is considered completely degraded.
- No expression of *Phytophthora* spp. induced dieback was evident.
- Habitat and food sources for the endangered *Calyptorhynchus latirostris* (Carnaby's Black Cockatoo) and vulnerable *Calyptorhynchus Baudinii* (Baudin's Black Cockatoo) may potentially be reduced if one or more of the following species are cleared:
 - *Banksia sessilis* var. *sessilis* (Parrot bush) - identified within the remnant vegetation of Area 1 in mostly good condition
 - *Corymbia calophylla* (Marri) – large Marri trees were identified in Area 1 and in isolated or scattered groups in Area 2
 - *Banksia grandis* and *Allocasuarina fraseriana* – both identified in the survey area.

10.1.3 Fauna Assessment (February 2010)

The EMRC commissioned Bamford Consulting Ecologists (BCE) in 2009 to conduct a fauna assessment within the bushland of Lot 12 within Red Hill WMF. The survey was undertaken in November 2009, to determine the fauna values of the site and identify the likely impacts of the potential clearing required for the expansion of the current landfill operations.

BCE concluded that, whilst there is the possibility that 57 fauna species of conservation significance could occur in the vegetation in Lot 12, the significance of clearing was considered to be low or low to moderate and unlikely to further fragment fauna populations in the area.

10.1.4 Vegetation Monitoring Report (November 2009)

The EMRC engaged Tranen Revegetation Systems (Tranen) in 2009 to monitor the revegetation of the Red Hill WMF over a number of completed landfill cells. The aim of the assessment was to determine the level of success of the rehabilitation works and provide recommendations for future planning.

Tranen observed a drop in species richness and overall native cover, which is considered normal due to successional change in the plants, the development of cover and weaker germinants dying. Overall the health of the plants is good and weed cover is minimal in most areas.

10.1.5 Archaeological and Ethnographic Heritage Survey Report (May 2008)

Australian Interaction Consultants (AIC) were contracted by the EMRC to facilitate an archaeological and ethnographic survey of the proposed expansion of the Red Hill WMF in 2008. Along with AIC consultants, the ethnographic survey involved a number of members of the Combined Swan River and Swan Coastal Plain Working Group, which includes the Swan Valley Noongar Community, the Independent Aboriginal Environment Group, Bibbulmun, Ballaruk and Jacobs Family. The archaeological survey was undertaken by AIC archaeologists. The lots inspected included 12, 82 and 501.

AIC concluded that no new sites were identified from the surveys and the proposed expansion of the landfill will not impact any registered sites and the archaeological potential for sub-surface materials to be uncovered is minimal. AIC also recommended that further archaeological and ethnographic research of Lots 12, 82 and 501 is not required.

10.2 Proposed Studies and Investigations

10.2.1 Air Quality

An Air Quality Assessment will be undertaken by a suitably qualified consultant to determine:

- the existing ambient concentrations within Red Hill WMF;
- the existing emissions from landfill (and associated) operations on Red Hill WMF; and
- the predicted emissions and plume dispersion resulting from operation of the RRF.

The consultant will adopt the DEC's Air Quality Management Branch air quality criteria / guidelines including sampling methodology, laboratory tests, data sets and computer dispersion model to satisfy the DEC requirements.

The consultant will undertake the following scope of works to complete the Air Quality Assessment:

- Review / investigate the site: including location, operations, potential receptors, surrounding land use, meteorological data, and terrain (etc);
- Formulate an appropriate sampling methodology and seek advice from the DEC in relation to this methodology;
- Undertake baseline sampling of air concentrations on and surrounding the site;
- Undertake a Preliminary Health Impact Assessment for each technology option based on inhalation pathway;
- Undertake dispersion modelling for both RRF technologies addressing volatile organic compounds (VOCs), particulates (PM₁₀ and PM_{2.5}), metals, chlorinated organics, dioxins, furans and nanoparticles as appropriate for the technologies; and
- Prepare and submit an Air Quality Assessment report which includes (but not limited to):
 - Air quality criteria / guidelines used
 - Existing or baseline emissions
 - Existing air emissions and identified sources of emissions
 - Current impacts on the surrounding environment
 - Plume dispersion modelling methodology
 - Data sets used
 - Results of plume dispersion modelling
 - Discussion
 - Recommendations.

The findings of the Air Quality Assessment will be summarised in the PER document, and the full Air Quality Assessment report will be provided as a separate report.

10.2.2 Odour

An Odour Impact Assessment will be undertaken by a suitably qualified consultant on and in the proximity of Red Hill WMF. The objective of the Odour Assessment is to determine the current level of nuisance odours, and also predict the likely impact the operation of an RRF will have on potential receptors located proximate to the site.

The scope of work for the Odour Assessment will be undertaken in accordance with DEC requirements and best practice. This will include:

- the EPA's interim *Guidance Statement No.47 Assessment of Odour Impacts from New Proposals* (EPA 2002);
- the consultant's NATA Accreditation for odour sampling and testing; and
- the Australian Standard for the Determination of Odour Concentration by Dynamic Olfactory AS/NZS 4323.3:2001.

The consultant will undertake the following scope of works to complete the Odour Impact Assessment:

- Review / investigate the site: including location, operations, potential receptors, surrounding land use, meteorological data, and terrain;
- Conduct sampling on and surrounding the site;
- Undertake odour dispersion modelling for each different RRF technology; and
- Prepare and submit an Odour Impact Assessment report which includes (but not limited to):
 - Sampling and testing methodologies used
 - Presentation of odour criteria / guidelines adopted
 - Existing odour emissions and identified sources of emissions
 - Current impacts on the surrounding environment
 - Odour dispersion modelling methodology
 - Data sets used
 - Results of odour dispersion modelling
 - Discussion
 - Recommendations.

The findings of the Odour Assessment will be summarised in the PER document, and the full Odour Assessment report will be provided as a separate report.

10.2.3 Solid and Liquid Residues

Information relating to the following issues will be obtained from similar operating facilities:

- Typical concentrations of contaminants in the bottom and fly ashes from gasification technologies and any residue from the digestate and liquid take off from the AD technologies;
- How metals are removed from the bottom ash;
- How residues will be tested to determine if and to what class of landfill they may be disposed; and
- Safe handling procedures.

This information will be reported in the PER document and will inform the specific management measures to be implemented for the operation of the facility.

10.2.4 Noise

A Noise Impact Assessment will be undertaken by a suitably qualified consultant to determine the current noise levels measured at emission sources and neighbouring premises, and also to predict the noise levels associated with future operation of the RRF (including operation of the facility, and associated machinery and transport). The Noise Impact Assessment will be undertaken in accordance with the *Environmental Protection Act 1986* and the *Environmental Protection (Noise) Regulations 1997*.

The consultant will undertake the following scope of works to complete the Noise Impact Assessment:

- Review / investigate the site: including location, operations, potential receptors, surrounding land use, meteorological data, and terrain.
- Conduct sound level measurements over a representative assessment period (i.e. to determine the L_A max, L_{A1} and L_{A10} levels) at the emission source, and at neighbouring premises.
- Undertake noise modelling for each different RRF technology.
- Prepare a Noise Impact Assessment report which includes (but not exclusively):
 - Details of the measurement methodology, guidelines and noise level criteria used
 - Presentation of assigned noise levels
 - Existing noise emissions and identified sources of emissions
 - Current impacts on the surrounding environment
 - Noise modelling methodology
 - Data sets used
 - Results of the noise modelling
 - Discussion
 - Recommendations.

The findings of the Noise Impact Assessment will be summarised in the PER document, and the full Noise Impact Assessment report will be provided as a separate report.

10.2.5 Traffic

A traffic study to determine the predicted impact the establishment of the RRF will have on the surrounding road network (in particular Toodyay Road) will be undertaken by qualified traffic engineers. The specific aims of the study will be to determine:

- the current number of collection trucks entering / leaving the site;
- the expected increase in collection trucks entering / leaving the site and trucks removing RRF products from the site; and
- the potential impacts on the surrounding road if the number of trucks entering / leaving the site increases.

10.2.6 Other studies

In addition to the above detailed studies, the following investigations will also be undertaken:

- Assess the potential artificial light requirements of the facility, and identify receptors particularly susceptible to the artificial light pollution, including the possibility of light from the RRF intruding into the prescribed airspace of Perth Airport; and
- Identify and document sources of potential dust emissions in relation to the construction and operation of the RRF.

These assessments will provide information for the specific management measures to be devised and implemented prior to construction and operation of the facility.

10.3 Community and Other Stakeholder Consultation Program

10.3.1 Community Consultation Previously Undertaken

Substantial engagement has taken place with the regional community, community groups and the Member Councils since the commencement of the RRF project. Community and stakeholder consultation is intended to continue to the end of the project. The following two key phases of the planning process have involved engagement of the community:

Preliminary Assessment of Sites and Technologies

The preliminary assessment of potential sites and technologies involved substantial community participation in the form of:

- community information sessions within each of the six Member Councils;
- two regional workshops (on 15 October 2005 and 18 February 2006 respectively);
- follow up telephone validation surveys;
- Market research including quantitative and qualitative components in 2009;
- Seminar for community stakeholders on EfW with Professor Themelis and Robin Davidov, April 2010; and
- Community Forum September 2010.

Preferred Resource Recovery Facility Options

A community research program was run by Patterson Market Research concurrently with the EOI process to ascertain the current community views on the acceptability of technologies and of sites. The study involved a structured phone survey, and discussions with community focus groups.

Briefings on the Resource Recovery Project were also provided to local members of Parliament, the Minister for Local Government, some Federal Members of Parliament, the State Shadow Cabinet and the Waste Authority between June and September 2009 (concurrent to the EOI process).

There have been ongoing briefing sessions to the EMRC’s Member Councils and local community groups throughout the planning phase of the project, with the most recent occurring during March 2011. These briefing sessions will continue until the commissioning of the facility in 2015. Community engagement will continue throughout the life of the project.

10.3.2 Ongoing Engagement

The project’s community engagement process has involved a range of activities since the project commenced and now involves three key community groups. Each of these groups’ purpose, structure and consultation program is summarised below in **Table 10-1**.

Table 10-1: Community Groups consulted for Red Hill and the RRF

Community Group	Purpose	Structure	Consultation Program
EMRC Waste Management Community Reference Group (WMCRG)	Formed in 2002, The WMCRG provides informed advice and feedback to the EMRC on a range of waste management and waste education issues, including feedback in relation to the resource recovery project.	Currently 14 Reps from across the 6 member Council region. Chaired by one of the members, EMRC record minutes and prepare agendas.	Every 2 months - ongoing
Red Hill	Formed in 2007 to provide advice	This is an open invitation to	Every 2 months -

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Community Liaison Group (RHCLG)	and feedback on Red Hill landfill operations. The group is also updated by the EMRC on the progress of the RRF project.	residents around Red Hill (including Gidgegannup, Stoneville and Parkerville). Agenda issued beforehand and minutes of previous meeting. Chaired by EMRC. Meetings advertised in community newspapers.	ongoing
EMRC Community Taskforce (CTF)	Formed in July 2010 to assist the EMRC in the development of a Community Partnership Agreement and to comment on the draft Tender Evaluation Criteria for the RRF project.	Eight community members drawn from around Red Hill and across the region plus two EMRC representatives and an independent facilitator.	Every 2-3 months until August 2011 and then as required.

The EMRC will continue to provide an ongoing flow of information to the general EMRC community throughout the life of the project, through:

- website information, news and updates;
- community newspaper articles;
- media releases;
- letter box drops; and
- meetings and presentations to local community groups, in particular, those located near to the Red Hill WMF.

As highlighted in **Table 10-1**, the EMRC has now completed an engagement process to develop a Community Partnership Agreement (CPA) with the community within the Region. The CPA identifies project issues of interest or concern to the community and how they will be managed during the construction and operation of the Resource Recovery Facility. The CTF was recruited from the regional community to assist the EMRC develop the CPA and provide comment on the tender evaluation criteria.

11 Key Environmental Factors and Principles for the Proposal

Table 11-1: Key Environmental Factors and Principles for the Proposal

No.	Environmental Factor	Relevant Area	Environmental Objective	Potential Impacts	Completed and Proposed Studies	Potential Management
11.1 Pollution Management						
11.1.1	Air quality	Surrounding area	<ul style="list-style-type: none"> › To maintain the environmental values, health, welfare and amenity of nearby land uses, and the wider Perth air shed by meeting the statutory requirements of air emissions, including dust emissions › To comply with EPA Guidance Statement No.18 – <i>Prevention of Air Quality Impacts from Land Development Sites</i>, Statement No. 3 – <i>Separation Distances between Industrial and Sensitive Land Uses</i> and Statement No. 12 – <i>Minimising Greenhouse Gas Emissions</i> 	<ul style="list-style-type: none"> › Human and faunal health issues due to exposure; › Deterioration of nearby terrestrial and aquatic ecosystems; › Degradation of buildings and structures; › Increased pollution of the wider Perth air shed; and › Amenity and nuisance issues. 	Air quality baseline study, modelling and Health Impact Assessment addressing VOCs PM ₁₀ and PM _{2.5} particulates, metals, chlorinated organics, dioxins, furans and nano-particles. Identify and document source of likely dust emissions.	<ul style="list-style-type: none"> › Prepare and implement a Air Quality Management Plan and a Dust Management Plan; › Employ appropriate pollution control equipment to remove contaminants from flue gases or composting aeration prior to emission into the atmosphere; › Monitoring of emissions; › Ongoing monitoring and sampling of nearby surface water body receptors; and › Select technology provider based on proven ability to meet regulatory air quality standards.

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No.	Environmental Factor	Relevant Area	Environmental Objective	Potential Impacts	Completed and Proposed Studies	Potential Management
11.1.2	Solid and Liquid Residues	Surrounding area	<ul style="list-style-type: none"> › To maintain the environmental values, health, welfare and amenity of nearby land uses by meeting the statutory requirements for the handling and disposal of solid and liquid waste › To comply with <i>Landfill Waste Classification and Waste Definitions 1996</i> (As amended December 2009) and <i>Environmental Protection (Controlled Waste) Regulations 2004</i> and the associated guidelines. 	<ul style="list-style-type: none"> › Human health issues from direct exposure to residues from incorrect handling or disposal. › Contamination of surrounding environment. 	Provide details of expected concentrations of contaminants in the bottom and fly ashes (for gasification technologies) and of any solid or liquid residues from the AD technologies, based on the performance of similar operating facilities.	<ul style="list-style-type: none"> › Implement appropriate safe handling and disposal processes; › Dispose all ashes in an appropriate class of landfill located at the Red Hill WMF, based on appropriate testing of the ashes; › Dispose of the residual liquid waste (from AD) to landfill or recirculate liquid to digester; and › Ensure that the residual digestate solids meet an appropriate standard such as AS-4454-2003 Australian Standards for Compost, Soils Conditioners and Mulches depending on the use of that material.
11.1.3	Noise emissions	Surrounding area	<ul style="list-style-type: none"> › To maintain the environmental values, health, welfare and amenity of nearby land uses by meeting the statutory requirements of noise emissions › To comply with EPA Guidance Statement No. 8 – <i>Environmental Noise (Draft)</i> and Statement No. 3 – <i>Separation Distances between Industrial and Sensitive Land Uses</i> 	<ul style="list-style-type: none"> › Human health issues and loss of amenity due to exposure › Disruption to normal faunal behaviours. 	Baseline noise studies and modelling of potential impacts from the RRF.	<ul style="list-style-type: none"> › Prepare and implement a Noise Management Plan; and › Comply with the <i>Environmental Protection (Noise) Regulations 1997</i>.

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No.	Environmental Factor	Relevant Area	Environmental Objective	Potential Impacts	Completed and Proposed Studies	Potential Management
11.1.4	Artificial light pollution	Surrounding area including the prescribed airspace of the Perth Airport	<ul style="list-style-type: none"> › To maintain the environmental values, health, welfare and amenity of nearby land uses by meeting the statutory requirements for artificial light pollution 	<ul style="list-style-type: none"> › Human health issues and reduced amenity from light trespassing into neighbouring properties / houses › Impacts on flora and fauna physiology and local ecosystems › Increased occurrence of pests attracted to light › Blinding or confusing pilots of aircraft operating in a prescribed airspace › Wasting energy on instances of unnecessary lighting. 	<ul style="list-style-type: none"> › Assess artificial light requirements for the RRF › Identify receptors which may be particularly susceptible to the artificial light pollution. 	<ul style="list-style-type: none"> › Design the RRF and landscape in a way to protect receptors from artificial light; and › Obtain approval from CASA (through the WAC) to ensure lights will not intrude on prescribed airspace.
11.2	Social Surrounds					
11.2.1	Odour emissions	Surrounding area	<ul style="list-style-type: none"> › To maintain the amenity of nearby land uses by meeting the statutory requirements for odour emissions › To comply with EPA Guidance Statement No. Statement No. 3 – <i>Separation Distances between Industrial and Sensitive Land Uses</i> 	Reduced amenity.	Baseline odour monitoring and modelling of predicted odour impacts.	<ul style="list-style-type: none"> › Prepare and implement Odour Management Plan; › Prepare and implement a Biofilter Management Plan › Operate within sealed buildings or in-vessel where practicable; › Maintain negative air pressure in odorous parts of the facility; and › Install appropriate Odour Control Systems to service the RRF.

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No.	Environmental Factor	Relevant Area	Environmental Objective	Potential Impacts	Completed and Proposed Studies	Potential Management
11.2.2	Public Health	Surrounding area	<ul style="list-style-type: none"> › To protect neighbouring residents and workers from any adverse health risks associated with the proposed RRF or increased traffic 	<p>Health impacts, including physiological and/or mental impacts, due to any one of the following causes:</p> <ul style="list-style-type: none"> › Direct or indirect exposure to air emissions at elevated levels › Noise emissions at prolonged excessive levels › Dust emissions at excessive levels › Artificial light 'trespassing' into neighbouring properties › Increased traffic levels › Exposure to solid and liquid residues. 	<ul style="list-style-type: none"> › Air quality studies and modelling › Noise studies and modelling › Assess artificial light requirements for the RRF › Identify receptors which may be particularly susceptible to the artificial light pollution › Traffic study. 	<p>Refer to Sections 11.1.1, 11.1.2, 11.1.3 and 11.1.4 for management information.</p>
11.2.3	Traffic	Local road network	<ul style="list-style-type: none"> › To ensure the traffic network can safely accommodate the projected traffic numbers and vehicle types 	<p>The following potential impacts may arise:</p> <ul style="list-style-type: none"> › Increase in traffic along Toodyay Road › Increase in traffic related noise › Increase in dust and litter. 	<p>Undertake a traffic study and determine potential impacts of each RRF technology option.</p>	<ul style="list-style-type: none"> › Prepare and implement a Traffic Management Plan; and › Continue to monitor traffic entering and leaving the site.

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No.	Environmental Factor	Relevant Area	Environmental Objective	Potential Impacts	Completed and Proposed Studies	Potential Management
11.2.4	Aboriginal Heritage	Aboriginal Heritage sites in proximity of Subject Site	<ul style="list-style-type: none"> › To maintain the Aboriginal heritage and cultural values associated with nearby sites of significance › To comply with EPA Guidance Statement No. 41 – <i>Assessment of Aboriginal Heritage</i> 	Changes to the physical and biological proposal may disturb or impact on an Aboriginal heritage site.	Archaeological and ethnographic survey (completed 2008)	Comply with <i>Aboriginal Heritage Act 1972</i> .
11.2.5	Visual Amenity	Surrounding area	To maintain the aesthetic amenity of nearby land uses by meeting the community's expectations of the current land use	Reduced visual amenity due to location of facility on the Subject Site.	Consult the local community and determine their requirements in relation to visual amenity.	<ul style="list-style-type: none"> › Design the RRF taking into account the community's recommendations; and › Landscape the area surrounding the RRF.
11.3 Biophysical Factors						
11.3.1	Surface water and Groundwater	Jane Brook and Susannah Brook catchments	<ul style="list-style-type: none"> › To maintain the quality of surface and ground water so that existing and potential environmental values are protected › To comply with EPA Guidance Statement No. 3 – <i>Separation Distances between Industrial and Sensitive Land Uses</i> › To comply with Australian and New Zealand Guidelines for Fresh and Marine Water Quality 2000 where applicable 	<ul style="list-style-type: none"> › Human / livestock / native fauna health impacts from exposure to contaminated water › Degraded aquatic ecosystem quality › Soil contamination from movement of contaminated groundwater through soil profile › Decrease in water quality › Potential improvements to water quality due to removal of putrescible materials to landfill. 	<ul style="list-style-type: none"> › Quarterly surface water and groundwater survey (2004 – 2009); and › Air quality studies and modelling. 	<ul style="list-style-type: none"> › Continue groundwater monitoring and sampling; and › Continue surface water monitoring and sampling.

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No.	Environmental Factor	Relevant Area	Environmental Objective	Potential Impacts	Completed and Proposed Studies	Potential Management
11.3.2	Terrestrial Vegetation / Flora	Vegetated areas on and surrounding the site	<ul style="list-style-type: none"> › To maintain the abundance, diversity, geographic distribution and productivity of flora at species and ecosystem levels through the avoidance or management of adverse impacts and improvement in knowledge › To comply with EPA Guidance Statement No. 51 - <i>Terrestrial Flora and Vegetation Surveys for Environmental Impact Assessment in Western Australia</i> and Statement No. 19 – <i>Environmental Offsets – Biodiversity</i> 	<ul style="list-style-type: none"> › Loss of priority species › Weeds › Excessive dust emissions › Decrease in vegetation quality › Fire ignition › Reduced colonisation ability. 	<ul style="list-style-type: none"> › Level 1 Flora and Vegetation Assessment (completed 2010); and › Vegetation Monitoring (completed in 2009). 	<ul style="list-style-type: none"> › Prepare and implement a Vegetation Clearing Management Plan; › Employ best practice clearing methods; › Recycle greenwaste produced to reduce fire risk; and › Comply with the conditions of the Licence 6833/10 issued by the DEC for the landfill operations at Red Hill WMF.
11.3.3	Terrestrial Fauna	Habitat areas on and surrounding the site	<ul style="list-style-type: none"> › To maintain the abundance, diversity, geographic distribution and productivity of fauna at species and ecosystem levels through the avoidance or management of adverse impacts and improvement in knowledge › To comply with EPA Guidance Statement No. 56 - <i>Terrestrial Fauna Surveys for Environmental Impact Assessment in Western Australia</i> and Statement No. 19 – <i>Environmental Offsets – Biodiversity</i> 	<ul style="list-style-type: none"> › Loss of habitat and foraging extent › Increase in pests species › Fauna deaths or injury during clearing › Reduction in wildlife corridor › Disruption to faunal behaviours › Decrease in health of fauna species due to pollution › Bioaccumulation &/or biomagnification of contaminants. 	Fauna Assessment Survey (completed 2010)	<ul style="list-style-type: none"> › Implement a pest / feral animal control program; › Prepare and implement a Fauna Management Plan; › Prepare and implement a Noise Management Plan; and › Comply with the conditions of the Licence 6833/10 issued by the DEC for the landfill operations at Red Hill WMF.

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No.	Environmental Factor	Relevant Area	Environmental Objective	Potential Impacts	Completed and Proposed Studies	Potential Management
11.3.4	Aquatic Flora	Nearby surface water bodies in Jane Brook and Susannah Brook Catchments	<ul style="list-style-type: none"> › To maintain the abundance, diversity, geographic distribution and productivity of flora at species and ecosystem levels through the avoidance or management of adverse impacts and improvement in knowledge › To comply with EPA Guidance Statement No. 19 – <i>Environmental Offsets – Biodiversity</i> and Statement No. 3 – <i>Separation Distances between Industrial and Sensitive Land Uses</i> 	<ul style="list-style-type: none"> › Increase in algae and decrease in oxygen › Invasive pest species › Excessive dust emissions. 	<ul style="list-style-type: none"> › Quarterly surface water survey (2004 – 2009); and › Air quality studies and modelling. 	Continue surface water monitoring and sampling.
11.3.5	Aquatic Fauna	Nearby surface water bodies in Jane Brook and Susannah Brook Catchments	<ul style="list-style-type: none"> › To maintain the abundance, diversity, geographic distribution and productivity of fauna at species and ecosystem levels through the avoidance or management of adverse impacts and improvement in knowledge › To comply with EPA Guidance Statement No. 19 – <i>Environmental Offsets – Biodiversity</i> and Statement No. 3 – <i>Separation Distances between Industrial and Sensitive Land Uses</i> 	<ul style="list-style-type: none"> › Increase in algae and decrease in oxygen › Invasive pest species › Excessive dust emissions › Degraded habitat › Reduced water quality › Disruption to normal faunal behaviours. 	<ul style="list-style-type: none"> › Quarterly surface water survey (2004 – 2009); › Air quality studies and modelling; and › Noise studies and modelling. 	<ul style="list-style-type: none"> › Continue surface water monitoring and sampling; and › Prepare and implement a Noise Management Plan.

12 Project and Assessment Schedule

The following schedule outlines the anticipated environmental assessment period for the proposal. This schedule allows for the assessment to be undertaken to the full provision of the regulatory process and is contingent on key information being available that enables the EMRC to prepare and submit necessary documentation. Based on these timeframes EMRC aims to obtain all environmental approvals by August 2012 and commence the operation of the RRF by September 2015.

Table 12-1 Estimated Project and Assessment Schedule

Task	Details	Commencement	Completion	Target Timeframe
Level of Assessment set		28 June 2010	13 September 2010	3 months
Appeal Period & Follow-up on Appeals		13 September 2010	October 2010	1 month
Environmental Scoping Document		July 2010	March 2011	8 Months
EPA Feedback and Review of Scoping Document		April 2011	June 2011	12 weeks
Scoping Document Agreed		June 2011	September 2011	3 Month
Draft EIA Report	Preparation	March 2011	October 2011	8 months
	Odour Assessment			
	Air Assessment			
	Noise Assessment			
	Flora and Fauna Assessment			
	Traffic Assessment			
	Preparation of Management Plans			
Community Liaison				
PER Assessment	Submit draft PER to EPA	1 November 2011	1 November 2011	Milestone
	Review by EPA	1 November 2011	13 December 2011	6 weeks
	Revise PER & Release	13 December 2011	31 January 2012	6 weeks
	Public Review	6 February 2012	30 March 2012	8 weeks
	EPA provide summary of submissions	2 April 2012	20 April 2012	3 weeks
	Proponent Response	23 April 2011	7 May 2012	2 weeks
	EPA Bulletin Preparation/Assessment	7 May 2012	27 July 2012	12 weeks
Appeals	Appeals Period	30 July 2012	10 August 2012	2 weeks

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Task	Details	Commencement	Completion	Target Timeframe
Minister	Minister Consideration	August 2012	November 2012	3 Months
Total Assessment Timeframe				28 Months
Member Council resolution to continue project		December 2012	December 2012	1 month
Request for Tender Process		January 2013	May 2013	5 months
Evaluation of Tender submissions		June 2013	September 2013	4 months
Finalise RRF contract		October 2013	April 2014	7 months
Development Approval / Works Approval / Building Licence		May 2013	July 2014	3 months
Complete construction of RRF		August 2014	October 2015	15 months
Obtain operational licence		August 2015	October 2015	3 months
Wet commissioning of RRF		October 2015	December 2015	3 months
Total Council Approval, Tender Process and Construction Timeframe				41 Months
Total Project Timeframe				69 months (~6 years)

13 Study Team and Peer Review

13.1 Study Team

The environmental impact assessment of the proposed RRF will be coordinated by Cardno (WA) Pty Ltd (Cardno) for the EMRC. Cardno will utilise the services of specialist consultants to undertake the proposed surveys/investigations as required. Only consultants who have extensive experience in their respective study areas within the industry and are recognised for their expertise will be selected.

- Air quality assessment – Synergetics Environmental Engineering
- Odour assessment – SLR Heggies Pty Ltd
- Noise assessment – Lloyd George Acoustics
- Traffic assessment – Cardno Eppel Olsen
- Structural engineers – Cardno Buckland
- Legal and Infrastructure Attorney – Freehills

General environmental advice and the undertaking of assessment relating to various environmental impacts will be undertaken by Cardno. Cardno will also provide general support to the EMRC and will prepare environmental documentation required for the State (and Federal, if required) EIA process.

The contractor to be appointed to design and construct the facility will be selected through a request for tender process, from a list of pre-qualified Acceptable Tenderers, in accordance with the Local Government (Functions and General) Regulations 1996. The tender process will take after (and if) the Part IV environmental approvals have been obtained, and assuming the EMRC Council resolves to continue with the Project.

13.2 Peer Review

The EMRC will engage the services of a suitable team for the peer review process. This team will provide a peer review of the findings and conclusions of the environmental surveys/investigations proposed as part of the environmental impact assessment process.

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Figure 1: EMRC Geographic Extent

Figure 2: Locality Plan

Figure 3: Proposed Facility Locations

Figure 4: Site Zoning

Figure 5: Topography

Figure 6: Geology

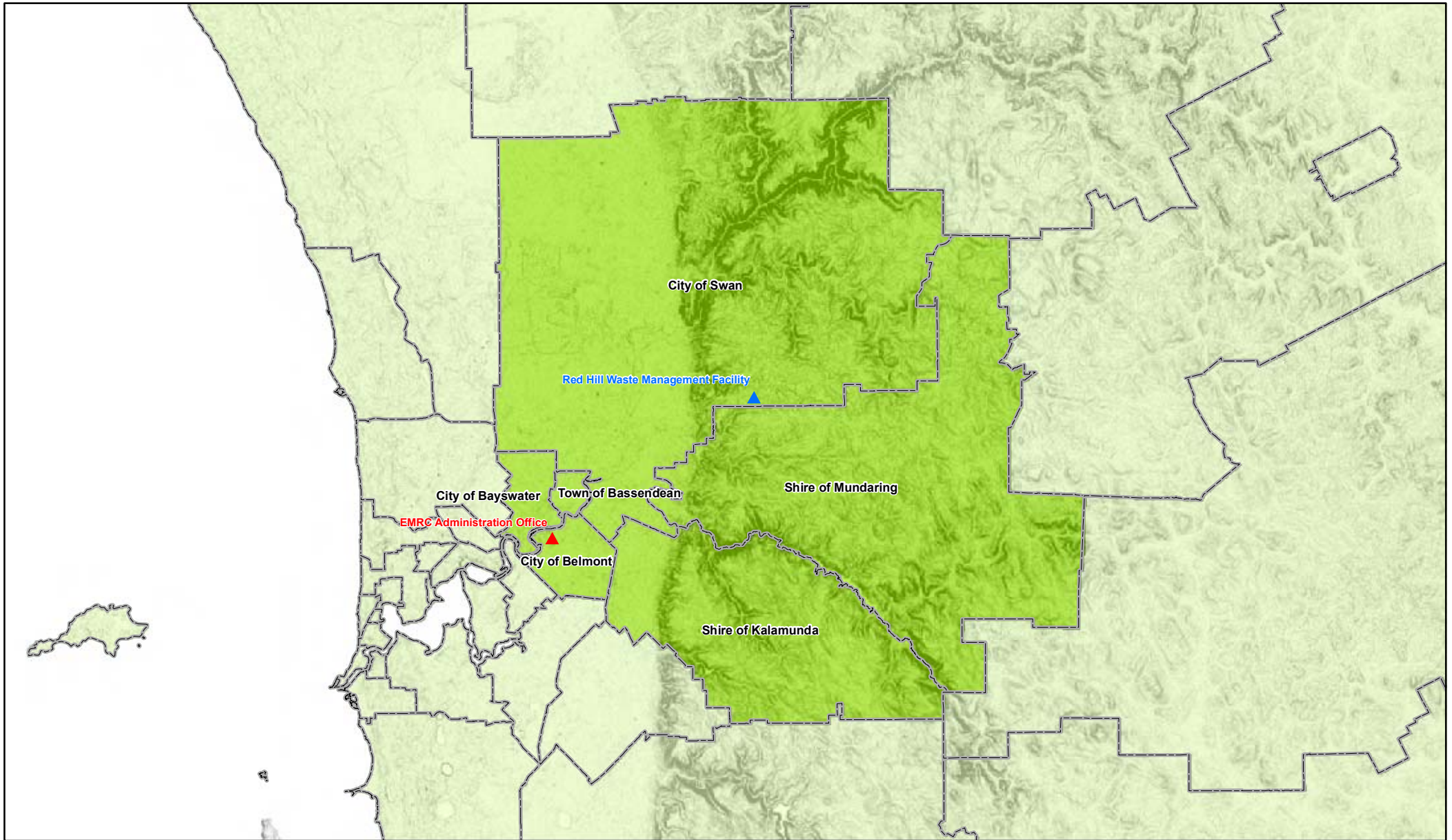
Figure 7: Surface Water and Catchment Areas

Figure 8: Vegetation

Figure 9: Bush Forever and Environmentally Sensitive Areas

Figure 10: Aboriginal Heritage Sites

Figures



DATE	No.	ACTIVITY - REVISION DESCRIPTION	DES	DRN	CHKD	APPD	DATE	No.	ACTIVITY - REVISION DESCRIPTION	DES	DRN	CHKD	APPD	DATE	No.	ACTIVITY - REVISION DESCRIPTION	DES	DRN	CHKD	APPD
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PROJECT **EMRC Resource Recovery Project**

DRAWING TITLE **Figure 1 - EMRC Geographic Extent**

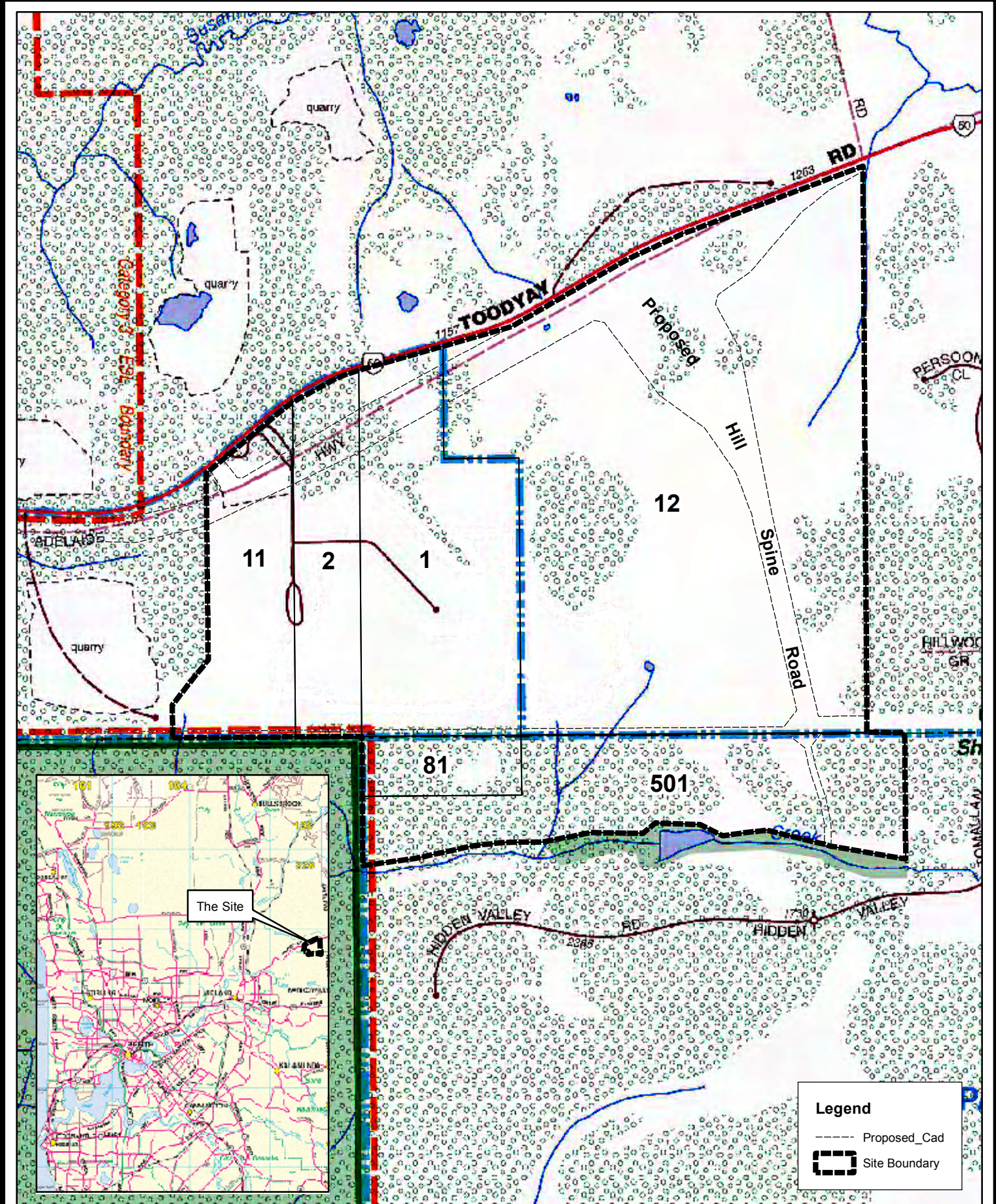
PRINCIPAL **EMRC**



Scale: **1:450,000**

<p>Cardno CONSULTING ENGINEERS TOWN PLANNERS PROJECT MANAGERS ENVIRONMENTAL CONSULTANTS</p>	<p>Cardno Centre 2 Bagot Road P.O. Box 155 Subiaco Western Australia 6904 Telephone (08) 9273 3888 Facsimile (08) 9388 3831</p>	<p>Project Number V9090-015 Drawing Number SK10</p>	<p>Revision 00 Original A4</p>
	<p>Designed BH Drawn MGW Local Authority Various</p>	<p>Checked Approved Date 26/07/10 Sheet 1 of 1</p>	

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Legend

- Proposed_Cad
- Site Boundary

DATE	No.	ACTIVITY - REVISION DESCRIPTION	DES	DRN	CHKD	APPD	DATE	No.	ACTIVITY - REVISION DESCRIPTION	DES	DRN	CHKD	APPD

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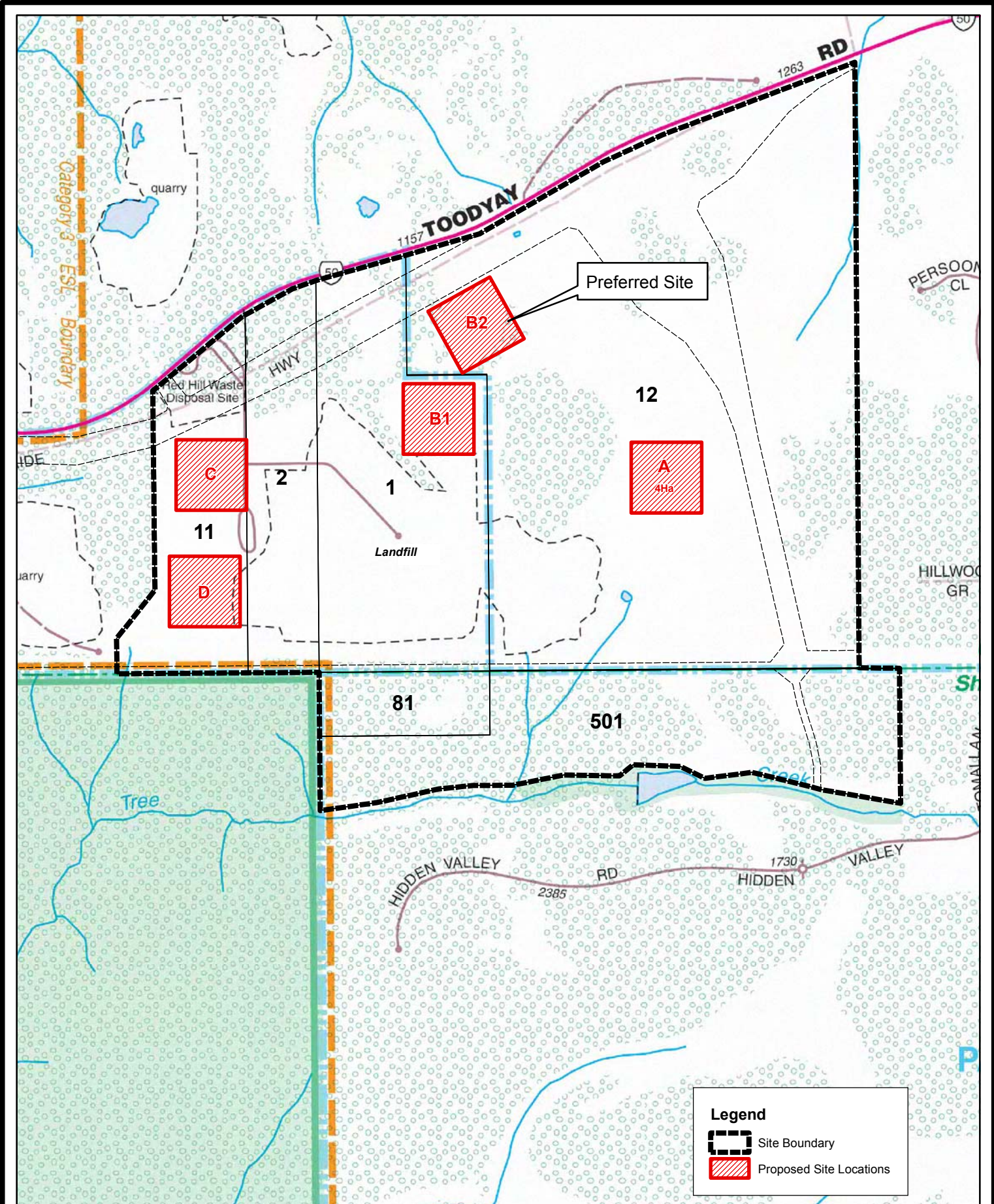
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0 100 200 400 600 800 1,000 1,200 1,400 Metres

PROJECT	EMRC Resource Recovery Facility Project	Project Number	V9090	Original	A4
DRAWING TITLE	FIGURE 2 : Locality Plan	Drawing Number	SK11	Revision	01
PRINCIPAL	EMRC	Designed BH		Checked	
		Drawn MGW		Approved	

Local Authority City of Swan
 Sheet 1 of 1
 Date 26/07/10

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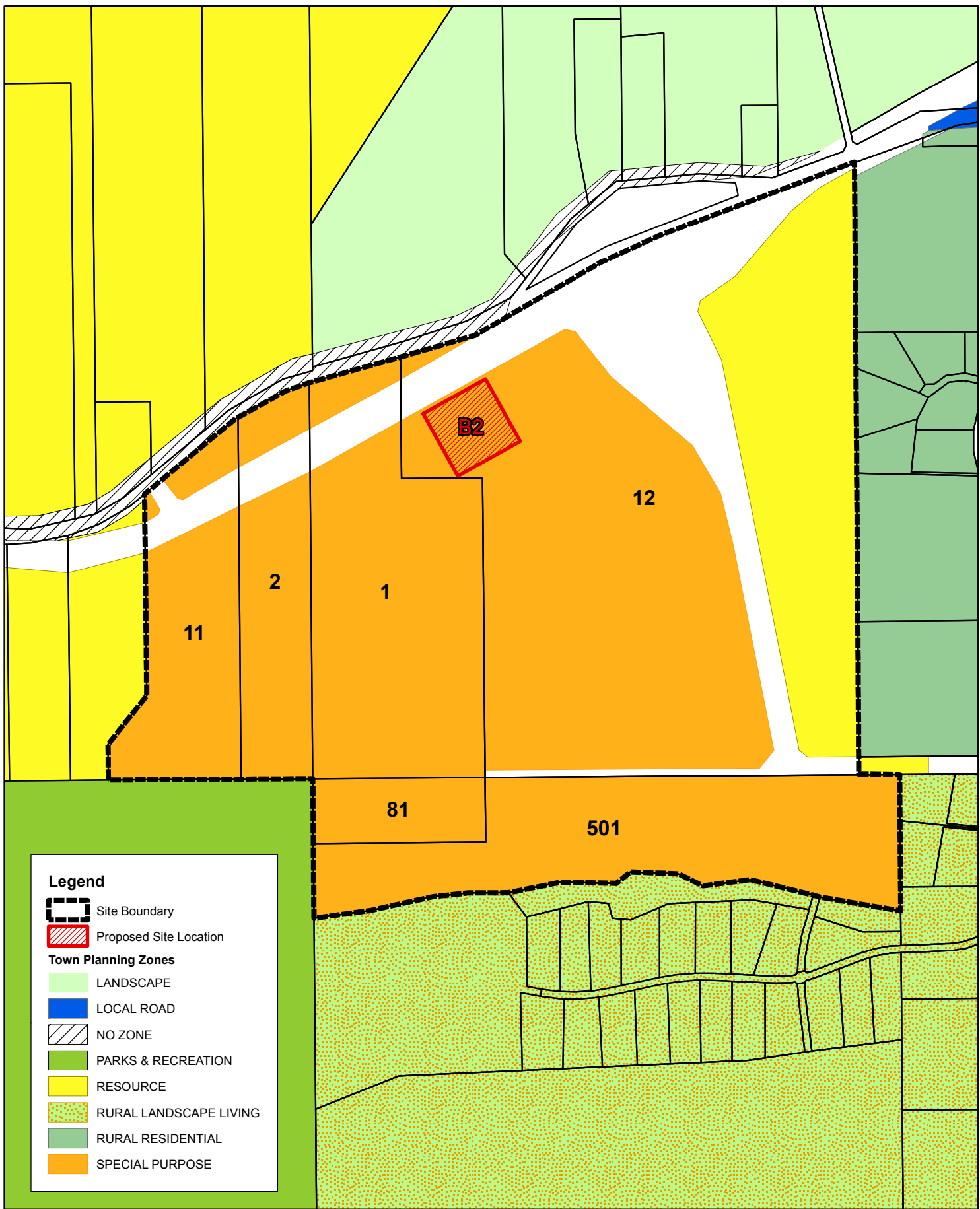
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PROJECT	EMRC Resource Recovery Facility Project	Project Number	V9090	Original	A4
DRAWING TITLE	FIGURE 3 : Proposal Facility Locations	Drawing Number	SK12	Revision	
PRINCIPAL	EMRC	Designed BH		Checked	
		Drawn MGW		Approved	
		Local Authority	City of Swan		
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Legend

-  Site Boundary
-  Proposed Site Location
- Town Planning Zones**
-  LANDSCAPE
-  LOCAL ROAD
-  NO ZONE
-  PARKS & RECREATION
-  RESOURCE
-  RURAL LANDSCAPE LIVING
-  RURAL RESIDENTIAL
-  SPECIAL PURPOSE

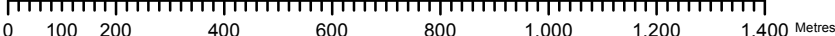
DATE	No.	ACTIVITY - REVISION DESCRIPTION	DES	DRN	CHK'D	APP'D	DATE	No.	ACTIVITY - REVISION DESCRIPTION	DES	DRN	CHK'D	APP'D



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Scale: **1:14,000** 

PROJECT **EMRC Resource Recovery Facility Project**

DRAWING TITLE **FIGURE 4 : Site Zoning**

PRINCIPAL **EMRC**



Project Number **V9090** Original **A4**

Drawing Number **SK13** Revision

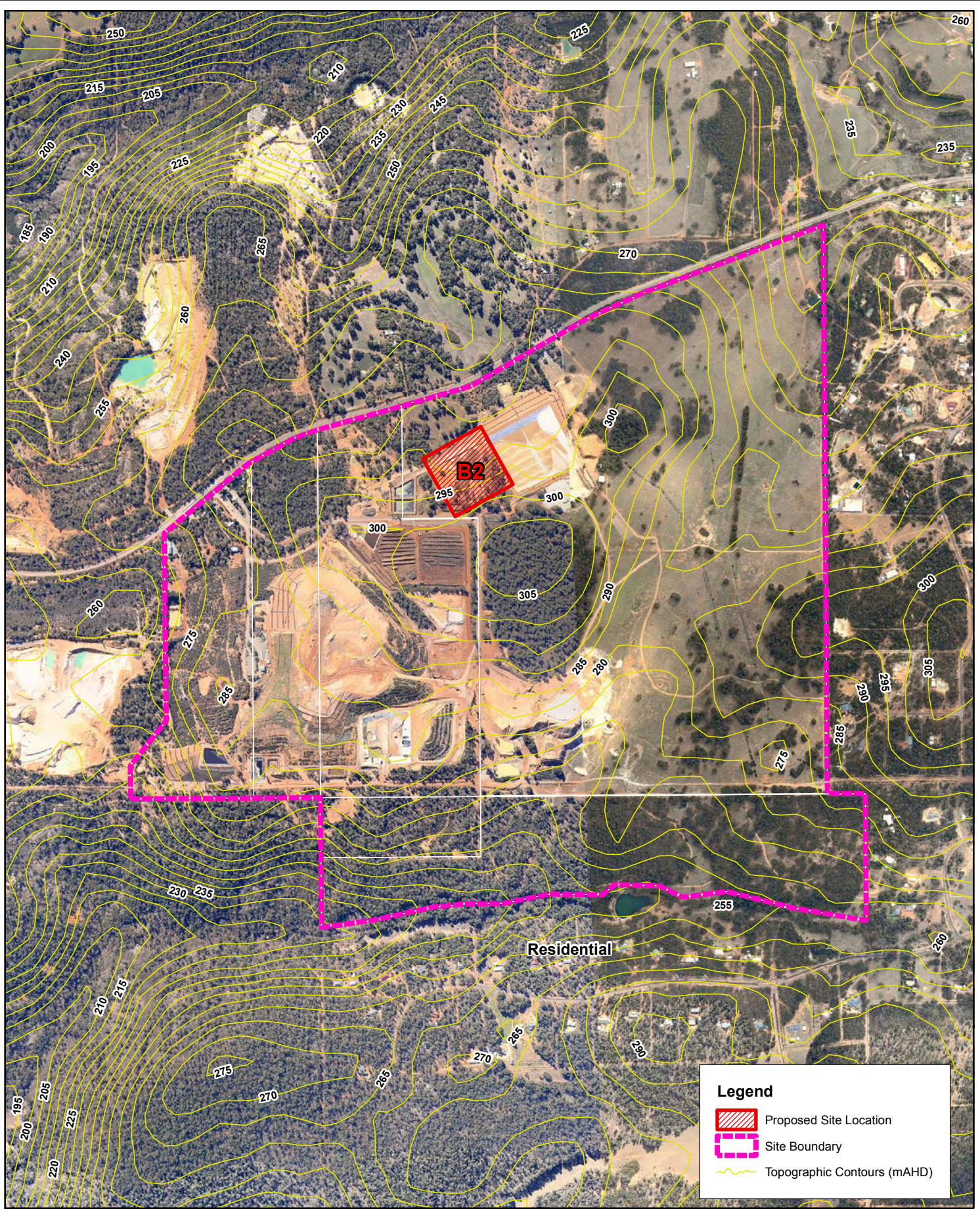
Designed BH Checked

Drawn MGW Approved

Local Authority City of Swan

Sheet 1 of 1 Date 26/07/10

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PROJECT: **EMRC Resource Recovery Project**

DRAWING TITLE: **FIGURE 5: Topographic**

PRINCIPAL: **EMRC**

Project Number: **V9090**

Drawing Number: **SK04**

Designed BH: _____

Drawn MGW: _____

Local Authority: **City of Swan**

Original: **A4**

Revision: **00**

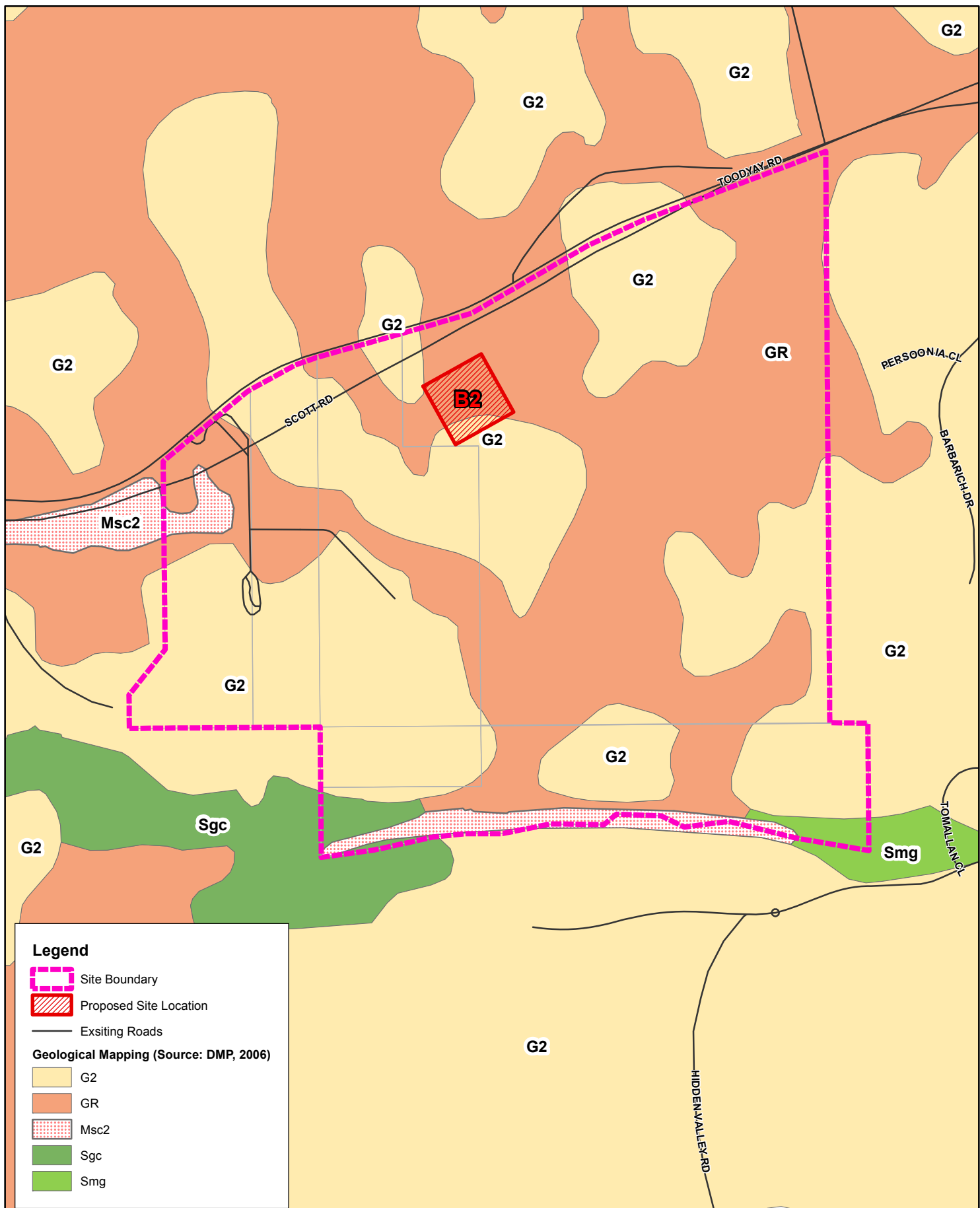
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Approved: _____

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Legend

- Site Boundary
- Proposed Site Location
- Existing Roads

Geological Mapping (Source: DMP, 2006)

- G2
- GR
- Msc2
- Sgc
- Smg

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PROJECT **EMRC Resource Recovery Project**

DRAWING TITLE **FIGURE 6: Geology**

PRINCIPAL **EMRC**

Project Number **V9090**

Drawing Number **SK05**

Designed BH

Drawn MGW

Local Authority City of Swan

Sheet 1 of 1

Original **A4**

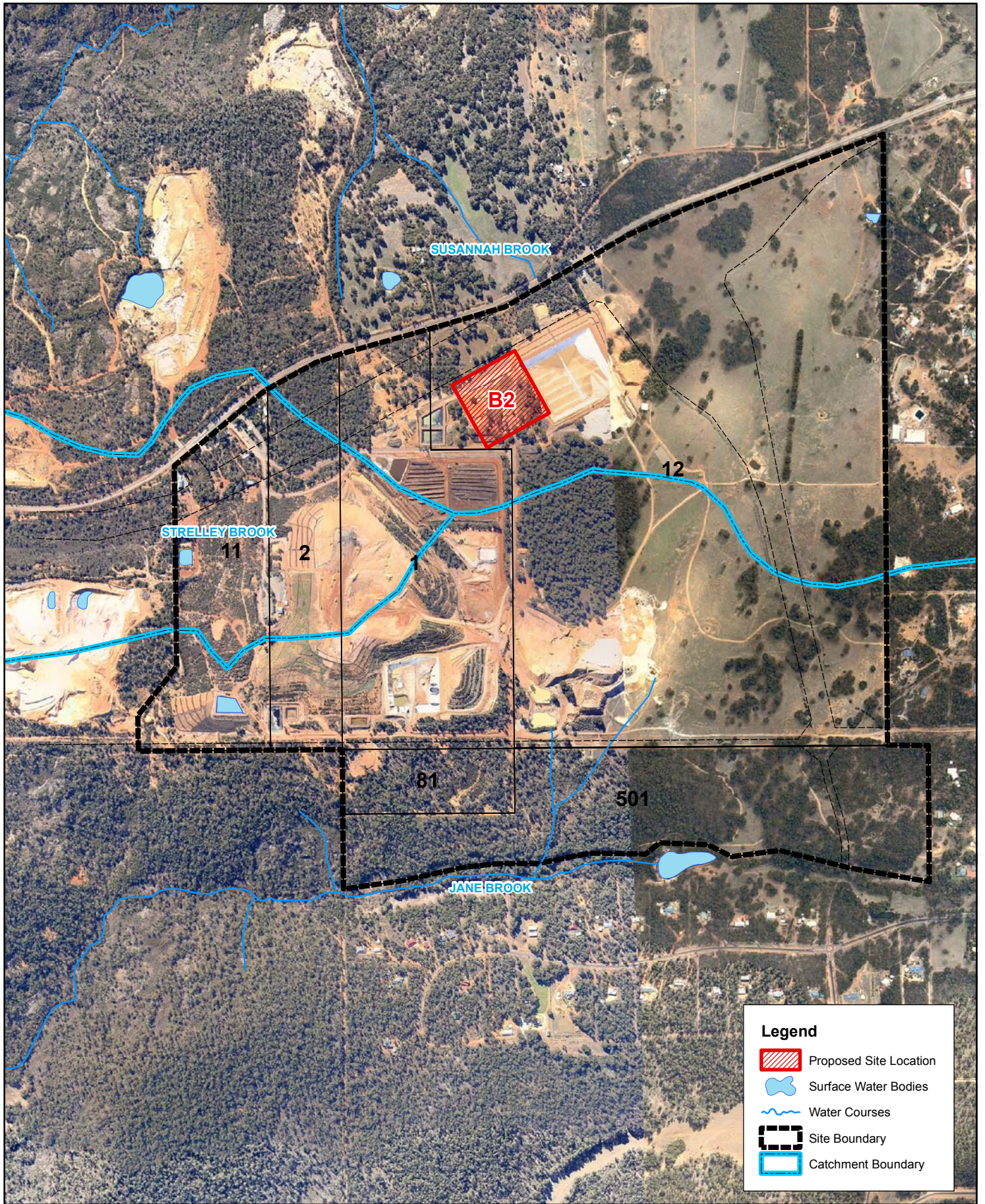
Revision **00**

Checked






Approved

Date 26/07/10

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Legend

-  Proposed Site Location
-  Surface Water Bodies
-  Water Courses
-  Site Boundary
-  Catchment Boundary

DATE	No.	ACTIVITY - REVISION DESCRIPTION	DES	DRN	CHK'D	APP'D	DATE	No.	ACTIVITY - REVISION DESCRIPTION	DES	DRN	CHK'D	APP'D




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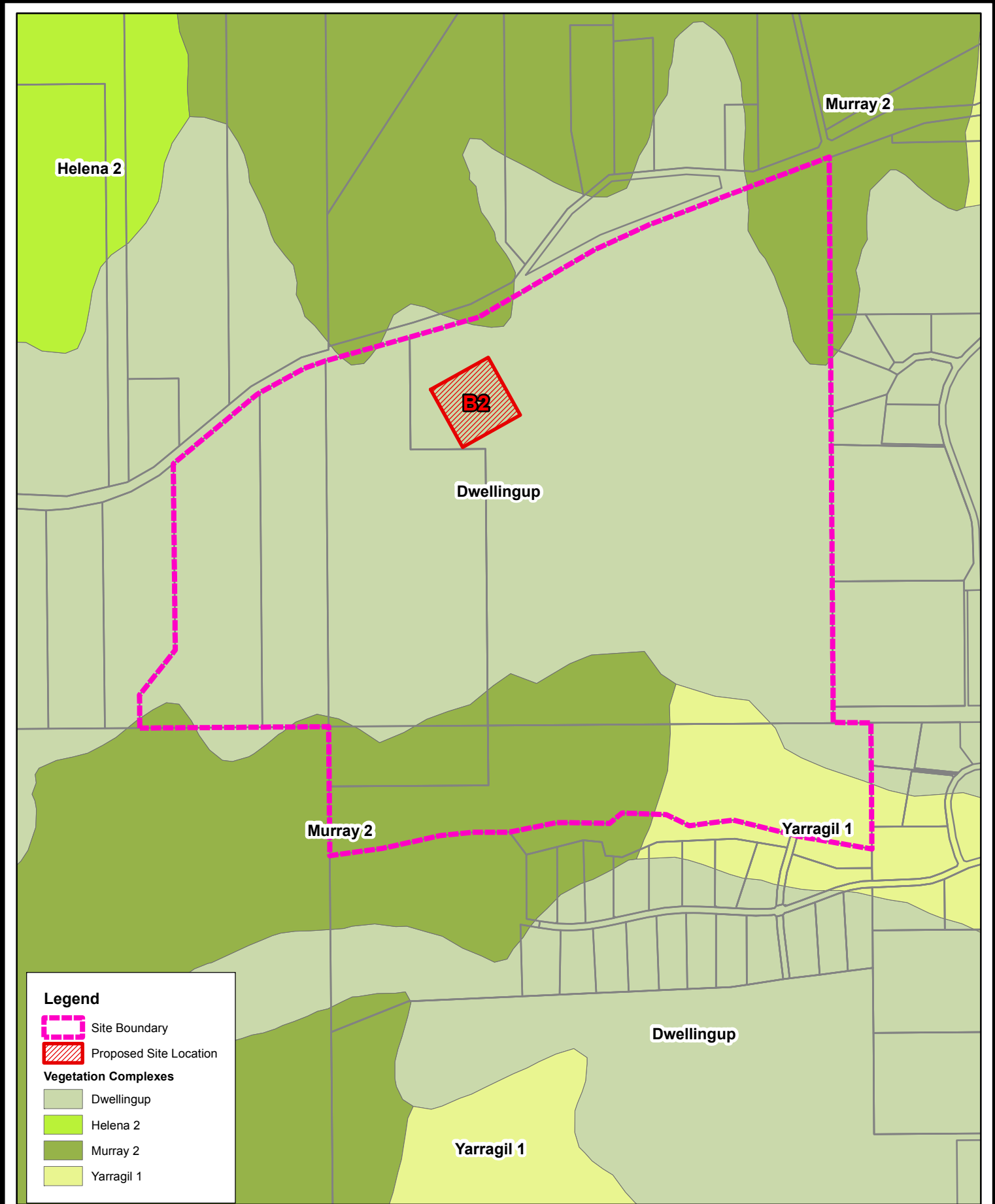
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PROJECT	EMRC Resource Recovery Project	Project Number	V9090	Original	A4
DRAWING TITLE	FIGURE 7 : Surface Water & Catchment Areas	Drawing Number	SK06	Revision	
PRINCIPAL	EMRC	Designed BH		Checked	
		Drawn MGW		Approved	
		Local Authority	City of Swan		
		Sheet 1 of 1		Date	26/07/10

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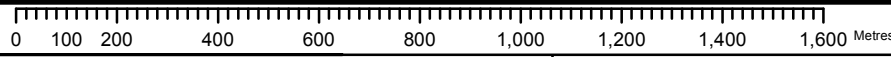


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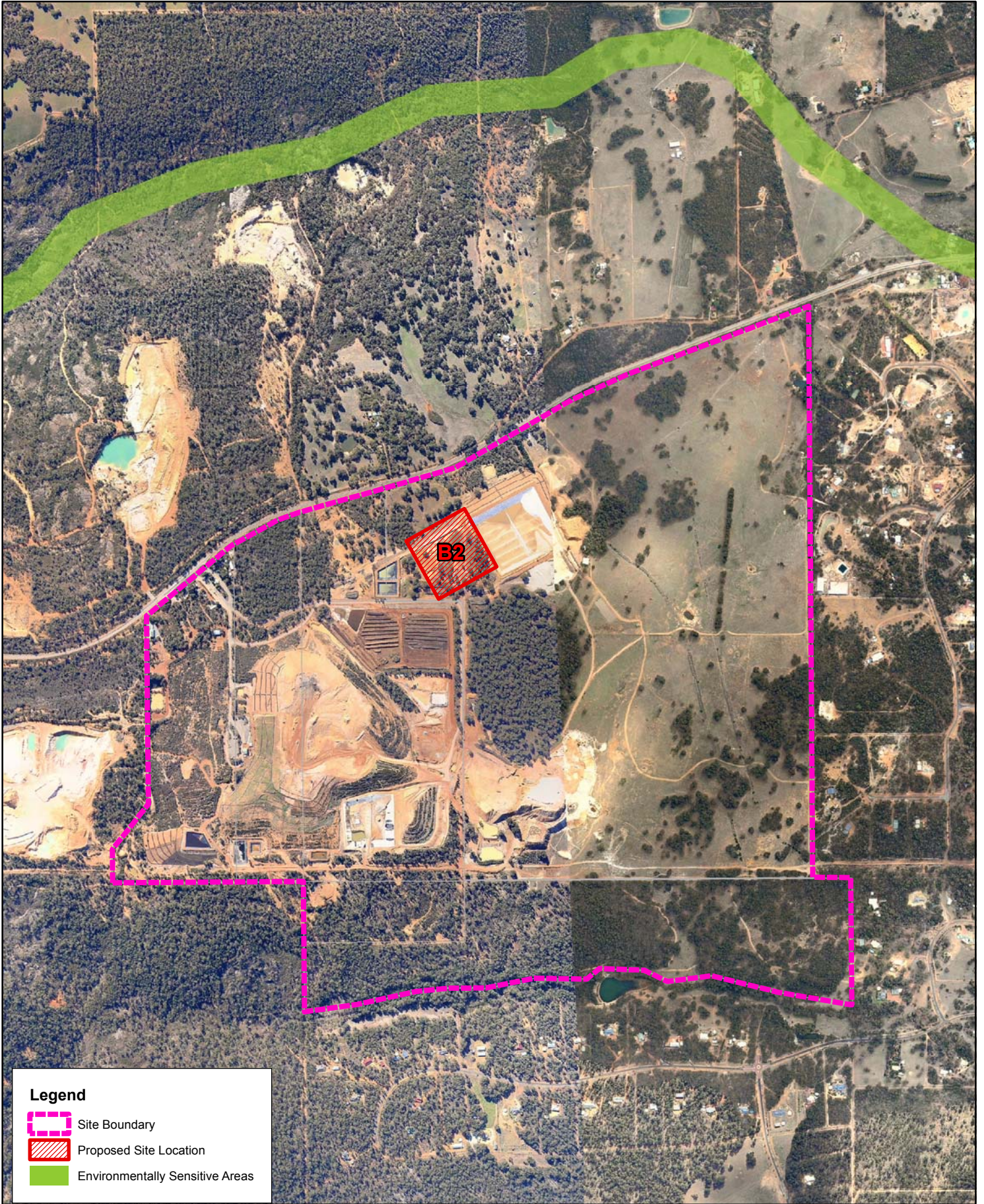
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PROJECT	EMRC Resource Recovery Project	Project Number	V9090	Original	A4
DRAWING TITLE	FIGURE 8: Vegetation	Drawing Number	SK08	Revision	00
PRINCIPAL	EMRC	Designed BH		Checked	
		Drawn MGW		Approved	
		Local Authority	City of Swan		
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Legend

-  Site Boundary
-  Proposed Site Location
-  Environmentally Sensitive Areas

DATE	No.	ACTIVITY - REVISION DESCRIPTION	DES	DRN	CHK'D	APP'D	DATE	No.	ACTIVITY - REVISION DESCRIPTION	DES	DRN	CHK'D	APP'D

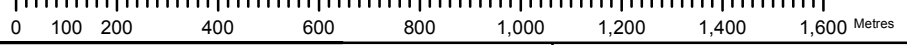



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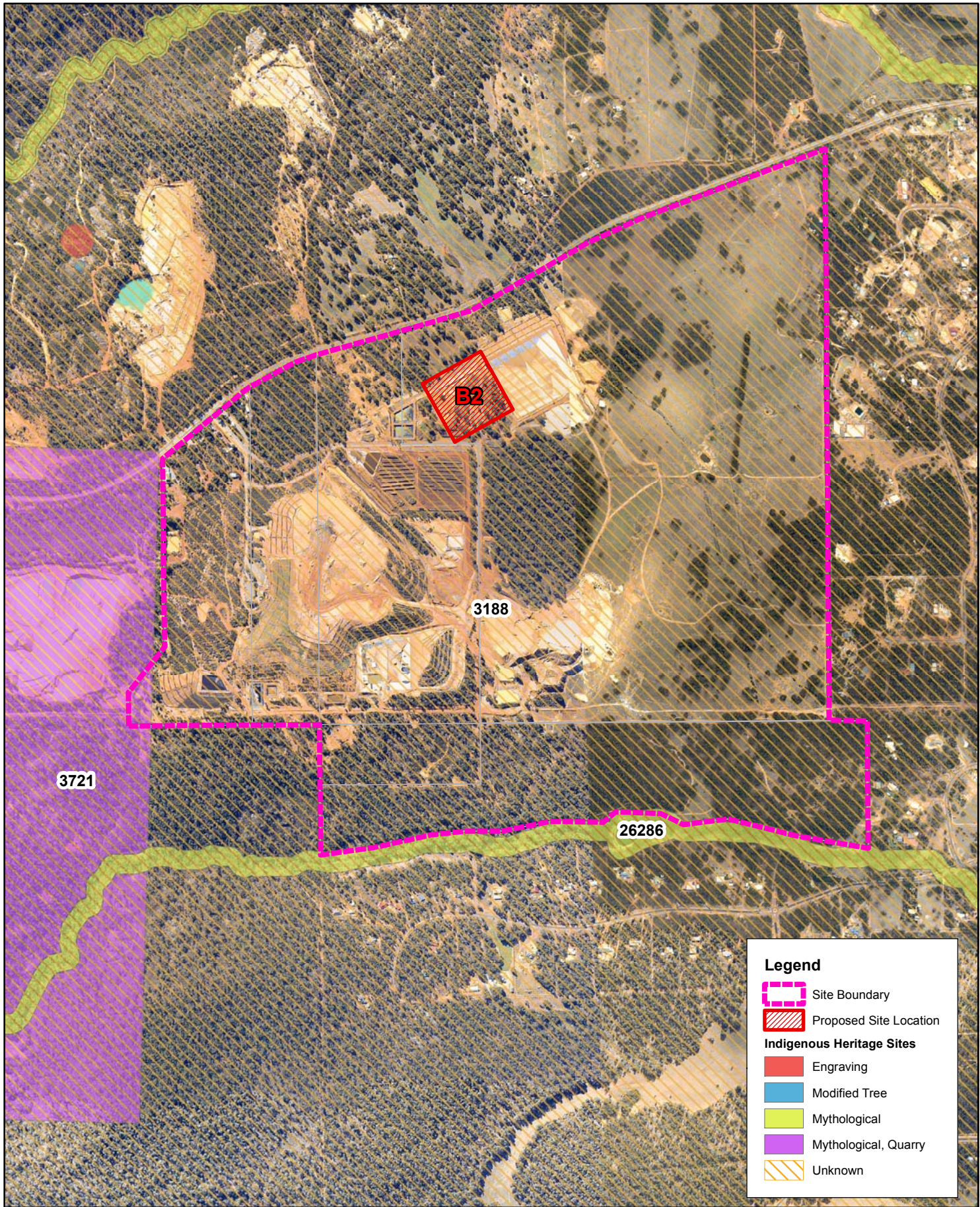
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PROJECT	EMRC Resource Recovery Project		Project Number	V9090	Original	A4
DRAWING TITLE	FIGURE 9: Bush Forever & Environmentally Sensitive Areas		Drawing Number	SK14	Revision	00
PRINCIPAL	EMRC		Designed BH	Drawn MGW	Checked	Approved
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Legend

- Site Boundary
- Proposed Site Location

Indigenous Heritage Sites

- Engraving
- Modified Tree
- Mythological
- Mythological, Quarry
- Unknown

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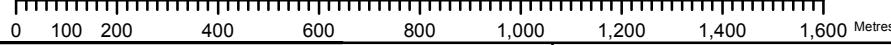


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PROJECT	EMRC Resource Recovery Project		Project Number	V9090	Original	A4
DRAWING TITLE	FIGURE 10: Aboriginal Heritage Sites		Drawing Number	SK09	Revision	00
PRINCIPAL	EMRC		Designed BH	Checked		
			Drawn MGW	Approved		
			Local Authority	City of Swan		
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