



INTEGRATED WASTE SERVICES
IWS NORTHERN BALEFILL



APPLICATION FOR VARIATION TO
DEVELOPMENT AUTHORISATION

WASTE TREATMENT FACILITY
DUBLIN, SOUTH AUSTRALIA

JUNE 2008



INTEGRATED WASTE SERVICES IWS NORTHERN BALEFILL

PREPARED BY





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1 INTRODUCTION

1.1 Overview

This report has been prepared in support of an application to amend the current Integrated Waste Services Pty Ltd Development Authorisation at the Dublin, Northern Balefill. The amendment seeks to vary the consent to incorporate facilities to treat contaminated materials. The location of the subject site is shown on **Figure 1, General Site Location Map**.

This documentation details the conceptual design, operation and environmental management of the proposed facility. It is intended to undertake the development in two stages.

Stage 1 will comprise construction of a concrete pad storage and laydown area that will form the foundation of the facility (a future operation specifically designed to treat contaminated materials). This storage and laydown area will be used for interim storage of contaminated soil, prior to the development of Stage 2. No walls, service areas or other infrastructure associated with the final operation will be constructed as part of the works associated with this.

Stage 2 will involve development of the overall facility, that is the infrastructure and aspects to treat contaminated soil.

The timing of the development, although to some extent dependent on market conditions, is expected to commence on issue of approval and licence amendment and commencement of Stage 2 no later than March 2011.

In addition to this planning report, a document has been prepared for the EPA (**Appendix A**) which also forms part of this application and provides details of the proposed handling and treatment processes for soil remediation activities.

This report incorporates the following:

- An overview of the existing operations at the site.
- Information on the applicant.
- The existing approvals and licensing of the site.
- Detailed information on the proposed development and site operations.
- An assessment of the proposal in relation to the relevant provisions of the Development Plan.
- Air modelling of the proposed facility.

A revised site Landfill Environmental Management Plan (LEMP) for EPA purposes accompanies this report (refer **Appendix F**).

The IWS site is currently licensed to accept a variety of non-recyclable waste, some demolition waste, low level contaminated waste and liquid treatment plant residue.



INTERGRATED WASTE SERVICES

GENERAL SITE LOCATION MAP

Legend

- Town Location
- Road
- Site Location

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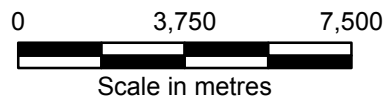
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DATUM GDA 1994
PROJECTION MGA Zone 54

FIGURE 1



In 1998 development of the IWS Northern Balefill as a solid waste landfill was approved pursuant to the requirements of the Development Act 1993 (**Appendix B**).

In September 2005 the DAC approved a variation to the IWS Northern Balefill to incorporate a Low Level Contaminated Waste and Liquid Treatment Plant Residues facility (**Appendix C**). This application proposes a variation to the existing authorisation.

1.2 The Applicant

The applicant, Integrated Waste Services Pty Ltd (IWS), is a privately owned South Australian based, specialist waste management company.

IWS is a significant participant in the provision of waste management services in metropolitan Adelaide with facilities located at Wingfield and Dublin. IWS's facilities are designed to world's best standards, and enable IWS to offer the best possible waste management and diversion solutions. Through their facilities at Wingfield and Dublin, IWS has invested significant capital and energy into South Australia, resulting in high standard waste management practices and valuable employment.

The objectives of IWS are to:

- Continue to improve innovative and environmentally progressive waste management systems.
- Maintain world's best practice in all areas of operation.
- Be aware of environmental issues and their effects on the community.
- Be prepared to implement improvements in waste management operations.
- Continue to remain abreast of innovative technologies that minimise waste to landfill and to implement such technologies in an economically sustainable manner.
- Maintain a safe and healthy working environment for all employees and contractors.
- Meet the environmental and economic expectations and requirements of clients and the community.
- Be an active member of the community by employing fulltime staff and supporting contractors on an ongoing basis.

1.3 Variation Application

This application is submitted to vary the current Development Authorisation to enable IWS to receive and process materials and soil contaminated as listed in Schedule 1 of the Environment Protection Act 2003¹.

¹ That is soil that exceeds the criteria for Waste Fill, Intermediate Landfill Cover and Low Level Contaminated Waste.

This application is for two stages of development:

- Stage 1: Construction and operation of a contaminated material receiving and storage area; and
- Stage 2: a facility to include treatment of contaminated solid and semi-solid waste streams.

The revised Landfill Environmental Management Plan (LEMP) includes environmental management procedures for the operation.

The potential for environmental effects associated with the Stage 1 and Stage 2 development are considered to be extremely low and will be managed in accordance with the management measures outlined in the LEMP (refer Section 7 of Appendix F).

A summary of the site's physical environmental characteristics, based on the EIS (1996), are provided in **Appendix E**.

1.4 Context of Application with SA Waste Strategy 2005 – 2010

South Australia currently has limited available treatment facilities for solid and semi-solid contaminated wastes. The need and demand for dedicated facilities to treat these materials is expected to increase for the following reasons:

- Changes to the Environment Protection Act 1993 relating to site contamination is likely to lead to an increased demand for facilities that treat and dispose of contaminated wastes.
- The trend towards urban consolidation and urban infill projects will potentially lead to more development on sites containing contaminated waste. In most urban localities, treating contaminated materials on-site can pose unnecessary environmental risk to neighbouring residents and properties, and therefore a dedicated treatment facility offers an off-site treatment and disposal option that respects closely settled living and working areas.
- Ongoing development of new policies and practices dealing with industrial and other wastes may require industry access for waste treatment. The variation offers an opportunity to facilitate waste management practices that are in line with community expectations.
- There are solid and semi-solid wastes currently being disposed to landfill style facilities. The variation offers the potential for treatment of material and reuse rather than disposal to landfill. Treatment can contribute to improving environmental protection through contaminant reduction or neutralisation, and minimising waste to landfill.
- Treatment of contaminated waste may offer the potential to create reusable materials.

The vision for the site is to provide a one-stop site for the receipt, treatment, recycling, recovery, energy generation and, where necessary, disposal of wastes.

This project represents an opportunity to contribute to the aims and commitments of the Zero Waste SA's South Australia Waste Strategy in an orderly and practical manner.

In addition to treating contaminated materials, the proposed development addresses key objectives of Zero Waste SA's Waste Strategy 2005-2010. This strategy aims to ensure a healthy environment for South Australians now and into the future. It establishes waste reduction goals and targets for South Australia and sets out a range of strategies and steps to achieve these goals and targets.

The five year strategy is focused on the key objectives described below.

The contribution of this project to some of these objectives is outlined in Table 1:

TABLE 1 - SA WASTE STRATEGY 2005–2010

SA Waste Strategy 2005 – 2010 Objectives	Project Contribution
1. Foster sustainable behaviour – simply providing information will not necessarily influence people to recycle or re-use material or resources in a sustainable way.	<ul style="list-style-type: none"> • The project will foster sustainable behaviour by providing an alternative mechanism by which contaminated material can be treated in a controlled environment, increase the amount that can be reused, and reduce off-site environmental risk by providing a treatment and disposal option. • Provide industry and developers with a readily accessible northern based option for waste management and disposal.
2. Less waste – achieving substantially less waste going to landfill in South Australia means that materials must be redirected towards more beneficial uses and treatment options.	<ul style="list-style-type: none"> • The variation provides a mechanism by which contaminated material can be treated in a controlled environment. Treatment has the potential to create reusable materials which will reduce overall waste disposal to landfill.
3. Effective systems – South Australia needs to establish, maintain and increase the capacity of recycling systems and re-processing infrastructure in metropolitan and regional areas.	<ul style="list-style-type: none"> • The use of effective waste treatment systems will increase the capacity for treatment of contaminated materials to remove, stabilise or neutralise contaminants. • The facility provides an option that will present an opportunity to reduce environmental and human health risk associated with leaving material onsite or to current disposal options.
5. Successful cooperation – targets of this and future strategies will only be reached with the successful cooperation of a range of stakeholders.	<ul style="list-style-type: none"> • This project supports the intent and goals of Zero Waste SA and forms part of IWS vision to contribute to the aims of the SA Waste Strategy 2005 – 2010.

2 EXISTING OPERATIONS

2.1 Development Authorisation

On 29 January 1998, His Excellency the Governor of South Australia granted development authorisation with conditions for Integrated Waste Services Pty Ltd to construct the Northern Balefill (Dublin) facility (Appendix B).

In addition, a notice was also made by the Governor delegating powers to the Development Assessment Commission (DAC) in relation to granting variations to the development approval or varying or revoking conditions in relation to the approval. Reference was also made to the requirement of a licence to operate a waste depot from the Environment Protection Authority (EPA). A subsequent variation to the conditions of the development authorisation was made on 17 October 2002, and the Development Approval was further amended with the approval of the Low Level Contaminated Waste and Liquid Treatment Plant Residues facility, that was gazetted on 8 September 2005 (Appendix C).

2.2 EPA Licence

IWS is authorised to operate a Waste or Recycling Depot under the Environmental Protection Act 1993 (Schedule 1, Part A, Clause 3(3)) and other relevant Environment Protection Policies. These requirements govern permissible emission or concentration levels as well as operation and/or maintenance standards of plant and equipment, subject to the conditions of the licence. A copy of the Licence (EPA Licence No. 11275) can be found in **Appendix D**. The Licence was renewed in 2008 until 2013.

2.3 Subject Land

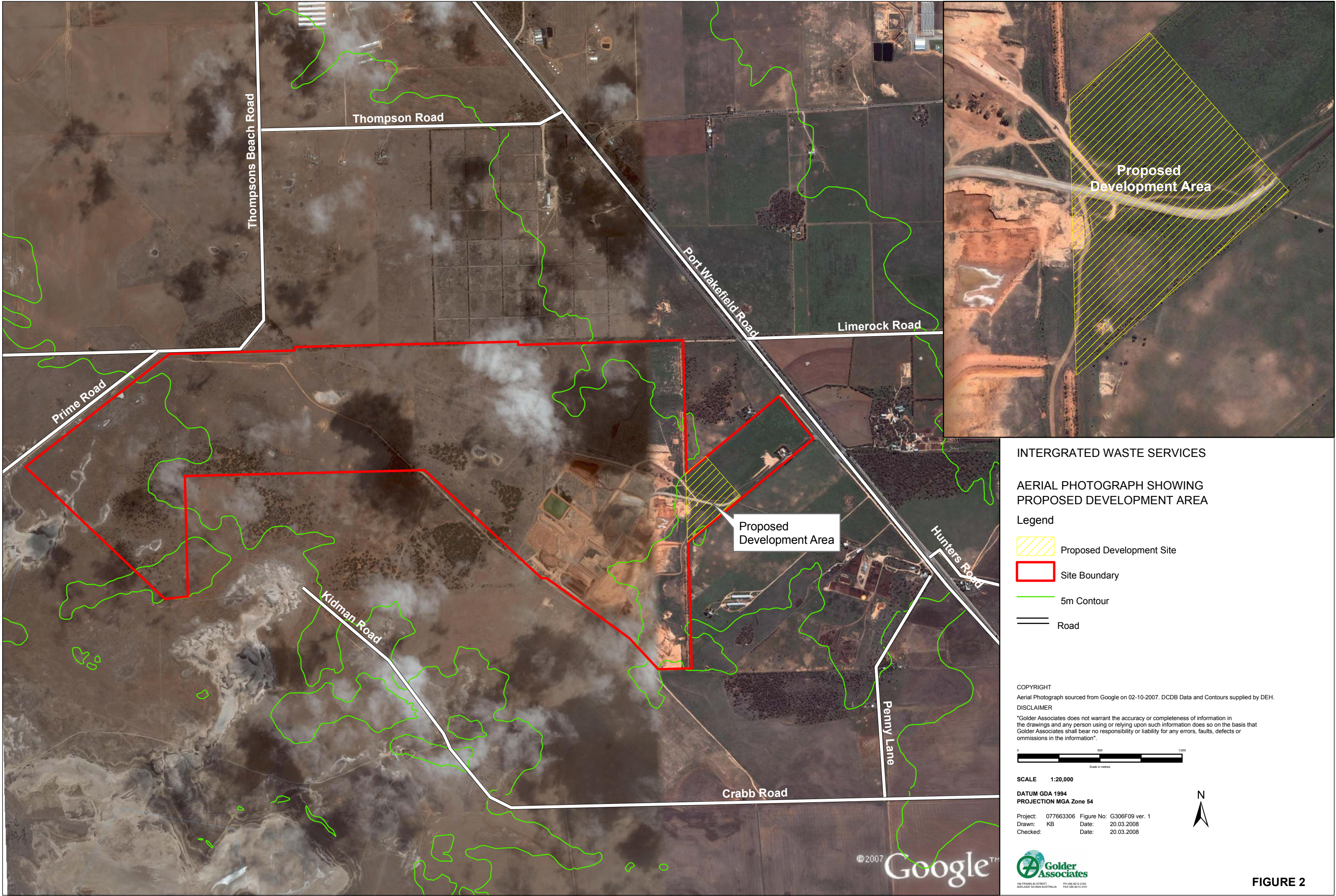
The proposed development is to be constructed within the existing IWS Northern Balefill facility, Dublin, South Australia. Land that forms the existing facility are:

- Section 312, Certificate of Title – Volume 5348, Folio 343.
- Section 311, Certificate of Title – Volume 5348, Folio 396.
- Section 310, Certificate of Title – Volume 5348, Folio 390.
- Allotment 76, Certificate of Title – Volume 5348, Folio 333.
- Allotment 92, Certificate of Title – Volume 5348, Folio 393.
- Allotment 93, Certificate of Title – Volume 5348, Folio 392.
- Allotment 94, Certificate of Title – Volume 5348, Folio 395.
- Allotment 95, Certificate of Title – Volume 5348, Folio 391.
- Allotment 96, Certificate of Title – Volume 5348, Folio 394.

Certificates of Title are provided in **Appendix G**.

The IWS Northern Balefill site is depicted on Figure 1, General Site Location Map in its regional context and more particularly on **Figure 2, Development Site**.





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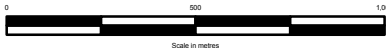
AERIAL PHOTOGRAPH SHOWING
PROPOSED DEVELOPMENT AREA

Legend

-  Proposed Development Site
-  Site Boundary
-  5m Contour
-  Road

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FIGURE 2

2.4 Overview of Existing Site Operations

The IWS Northern Balefill facility opened in May 2002 and is currently licensed to accept the following waste types:

- domestic waste (baled);
- municipal waste (shredded and baled where reasonable and practicable);
- commercial and industrial waste (shredded and baled where reasonable and practicable);
- construction and demolition waste;
- green waste and kerbside collected green waste (shredded where reasonable and practicable);
- Intermediate Landfill Cover as defined in the Environment Protection (Fees and Levy) Regulations 1994, Schedule 6.
- Waste Fill as defined in the Environment Protection (Fees and Levy) Regulations 1994, Schedule 6, and
- Low Level Contaminated Waste and Liquid Treatment Plant Residue that meet the chemical criteria established in Table 3 attached to the EPA Licence (refer **Appendix D**).

The facility primarily accepts baled non-recyclable wastes and unbaled construction and demolition wastes for disposal. The balefill cells are designed and constructed with full environmental controls, including groundwater control, base liner system, leachate collection system, daily/intermediate/final cover system, and a landfill gas control system. The balefill cells have been developed so separate materials can be baled at Wingfield, stored in cells and the position recorded. Should future technologies enable the use of that material as a secondary resource, the material is recoverable for that purpose in the future.

Balefill Stages 1 and 2, comprise cells 1 to 20 in the eastern and southern areas of the site. These areas cover, in part, the land previously quarried during construction works on Port Wakefield Road. These stages will take between 15 to 20 years to fill at projected waste disposal rates. These cells will be progressively covered and landscaped to provide a buffer to the adjacent residences and Port Wakefield Road to the east. Cells are designed to provide 9 to 12 months capacity with separate leachate collection systems draining to sumps outside the landfill cells. These separate leachate systems enable variable leachate management practices depending on the type of materials stored in the cells, age of the cell, performance of the final cap and leachate management techniques.

Stage 3, Cells 22 to 31 are reserved for Low Level Contaminated Waste and Liquid Treatment Plant Residue, commencing with Cell 31. Stages 4 to 7 will be developed separately from east to west.

Prior to developing these stages, stormwater control, perimeter access roads and landscaping will be developed to ensure maturity of screening and erosion control planting before landfill cell development.

Further detail regarding the site operation and environmental management procedures in place for the site are given in the LEMP (refer Appendix F).

2.5 Site Features

Existing site features include:

- revegetated perimeter screen zones;
- fully sealed and landscaped entrance roadway and main site access road;
- weighbridge/load control gatehouse;
- supervised rejected vehicle turn paths;
- office/environmental education facilities;
- stormwater management systems to prevent flow concentrations, minimise sediment loads and divert flows away from balefill zones;
- vehicle wheel wash;
- balefill cells with full environmental controls including groundwater control, base liner system, leachate collection system, final cover and landfill gas control systems;
- the ability to separate waste into designated areas for future recovery should appropriate technologies become available;
- an approved low level contaminated waste (LLCW) and liquid treatment plant residue (LTPR) cell, with environmental protection controls;
- a tracking system to record the receipt and placement of all wastes for future recovery;
- the award winning SISS (Slow Inward Seepage System) dewatering system; and
- an EPA approved LEMP.

Detailed heritage, soil, groundwater and climate assessments were undertaken previously for the site. An overview of these assessments is provided in Appendix E.

The location of this site offers an opportunity for waste from northern metropolitan urban areas to avoid transport across the city, and access to major transport corridors for waste from other areas of the city. Benefits of siting the proposed facility within the existing Northern Balefill site include:

- no loss of rural land currently utilised for primary production, recreation or water and nature conservation;
- appropriate buffer zones to adjacent rural and residential properties already exist;
- existing site infrastructure and services can be utilised, thereby reducing the environmental effects as compared to a standalone facility; and
- the EPA approved Landfill Environmental Management Plan (LEMP) for the IWS Northern Balefill site can be readily modified to incorporate considerations of the proposed infrastructure and associated processes.

2.6 Services

Existing site services include:

- electricity;
- mains pressure water;
- telecommunications; and
- septic system for sewerage from facility amenities.

A sealed road extends past the gatehouse to the existing wheel-wash and continues to Cell 1 as a fully engineered quarry rubble graded road. An existing sealed road extends into the proposed development area.

There are fully serviced staff amenities within the caretaker's residence, a gatehouse at the weighbridge and a fully equipped workshop. The caretaker's residence allows a staff member to be on site at all times in the case of an emergency. The proposed development will utilise existing services on site as much as practicable and will include the construction of demountable/portable site office and employee amenities close to the work area.

2.7 Site Location

The land and location of the IWS Northern Balefill facility was originally selected for the following reasons:

- it is located north of Adelaide, rather than to the east, thus avoiding transportation of waste through more densely populated residential areas and the Mount Lofty Ranges;
- land was in a degraded state due to former use for mining and off road vehicle racing activities, and was significantly cleared of native vegetation;
- land is not prime agricultural or primary production land;
- groundwater at the site is highly saline with no beneficial uses;
- the area is sparsely populated;
- major road access is adjacent the site; and
- the site can be developed in a manner which results in limited visual intrusion.

The proposed development is within the site as shown on Figure 1 and within the existing IWS Northern Balefill facility, as shown on Figure 2.

2.8 Surrounding Land Uses

Current surrounding land uses are agricultural. There are two residences within 500m of the eastern property boundary and a Mineral Lease Area on the western property boundary. There is grazing and intensive animal husbandry within 1.0 kilometre of the other property boundaries including piggeries, feedlots and poultry to the southwest, and rural housing and feedlots to the north. Extensive grazing occurs on other farming land in the region.

Adjacent land uses to the site are described in detail in the 1996 *Mallala Solid Waste Landfill Environmental Impact Statement* (P & M Borrelli & Sons Pty Ltd, 1996). There have been minimal changes to surrounding land use from 1996 to present (refer **Figure 7, Land Use Survey**).

The site is not readily visible from the main road system, National Highway No.1, and vegetation screen zones are being progressively established around the site perimeter. A portion of the site is visible from Prime Beach Road, which is neither a tourist route nor a through road.

2.9 Landfill Environment Management Plan (LEMP)

In accordance with the Governor's consent granted to IWS for the Development of the IWS Northern Balefill, dated 29 January 1998 (revised 17 October 2002 and 8 September 2005), a Landfill Environmental Management Plan (LEMP) was prepared.

IWS currently operates the Northern Balefill facility in accordance with its EPA approved LEMP. The LEMP details the approved strategies for managing potential environmental impacts and is reviewed and updated periodically. The LEMP undergoes ongoing EPA review and approval.

The LEMP includes the following key site management aspects:

1. Environmental Management System.
2. Groundwater and Leachate Management Plan.
3. Soil Erosion Management Plan.
4. Surface Water and Drainage Management Plan.
5. Landfill Gas Management Plan.
6. Air Quality and Management Plan.
7. Vegetation Management and Revegetation Plan.
8. Pest Plant and Animal Management Plan.
9. Aboriginal Heritage Management Plan.
10. Facilities Management Plan.
11. Fire Risk Management Plan.
12. Financial Assurance.
13. Closure and Post Closure Management Plan.
14. Low Level Contaminated Waste (LLCW) & Liquid Treatment Plant Residue (LTPR) Cells.
15. Hazardous Substances Management Plan.
16. Multi-purpose Waste Treatment Facility Management Plan.

The LEMP has been updated to include environmental management procedures for the facility, which are detailed in Section 18 of the LEMP (refer Appendix F). Where changes to the existing LEMP have been required, they have been highlighted in the updated document.

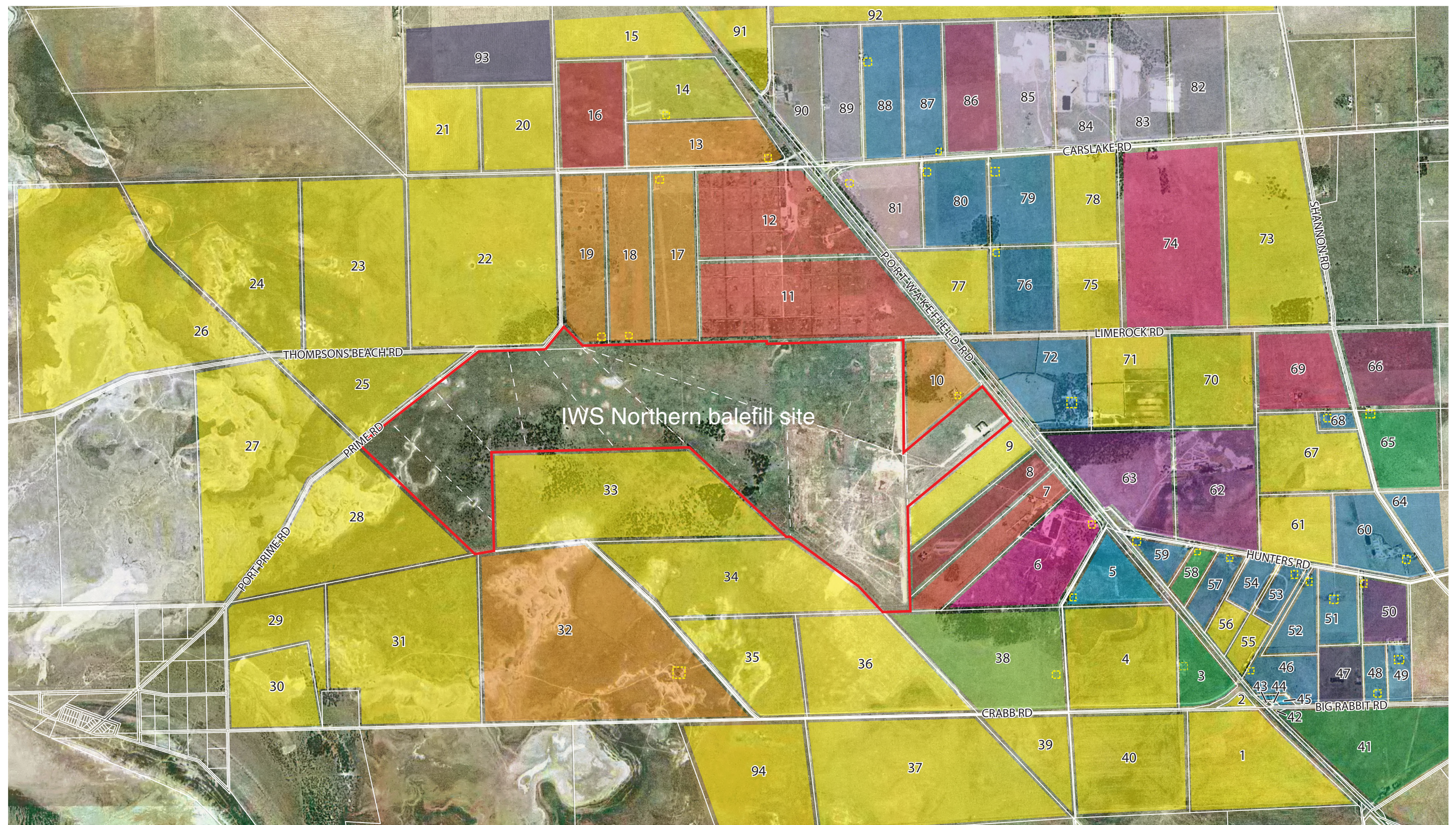


Figure 7
LAND USE SURVEY
 IWS Northern balefill site location

KEY

- Farming
- Detached dwelling, sheds & horse keeping
- Detached dwelling, caravan, sheds & horse keeping.
- Detached dwelling, sheds, intensive animal keeping & feedlots
- Intensive animal keeping - poultry
- Intensive animal keeping, feedlot & sheds
- Farming & detached dwellings

- Intensive animal keeping - poultry, detached dwelling
- Detached dwelling & horse-keeping
- Recreation
- Dwelling & yard
- Detached dwelling
- Farming and detached dwelling with sheds
- Farming and sheds
- Agricultural & detached dwelling with sheds
- Intensive animal keeping - piggery

- Horse keeping
- Farming, caravan & sheds
- Extractive industry - quarry
- Detached dwelling & junkyard
- Intensive animal keeping
- Farming, offices and sheds



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3 PROPOSED DEVELOPMENT

The layout of the proposal in simple terms is shown in **Figure 4**. The facility will receive contaminated materials, principally contaminated soil, that exceeds the Low Level Contaminated Soil criteria (refer Table 3 of the Northern Balefill EPA licence, Appendix D of this report). Contaminated waste will be transported to the IWS Northern Balefill for treatment facilitating reuse or disposal.

The facility will be developed to incorporate the following features:

- Concrete and bunded soil storage and laydown areas.
- Sealed soil treatment and remediation facilities.
- Unidirectional drive through facility with vehicle rejection area.
- Clean stormwater harvesting infrastructure for utilisation in processing and revegetation.
- Stormwater management systems to divert flows around the facility while minimising erosion and systems to store water from contaminated storage and treatment facilities.
- Utilisation of existing site facilities, including the weighbridge and wheel wash.
- Revegetated perimeter buffer zones & retention of existing revegetation where possible.

This proposal comprises two stages:

- Stage 1 - the concrete and bunded soil storage and laydown shown as 'Temporary Storage Area' (refer Figure 4).
- Stage 2 - the completed facility (refer Figure 4).

The layout of the final concept of the proposal is shown in **Figure 6**.

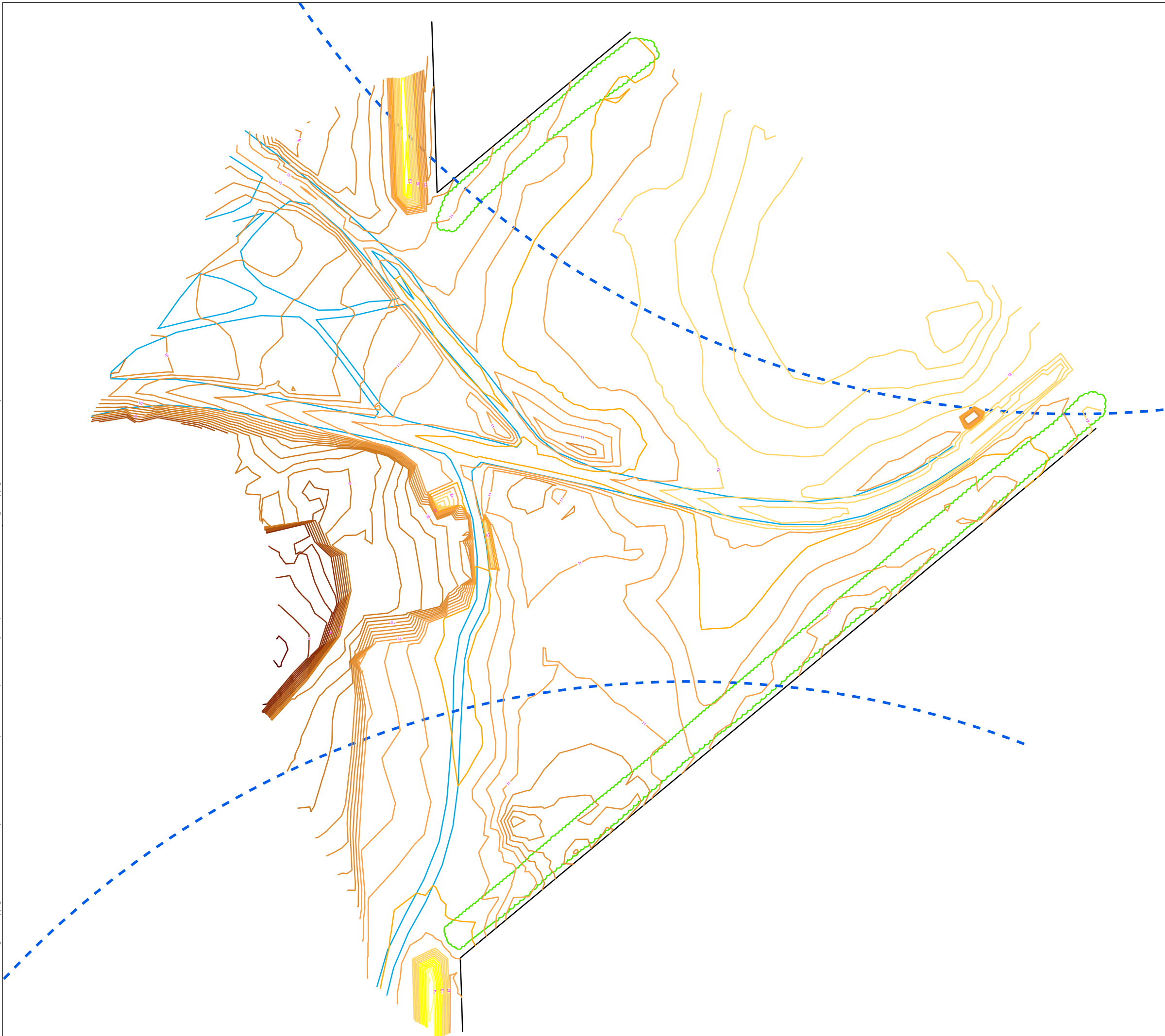
The Stage 1 proposed temporary receiving and storage laydown area will be located within the Northern Balefill site, approximately 700 metres from Port Wakefield Road and within the existing 520 metre buffer zone to the nearest dwellings on the adjacent properties (refer **Figure 5**). Aerial photographs (refer Figure 1 and 2) and a detailed survey of the development site (refer **Figure 3**) were obtained to identify existing site features and land contours.

3.1 Stage 1: Storage and Laydown Area

The concept design for the facility that will receive and store the soil/material to be treated is shown in Figure 6. The facility will occupy approximately 125 m x 50 m and be constructed of an impervious material (concrete or similar). It is proposed that a maximum carrying capacity of 6,000 m³ to an approximate average height of 2.0 metres will be implemented at the facility.

The area will be laid out to incorporate receiving bays, which will be delineated using concrete blocks. These blocks are moveable to enable alteration of bay size according to the volume of material within a discrete batch.

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PROPOSED DEVELOPMENT
AREA SURVEY

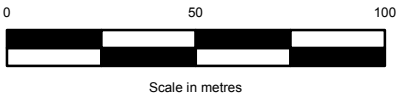
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CONTOUR - ELEVATION (m)

- 0
- 6.8
- 7 - 7.8
- 8 - 8.8
- 9 - 9.8
- 10 - 10.8
- 11 - 11.8
- 12 - 12.8
- 13 - 13.8
- 14 - 14.4
- 520m BUFFER
- FENCE
- TRACK
- TREE

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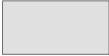

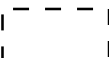

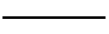
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FIGURE 3

INTERGRATED WASTE SERVICES

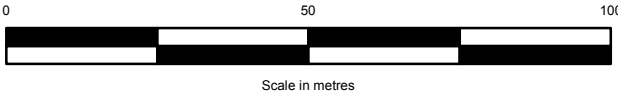
MULTIPURPOSE WASTE TREATMENT
FACILITY SITE LAYOUT

Legend

-  Building
-  Storage and Laydown Area for Treatment Storage
-  Wheel Wash
-  Boundary
-  Buffer Zone (520m)
-  Cell Boundary

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SCALE 1:1,250

DATUM GDA 1994
PROJECTION MGA Zone 54



Project: 077663306 Figure No: G306F16 VER. 3
Drawn: KB Date: 19.03.2008
Checked: Date: 19.03.2008

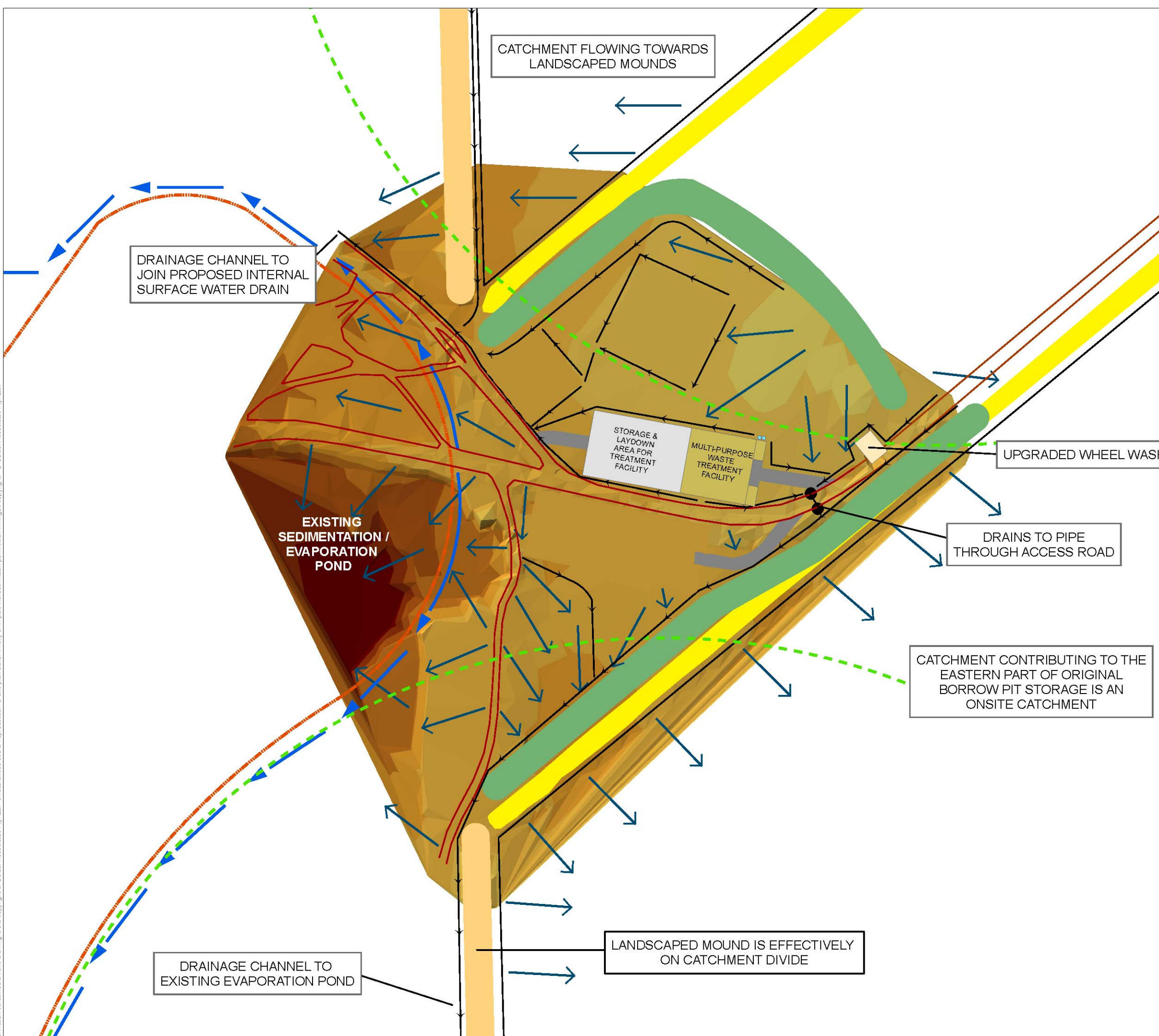


199 FRANKLIN STREET
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FIGURE 4

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INTERGRATED WASTE SERVICES SURFACE WATER DRAINAGE FOR WASTE TREATMENT FACILITY

Legend

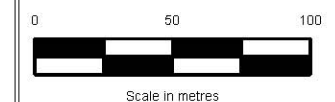
- Landscaped Mound Toe Drain
 - - - 520m Buffer
 - Track
 - Drain
 - Internal Surface Water Drain
 - Surface Water Drainage Direction
 - Proposed Vegetated Screen
 - Existing Mounded Vegetated Screen
 - Existing Vegetated Screen
 - Building
 - Future Energy Generator
 - Possible Future Resource Recovery Facility
 - Possible Future MRRF Site
 - Rainwater Tank
 - Storage and Laydown Area for Treatment Storage
 - Upgraded Wheel Wash
 - Boundary
 - - - Cell Boundary
- Elevation (m)
- 13.554 - 14.412
 - 12.696 - 13.554
 - 11.838 - 12.696
 - 10.979 - 11.838
 - 10.121 - 10.979
 - 9.263 - 10.121
 - 8.405 - 9.263
 - 7.547 - 8.405
 - 6.688 - 7.547

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SCALE 1:2,750

DATUM GDA 1994
PROJECTION MGA Zone 54

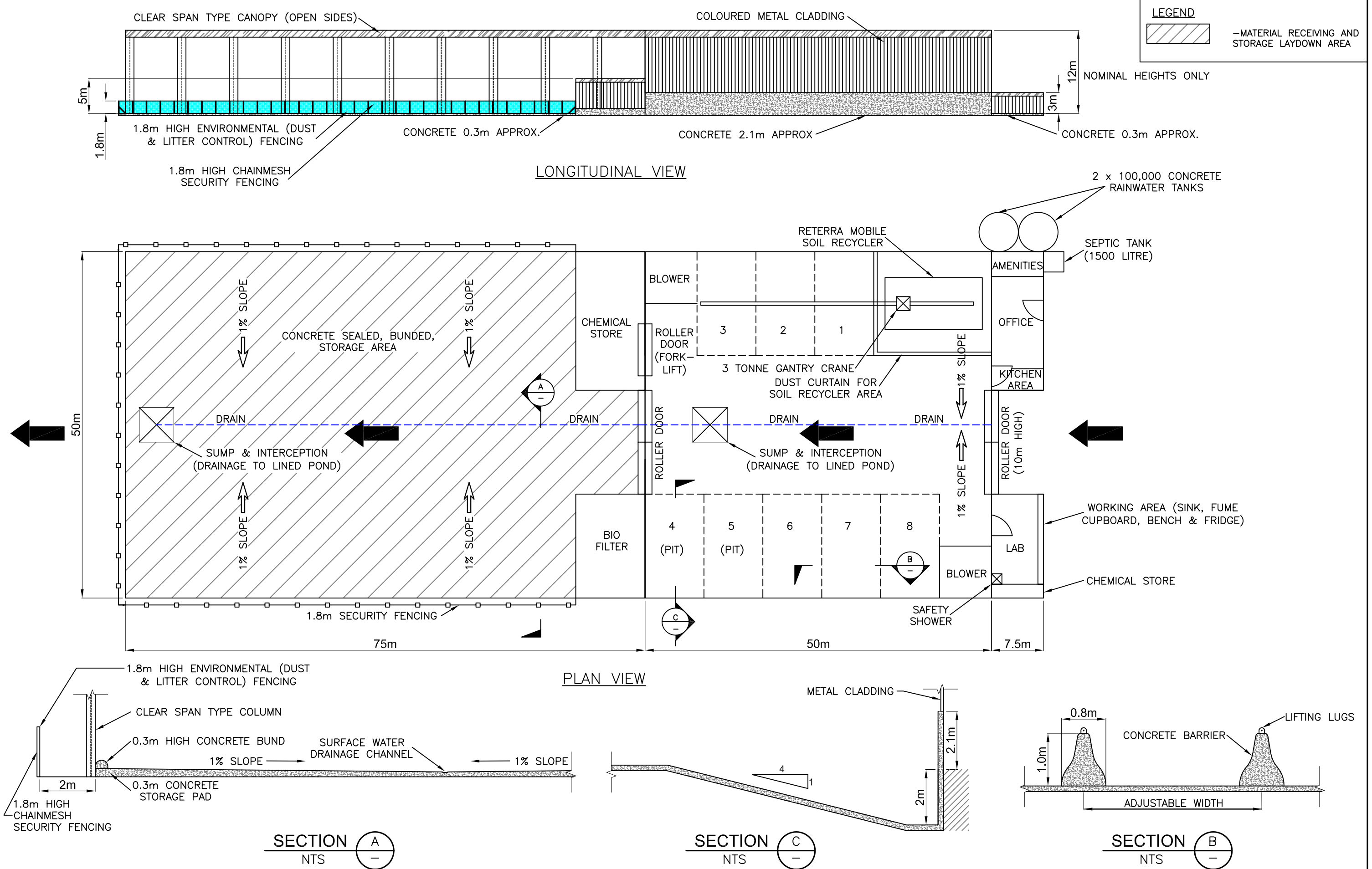
Project: 077663306 Figure No: G306F13 ver. 2
Drawn: KB Date: 19.03.2008
Checked: Date: 19.03.2008



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FIGURE 5



The floor of the building will have a minimum 1% drainage slope. Two bays will be constructed with a concrete sloping ramp of 25% with a small area of the base acting as a sump to allow wet solids to be placed into the bay.

Product arriving at the facility will be unloaded into a labelled banded bay following documentation checks and clearance. Rejected loads will not be permitted to unload and will be required to leave the site.

A roof is proposed as part of Stage 2. A roof will be constructed as a single structure for both the storage area and proposed treatment facility. It is proposed that for Stage 1 of the development that temporarily stored material will be covered using material of low permeability, such as plastics (ie high density polyethylene) or geomembranes (such as Bentofix) or similar material to prevent infiltration of stormwater and dust suppression. Covers will allow for stormwater run-off, which will be directed to a temporary detention pond and discharge as part of normal stormwater runoff is proposed.

3.2 Stage 2: Multipurpose Waste Treatment Facility

3.2.1 Receipt/Storage Building

The concept design for the building that will receive the soil/product to be treated and also store the treated product is shown in Figure 6. The building will occupy approximately 0.25 hectares (50 m x 50 m) and be of steel frame construction with a coloured metal cladding. The floor of the building will be constructed of an impervious material (concrete) (as proposed for Stage 1) and this floor will form a coving along the edge of the building that is reinforced and rises vertically to form a 2.1 metre wall. The sides of the bays will comprise concrete blocks that are moveable so that the size of the bays can be adjusted according to the volume of material within a discrete batch that requires treatment.

The floor of the building will have a minimum 1% drainage slope. Two bays will be constructed with a concrete sloping ramp of 25% with a small area of the base acting as a sump to allow wet solids to be placed into the bay. The liquid will therefore drain into the sump and the drier material can be scooped out for treatment. There is not expected to be any excess water associated with the treatment of the material outside of these specific bays. However, if there is any, the water will be collected by the internal drainage system and will pass through a sediment trap to a sump where it can be disposed to the existing LLCW and LTPR lined sedimentation pond for storage and treatment.

To minimise potential odour, the building will operate under negative pressure, created by an exhaust gas removal system and be fitted with rapid closing doors. The negative pressure and rapid closing doors will maximise the capture of potential odours and minimise fugitive emissions from the building.

The exhaust system will be connected to a biofiltration unit that will treat and reduce potential odour emissions below the odour criterion of 10 odour units (3 minute average, 99.9%), as required by the *EPA Guideline (373/07), Odour Assessment using Odour Source Modelling*. The criterion of 10 odour units (3 minute average, 99.9%) applies to this situation, as there are less than 12 residents within a 500 metre radius of the facility.

Additional information relating to the biofiltration unit is provided in AWN Pty Ltd's report, provided in **Appendix H**.

Any chemicals utilised in the treatment process will be stored within this building within a bunded chemical storage area. The volume of chemicals stored will be minimised by ordering chemicals for specific batch requirements, thus offsetting the need to maintain larger quantities of chemicals over extended periods.

Product arriving at the facility will be unloaded into a labelled bunded bay following documentation checks and clearance. Rejected loads will not be permitted to unload and will be required to leave the site. Treated product may also be stored within this building, either within a bunded area for this purpose or retained within a treatment vessel until loaded and transported off-site.

3.2.2 Treatment Platform

An impervious treatment pad (concrete or similar) will be constructed as part of Stage 1 of the development. This treatment pad will be approximately 75 m x 50 m (0.375 hectares) (refer Figure 6). This treatment pad will be situated immediately adjacent to the storage shed in order to minimise the distance required to transport materials.

The pad will have a minimum 1% drainage slope, draining to the middle of the pad, where a spoon drain extending the length of it will collect any water that falls onto the pad or seeps from moist material. The volume of liquid collected within this system is expected to be very small as the concrete pad will be covered by the extension of the roof from the receiving shed.

During operation of the treatment facility, the small volume of liquid that may be collected within the sump can be tested for disposal or utilised for dust suppression on the same or similar contaminated material. It may also be possible to dispose of this liquid via the existing LLCW & LTPR lined sedimentation pond. Vehicles will be loaded directly from the treatment pad either for disposal on-site or for transport of clean material off-site as fill.

3.2.3 Site Amenities

A site amenity building will be provided for the anticipated two full-time and up to four staff that may be required to operate the facility. Amenities will include a shower, toilet and kitchen area.

This building will be constructed of the same materials as the storage shed and will be immediately adjacent to the storage shed.

Wastewater will be disposed of via a septic tank (in-ground polyethylene, 1,620 L) and soakage trench system in accordance with the design requirements of the *Public and Environmental Health Act 1987*.

A separate application will be lodged with the District Council of Mallala for the septic tank and effluent disposal system.

3.3 Odour Assessment

AWN Pty Ltd were commissioned to undertake odour dispersion modelling of Stage 1 and 2 activities, in accordance with *EPA Guideline (373/07) Odour Assessment using Odour Source Modelling*. As the proposed facility is not operational, a precautionary approach was taken, with the modelling based on a worst case scenario, which involved:

- An estimation of odour emission rates using odour flux rates measured at a gas works remediation site in Victoria (contaminated gas works soil are generally accepted as highly odorous and representative of the 'worst case scenario' for this facility).
- The facility operating at maximum capacity.
- Odour emissions from three main sources:
 1. The biofiltration unit (treating 50% of odour within the building at an efficiency of 85%).
 2. Fugitive emissions from the receipt/storage facility (50% of odour within the building).
 3. The treatment pad.

The modelling predicted maximum ground level concentrations of 1.9 odour units (3 minute average, 99.9%) at the nearest sensitive receptor (refer to Appendix H, Figure 3). This level is below the *EPA Guideline (373/07) Odour Assessment using Odour Source Modelling*, criterion of 10 odour units (3 minute average, 99.9%). There are less than 12 residents within 500 metres of the site, and therefore a level of 10 odour units (3 minute average, 99.9%) applies to this development (EPA Guideline 373/07).

Further evidence that potential odours will have a minimal effect on the surrounding areas is provided in an isopleth plot of the highest ground level odour concentrations. The plot predicts that the odour criterion of 10 odour units (3 minute average, 99.9%) will be confined to an area between 100 metres to 200 metres from the operation and within the IWS facility (refer Appendix H, Figure 4).

A copy of the Plume Dispersion Modelling Assessment report, prepared by AWN Pty Ltd, is provided in Appendix H.

To confirm the facility meets the EPA odour criterion of 10 odour units (3 minute average, 99.9%), odour dispersion modelling will be undertaken within 12 months of the completed facility commencing operations.



The modelling will be based on samples taken from odour sources on-site, including the biofiltration unit and treatment pad. A copy of the odour dispersion modelling report will be provided to the EPA for their information.

3.4 Surface Water and Drainage Management

Surface water and drainage management will be conducted in accordance with the existing *Surface Water and Drainage Management Plan* of the LEMP.

Surface waters from the development site area will be directed so as to link in with the existing surface water and drainage management plan, as shown in Figure 5. Environmental screens (embankments) planned as part of future works will also act to redirect water around the facility.

The surface water, watercourses and water bodies are protected by the management strategies delineated in the LEMP (refer Appendix F). It should be noted that there are no existing natural watercourses in or around the site and water will not flow onto the receiving and storage area due to the combination of interception drains and concrete edges to the facility is covered, protecting stormwater from coming into contact with contaminated or treated material. Stormwater is also unable to flow onto the receiving shed floor or concrete pad due to the combination of interception drains and the concrete coving that forms the walls of the facility. Natural patterns of surface water flow are maintained, as far as is practicable, and the use of vegetated drains is designed to slow the movement of water to reduce erosion and sediment transport.

The proposed site for this development is highly disturbed and the original vegetation structure was destroyed prior to the site being purchased by IWS. Existing native vegetation where it exists and revegetation has been protected by the careful location of the stormwater system and the vegetation in turn will reduce the surface volume of stormwater.

3.5 Water Supply

Stormwater that falls on the facility roof will be collected by rainwater tanks and utilised at the site. Any overflow will be directed into the stormwater drainage system. Captured water may subsequently be utilised on site for processing, dust suppression or the watering of the plants that form the environmental screens. Two concrete rainwater tanks totalling 100,000 litres will be installed adjacent to the site office to capture runoff from the roof of the facility, as part of Stage 2.

The expected water consumption for the contaminated soil treatment facility is approximately 10 ML of water per 10,000 tonnes of treated waste material. On average, the proposed facility is expected to receive around 15,000 to 30,000 tonnes per annum which equates to approximately 15 to 30 ML of water per year.

3.6 Environmental Screens

The structure and location of the existing mounded and un-mounded vegetation screens is provided in the LEMP (refer Figures 10.2 and 10.3). Stage 2 of the development is not expected to have significant effects to visual amenity. Stage 2 works will include extension of mounded vegetation screens to provide additional visual screening from the direction of Port Wakefield Road and the northern property boundary, as shown in Figure 5.

Un-mounded revegetation that exists adjacent to the property boundaries will be retained with the earth mounds constructed internal to this revegetation, generally as shown in Figure 5. Vegetated mounds will therefore be present around three sides of the proposed facility. The revegetation work will improve local amenity, increase biodiversity, assist the control of surface water flows and reduce dust and noise emissions. The revegetation work will be undertaken in accordance with the existing Vegetation Management and Revegetation Plan of the LEMP.

3.7 Transport

The layout and design has incorporated the need for traffic flow through the facility to be uni-directional (refer Figure 6). The facility has been sited adjacent to the existing main service road to offset the need to construct additional road infrastructure. All roads and traffic areas are to be constructed in accordance with the Australian Standard design requirements, in order to provide all weather access to the facility for heavy vehicles. The facility includes a rejected vehicle return path.

3.8 Environmental Issues & Management

A new section of the Landfill Environmental Management Plan (LEMP) for the Northern Balefill has been prepared, which documents the environmental management requirements for the proposal (refer Section 18), integrated within the existing management requirements of the site.

Air modelling was undertaken as part of assessment activities as described above, and findings are included as part of this variation application and associated documents (refer Section 3.3 of this report and **Appendix H**). No other environmental effects studies were undertaken for the proposal, and general conditions are considered consistent with the environmental impact assessment undertaken as part of the overall Northern Balefill site Environmental Impact Statement (EIS) (1996).

The potential for negative environmental effects associated with Stage 1, the proposed storage and laydown area is low and will be managed in accordance with the management measures outlined in the LEMP (refer Appendix F). The risk of on or off-site movement of contaminated material is low due to the proposed management measures.

The potential for negative environmental effects associated with Stage 2 is low based on the design aspects and management measures outlined in this variation application and the site LEMP.

The IWS Northern Balefill LEMP outlines the current environmental management and mitigation controls for the site. The LEMP was updated to provide additional controls relating to Stage 1 and Stage 2 of the proposed development. This will be submitted to the EPA for approval. The LEMP includes management measures for the following environmental issues:

- Groundwater and Leachate.
- Surface Water and Drainage.
- Air Quality.
- Noise.
- Odour.
- Dust.
- Amenity.
- Effluent.
- Facilities.

3.9 Proposed Development

The proposed variation is within the site of the existing IWS Northern Balefill facility.

The variation comprises a storage and treatment shed that extends cover over a sealed concrete pad and other operational and staff facilities, the details of which are detailed below and in Section 4.

The proposed development will be located approximately 700 metres from Port Wakefield Road and outside the existing 520m buffer zone created around the nearest dwellings on the adjacent properties (refer Figure 4).

The variation forms part of IWS's commitment to develop an integrated waste reuse, recycling, treatment and management facility for South Australia. The facilities are designed to maximise secondary resource recovery and environmental management of the solid waste stream.

The facility will be capable of receiving and processing material that is contaminated as listed in Schedule 1 of the *Environment Protection Act 2003*, that is, soil that may exceed the criteria for Waste Fill, Intermediate Landfill Cover and Low Level Contaminated Waste, refer Section 5. It is proposed that soil exceeding the *low level contaminated waste criteria for the classification and disposal of contaminated waste* may also be received and processed at the treatment facility (refer Appendix D).

It is noteworthy that often this type of material is treated on sites within the populated urban areas. This proposal will reduce potential environmental effects on the local environment and communities.

4 OPERATIONAL DETAILS – STAGE 1

4.1 Modus Operandi

On entering the site (off Port Wakefield Road), trucks will report to the existing gatehouse where drivers will sign in and complete a brief site safety induction, if not previously inducted to the site. Prior to development of the full facility infrastructure, the existing gatehouse will be the contact point for load inspection and documentation review duties. Waste documentation will include details of contaminated waste including chemical analysis. If the appropriate documentation is not presented to staff upon arrival, trucks will be denied access until documentation is presented.

Upon receiving the appropriate documentation, facility staff will direct trucks to unload in the receiving and storage floor area. Traffic flow through the shed will be one-way at all times, with the exception of trucks reversing to unload. Once unloaded, trucks will proceed through the shed and concrete pad, exiting the facility via the western end of the concrete pad, and exiting the site via the sealed access road back to the main entrance gate.

It is anticipated that stockpiling limits for the receiving and storage laydown area will be a maximum storage volume of approximately 6,000 m³ to an approximate average height of 2.0 metres, during operation of the temporary facility. During construction, material may be required to be moved around within the material storage area, which for short periods will result in a stockpile height above 2.0 metres.

4.2 Hours of Operation

In accordance with the Licence conditions (Condition 40) of the Northern Balefill facility, the proposed contaminated soil treatment facility will operate during the following hours:

- 6.00 am to 6.00 pm – Monday to Friday.
- 7.00 am to 5.00 pm – Saturday.
- 8.00 am to 4.00 pm – Sundays and public holidays.

4.3 Employees

Employee numbers will vary depending on process and work load demands, however it is expected that current site staff number will be suitable for the receipt and storage of material (Stage 1).

4.4 Site Access and Security

Site access will be via the current IWS Northern Balefill entrance, via the service road from Port Wakefield Road where contractors and visitors are required to report to the site office and complete a brief site safety induction, if not previously inducted to the site.

The perimeter boundary fence for the Northern Balefill site is currently a 1.5 metre high post and wire fence with vermin proof wire to a height of 1.0 metre and two strands of barbed wire above. This is generally consistent in overall form and height with standard agricultural fencing.

Boundary fencing around the proposed facility will be 1.8 metre high chain wire security fence incorporating shade cloth or material of a equivalent nature for the control of dust.

The proposed receiving and storage laydown area will be signposted to prominently display warnings, site information and directions, including the following:

- Main entrance sign indicating that the facility is not open to the general public, the name of the licensee, emergency phone numbers, licence number and hours of operation, existing signage will be modified as required.
- Traffic signs to direct users and indicate speed restrictions within the site.
- Direction, information and other signs to ensure appropriate and orderly use of the facility.

4.5 Traffic

It is expected that due to the storage limit proposed as part of this development application, the number of vehicles will be limited. It would be anticipated that deposition of material will be dependent on actual needs, and will be limited by the carrying capacity of the facility, that is, a maximum of 6,000 cubic metres. Traffic is not expected to be significant (refer Section 5.6 below).

5 OPERATIONAL DETAILS – STAGE 2

5.1 Modus Operandi

On entering the IWS waste management site (off Port Wakefield Road), trucks will report to the existing gatehouse where drivers will sign in and complete a brief site safety induction, if not previously inducted to the site. Once inside, trucks will proceed along the sealed access road and enter the treatment facility where they will report to the site office and drivers will present the appropriate documentation. This documentation will detail the nature of the contaminated waste. While waiting, trucks can be parked in the sealed parking area adjacent to the site office and staff amenities, refer Figure 4. If the appropriate documentation is not presented to staff upon arrival, trucks will be denied access until documentation is presented, and drivers will be required to exit the facility via the rejected vehicle turn path if acceptable documentation is not produced.

5.2 Proposed Soil Treatments

A brief summary of the proposed treatment technologies is given below. A more detailed description of the technologies is given in **Appendix I**.

5.2.1 Contaminant Stabilisation

Prior to treatment and costing, initial bench top trials will be conducted to determine the most effective methods of stabilisation. Based upon the outcome of these trials, advice can be given on the most cost effective approach to achieving the objectives of the remediation. Both physical and chemical stabilisation/fixation can be enhanced with the use of the treatment unit. Up to 100 tonnes per hour can be homogeneously mixed with fixating chemicals.

5.2.1.1 Physical Stabilisation (Solidification)

Mixing waste with sulphur cement, silicate cement or phosphates results in solidification of the material. The treated waste can then be managed on-site or disposed to a licensed off-site facility. Waste characteristics such as void volume, soil pore size and permeability will influence the effectiveness of this treatment method.

5.2.1.2 Chemical Stabilisation

Contaminants are chemically absorbed and immobilised or reduced in toxicity by proprietary processes. This process involves the addition of proprietary reagents to the soil in order to produce an insoluble complex within the soil matrix. It also minimises the leachability of heavy metals from within the soil matrix. Contaminated soil is pre-screened to remove debris that can adversely affect the process.

Pre-treatment may be required to improve the performance of the process and the product to meet specific conditions. Contaminated soil is then loaded into a hopper and conveyed to the reaction vessel where proprietary fixation reagents are added and blended with the soil. Treated soil exits on a conveyor and is stockpiled and analysed to verify compliance with site specific targets. Pending successful remediation results, waste is released from holding to be disposed off-site or reused on-site in accordance with existing license conditions.

5.2.2 Bioremediation

Bioremediation processes normally require the contaminated material to initially be screened and subsequently mixed in the Reterra with the required amendments before being placed into windrows on the concrete pad. Mixing occurs within the shed. Amendments may include:

- Green organics.
- Inorganic fertilisers (eg super phosphate and urea).
- Biosolids (as an inoculum).
- Biosurfactants (microbial and plant derived surfactants).
- Vegetable oils.
- Complex sugars (eg cyclodextrins).
- Carbohydrates.

In most cases a forced vacuum aeration system will be established on the concrete lined pad in a bed of woodchips before the mixed material is placed on top. Windrow dimensions will generally be 5.0 metres at the base, 2.5 metres high and of a practical length, determined by the volume of material and size limitation of the concrete pad. Windrow forming will be undertaken using a front end loader or excavator. All windrows will be covered for dust suppression and to maintain windrow integrity.

Monitoring during treatment will involve a number of parameters, including:

- Contaminant sampling and testing.
- Temperature monitoring.
- Moisture monitoring.
- Off-gas monitoring for oxygen, carbon dioxide and methane.

5.3 Hours of Operation

In accordance with the licence conditions (Condition 40) of the Northern Balefill facility, the proposed contaminated soil treatment facility will operate during the following hours:

- 6.00 am to 6.00 pm – Monday to Friday.
- 7.00 am to 5.00 pm – Saturday.
- 8.00 am to 4.00 pm – Sundays and public holidays.

5.4 Employees

Employee numbers will vary depending on process and workload demands. Operation of the completed facility (Stage 2) is expected to require four full-time employees when fully operational.

5.5 Site Access & Security

Site access will be via the current IWS Northern Balefill entrance, via the service road from Port Wakefield Road where contractors and visitors are required to report to the site office and complete a brief site safety induction, if not previously inducted to the site.

The perimeter boundary fence for the Northern Balefill site is currently a 1.5 metres high post and wire fence with vermin proof wire to a height of 1.0 metre and two strands of barbed wire above. This is generally consistent in overall form and height with standard agricultural fencing. Boundary fencing around the proposed facility will be 1.8 metre high chain wire security fence incorporating shade cloth or material of a equivalent nature for the control of dust.

The proposed facility will be signposted to prominently display warnings, site information and directions, including the following:

- Main entrance sign indicating that the facility is not open to the general public, the name of the licensee, emergency phone numbers, licence number and hours of operation, existing signage will be modified as required.
- Traffic signs to direct users and indicate speed restrictions within the site.
- Signs stipulating the types of waste the depot is not licensed to receive.
- Direction, information and other signs to ensure appropriate and orderly use of the facility.

5.6 Traffic

On average, the proposed facility is expected to receive a around 15,000 tonnes to 30,000 tonnes per annum. This is based on the use of B-double or semi-trailer tipper vehicles for the transport of soil, with a capacity of approximately 15 tonne per vehicle average. This equates to around 20 to 40 vehicles per week or 3 to 6 per day entering the facility. This further equates to approximately 6 to 12 two-way vehicle movements per day.

The traffic movements reported in the *Mallala Solid Waste Landfill Environmental Impact Statement* (February 1996) were 7,300 two-way movements per year along Port Wakefield Road. Therefore, the additional vehicle movements expected as a result of the proposed facility form less than 0.1 % of those reported in the EIS and can be described as negligible.

There is expected to be some additional vehicle movements if the removal of suitably treated soil off-site becomes viable, however, standard industry practice is to backload vehicles that have delivered contaminated soil.

6 PLANNING ANALYSIS

This section provides an assessment of the proposed variation in relation to the relevant provisions of the Development Plan for the *Mallala District Council*.

6.1 Outer Metropolitan Region – Development Zone Objectives

The Integrated Waste Services Pty Ltd Northern Balefill facility is located within the Mallala District Council within the Outer Metropolitan region. The Outer Metropolitan Region Development Zone comprises 15 Councils, including the Mallala District Council. The following objectives and principles that apply for the control of development within this Outer Metropolitan Region in addition to those that are specific for Mallala District Council.

The following objectives and principles of development control are applicable to the nature of the proposed facility.

OUTER METROPOLITAN REGION	
<i>Form of Development</i>	Comment
Objective 1: Orderly and economic development	<p>The proposed variation is located entirely within the existing IWS Northern Balefill site and will not involve the loss of rural land currently utilised for primary production, recreation or water and nature conservation. The location has significant economic advantages for the development industry as it allows existing site infrastructure and services to be better utilised. The proposed development is orderly as it co-locates activities within a discrete area on the established waste management site and integrates existing services offered at the site.</p> <p>The development of these facilities north of the City of Adelaide is consistent with the increasing community need, as residential development increases on the northern side of the metropolitan area within former industrial areas that are associated with contaminated soils. The only other equivalent facility is located well to the south of Adelaide.</p> <p>The proposal provides for traffic in a manner that does not prejudice the free flow of traffic in the locality, and does not affect the operation of neighbouring or nearby land uses. The development is a form that can be established such as not to effect the character or amenity of the locality. Accordingly, as the proposal satisfies the design and function criteria set out in the Development Plan, it results in an orderly and economic development.</p>

OUTER METROPOLITAN REGION	
<i>Form of Development</i>	Comment
Objective 2: A proper distribution and segregation of living, working and recreational activities by the allocation of suitable areas of land for those purposes.	<p>The IWS Northern Balefill site is a highly suitable location having been identified and approved as a significant waste management facility. The variation can be established entirely within the site, offsetting the need to develop land utilised for other purposes, such as farming.</p> <p>The site is suitably separated from other living and working environments.</p>
<i>Movement of People and Goods</i>	
Objective 11: The safe and efficient movement of people and goods. Objective 12: The free flow of traffic on roads by minimising interference from adjoining development.	<p>The primary road network utilised is Port Wakefield Road, with the existing service road and on-site traffic network. Additional vehicular access and egress will be developed on site to link the infrastructure with the on-site traffic network. A uni-directional flow of vehicular traffic through the facility is established. All roadways and vehicular services will be constructed in accordance with the relevant design requirements and standards.</p> <p>Additional, traffic movements associated with the operation of this facility will not affect the operating status of Port Wakefield Road. It is the highest order road being part of National Highway 1 with a service road designed in accordance with DTEI requirements.</p> <p>There will not be a continuous flow of traffic associated with this activity as the material delivered to the site will reside in the facility for storage and treatment.</p> <p>The type of vehicles accessing the proposed facility and utilised within the facility are consistent with those currently transporting waste to the site.</p> <p>There is no surrounding development that will interfere with the operation of this facility and the site is sufficiently buffered so as to prevent interference from future development.</p> <p>Contaminated material will only be transported to the site by an operator licensed in accordance with EPA and NEPM guidelines.</p>
<i>Appearance of Land and Buildings</i>	
Objective 27: The amenity of localities not impaired by the appearance of land, buildings and objects.	<p>The proposed variation is within the existing landfill site, with the proposed infrastructure to be located approximately 700 metres from Port Wakefield Road and beyond the existing 520 metre buffer zone defined as a separator from the nearest dwellings on the adjacent properties.</p>

OUTER METROPOLITAN REGION	
<i>Form of Development</i>	Comment
	<p>The soil treatment area will be further screened from Port Wakefield Road and adjacent properties by existing vegetated earthen mounds located adjacent to the property perimeter. Additional vegetated mounds and revegetation work in the immediate vicinity of the operation will be part of Stage 2 of the development.</p> <p>Plantings will enhance the visual amenity of the proposed infrastructure and provide habitat for endemic native flora and fauna. The typical structure of the vegetated earthen mounds is provided in the LEMP as Figures 10.2 and 10.3.</p> <p>The site will be maintained in an orderly manner in accordance with the Landfill Environment Management Plan established for the site.</p>
<i>Rural Development</i>	
<p>Objective 37:</p> <p>The retention of rural areas primarily for agricultural, pastoral and forestry purposes, and the maintenance of the natural character and beauty of such areas.</p>	<p>The co-location of the proposed facility within the existing IWS Northern Balefill site preserves the surrounding rural landscape, as this site has already received development approval for waste management activities. Furthermore, revegetation work at the site and vegetated environmental mounds have contributed to enhancing the character of the area. The proposed facility will not affect the land use of the adjoining properties or surrounding rural area.</p>
<i>Conservation</i>	
<p>Objective 42:</p> <p>Retention of native vegetation.</p> <p>Objective 43:</p> <p>Buildings and other structures sited on allotments in a manner which minimises the requirement to clear or remove native vegetation.</p>	<p>Native vegetation existing at the site is managed in accordance with the requirements of the Native Vegetation Act and the Vegetation Management and Revegetation Plan as incorporated into the LEMP. The siting of buildings and other infrastructure is undertaken so that no clearance of native vegetation, is required.</p>
COUNCIL-WIDE	
<i>General</i>	
<p>Objective 1:</p> <p>Orderly development of the Mallala district, with economic extensions of services and facilities.</p>	<p>The proposed development is an extension of the services currently offered at this site in the same use of waste management. The location of the proposed facility allows existing infrastructure to be shared and avoids the necessity to duplicate facilities. The environmental footprint of the facility is reduced through the ability to be co-located.</p>

OUTER METROPOLITAN REGION	
<i>Form of Development</i>	Comment
	The provision of these additional services will provide an economic provision of these facilities to the Adelaide community. With continuing residential development in former industrial areas occurring within Adelaide, there is likely to be increasing demand for such a facility to the north of the city.
Objective 2: Development and land management which seeks to protect and enhance biodiversity and areas of conservation significance.	<p>There are no areas of conservation significance at the proposed site. The existing LEMP has been updated to incorporate considerations of the proposed infrastructure and associated processes.</p> <p>Environmental values are protected through the implementation of the LEMP. Section 10, 'Vegetation Management and Revegetation Plan' of the LEMP outlines the objectives and management actions that will be undertaken to enhance the biodiversity of the site.</p>
Objective 8: Minimisation of fire risk throughout the Mallala district.	<p>Fire suppression and prevention actions are established at the facility and these have been upgraded to accommodate the proposal. Section 14 'Fire Risk Management Plan' of the LEMP details fire management objectives and procedures, and fire management is incorporated into the design requirements of the facilities themselves in accordance with the BCA requirements.</p>
Objective 10: Opportunities for further diversification and growth of local employment.	<p>The proposal to establish a contaminated soil receivable facility (Stage1) and a treatment facility (Stage 2), at the Northern Balefill site is a diversification of the existing facility and represents additional employment opportunities for the local population.</p>
<i>Form of Development</i>	
Objective 14: Development of land that is suitable for the intended use, activities and structures having regard to flood potential, slope and land slip, erosion, water tables, sea level rises, extreme tides, stormwater, wave effects and other coastal influences, mineral deposits and mining operations.	<p>The site is highly suited to the proposed function and is not subject to the effects of coastal processes such as tidal movements, wave action or extreme tides. The proposed site has previously been assessed through the preparation of an EIS for the Northern Balefill (1996) planning approval process and is not known to have mineral deposits and is not subject to mining operations. As the area is relatively low lying and gently sloping the management of surface water is an environmental issue that has been addressed through Section 7 'Surface Water and Drainage Management Plan' of the LEMP.</p>

OUTER METROPOLITAN REGION	
<i>Form of Development</i>	<i>Comment</i>
	Design and siting considerations have been incorporated into the infrastructure so that it does not contribute to localised flooding or erosion. The land chosen for this facility has been assessed to be suitable for the purpose.
Objective 15: Buildings and structures sited on allotments in a manner which minimises the requirement to clear or remove native vegetation.	This is within an area that does not require the clearance of native vegetation.
Objective 16: Compatibility of new buildings with the surrounding environment.	<p>Stage 2 includes the construction of a shed for the temporary storage of soil and an amenity building for staff at the site. The shed and amenity building will be constructed of materials (Colorbond® finished or similar) that is consistent with large farm machinery storage sheds or processing facilities and will comply with the Building Code of Australia.</p> <p>The external finish of the shed will be of an environmentally sympathetic colour (eg light green) so as to blend into the natural environment. These buildings will be within character for a rural landscape. The facility will be screened by both existing and newly established vegetated mounds. The mounds will be planted with local species adapted to the on-site conditions and serves to connect the facility to the surrounding environment.</p> <p>This type of shed is entirely consistent with a range of built form that can be anticipated within the rural area.</p>
Objective 17: Avoidance of nuisance from noise, light, dust, odour and any other source.	<p>The proposed facility is located beyond the established buffer zones (520 metres) for the nearest sensitive receptors and is not likely to present an environmental nuisance. The existing LEMP has been modified where required to manage any additional potential environmental issues associated with the facility and its operation. The vegetated mounds established around the facility will act to reduce noise, dust and create a visually appealing site that is connected to the surrounding landscape. Administrative controls have been established in accordance with existing development approval conditions and EPA licence conditions to avoid environmental nuisance. Hours of operation will remain unchanged.</p>

OUTER METROPOLITAN REGION	
<i>Form of Development</i>	Comment
Objective 19: Land zoned for general farming and horticulture protected from encroachment by incompatible land uses.	<p>The existing Northern Balefill site is an approved waste management facility. The establishment of these facilities within this site does not represent encroachment upon general farming land within the surrounding area. The proposed facility is entirely compatible with the existing land use.</p>
<i>Industrial Development</i>	
Objective 24: The minimisation of environmental impacts of industrial activity through appropriate location, site design and management, the minimisation and control of emissions, and the provision of appropriate buffer distances from sensitive uses.	<p>The proposed development is sited beyond the established appropriate buffer zone (520 metres) from the nearest sensitive receptors. The co-location of facilities at the Northern Balefill site allows existing services and facilities to be utilised, thereby reducing the environmental effects as compared to a standalone facility.</p> <p>Section 9 'Air Quality and Noise Management Plan' of the LEMP for the existing site has been updated to incorporate the infrastructure and processes associated with the proposed facility so that potential environmental issues, including control of emissions, are appropriately managed. Design considerations have been incorporated to the design to allow for rainwater harvesting so that this water can be utilised on site, the design of the vegetated mounds to reduce dust emissions, improve amenity and create ecological habitat and the stormwater diversion and treatment systems to protect the quality of surface and groundwater within the area.</p>
<i>Movement of People and Goods</i>	
Objective 26: Protection of land in the vicinity of Port Wakefield Road and secondary roads from unsightly developments.	<p>The development is screened from Port Wakefield road by the vegetated mounds and existing plantings along the service road. In addition the shed will be finished in an environmentally sympathetic colour (eg light green) to further blend into the surrounding environment. The development utilises existing services and infrastructure where possible to reduce the environmental footprint and avoid the unnecessary duplication of these services and structures. The proposed facility is orderly, appropriately sited and effectively screened by the vegetated mounds.</p>
Objective 28: Provision of a safe and efficient transport system to facilitate travel to, from and within the Mallala district.	<p>The proposed development will utilise the existing transport system, namely Port Wakefield Road and the existing service road into the site. Access will be constructed from this service road to the facility.</p>

OUTER METROPOLITAN REGION	
<i>Form of Development</i>	Comment
	It should be noted that the construction of this facility at this site will provide a necessary service to the north of the city of Adelaide, offsetting the present need to transport soil through the city to the alternate site situated south of Adelaide.
Waste Management	
Objective 34: The orderly and economic development of waste management facilities in appropriate locations.	This proposal represents an orderly development within an existing waste management facility that has been approved and is operational as an appropriate location. The facilities provide economic development within the region and will act to reduce the amount of contaminated soil that is presently disposed of to landfill.
Objective 35: Minimisation of environmental impacts from the location and operation of waste management facilities.	Environmental impacts associated with the receiving and storage areas are expected to be minimal. Potential environmental effects associated with the proposed facility will be managed through the mitigation measures outlined in the updated LEMP. The facility is beyond the prescribed separation distance from sensitive receivers.
Objective 36: Waste management facilities to be protected from incompatible development.	The location of the proposed facility is beyond the existing buffer zones for the sensitive receivers. The proposed development is compatible and complementary to the existing waste management facility.
Environment Protection	
Objective 37: Protection of the quality of water resources and coastal areas from hazardous waste, discharge or storage uses.	<p>All materials on-site are stored within appropriately bunded or sealed areas as required by legislation and licensing requirements, thus preventing discharge to the surrounding environment.</p> <p>The concrete pad has a sloping floor that drains the surface to a drain that extends the length of the centreline that is connected to a sump, while a 0.3 metre high concrete bund extends around the perimeter of the pad. The small volume of liquid collected by this sump will be managed in accordance with the licence requirements. It is proposed that interim storage of materials, as part of Stage 1 of the development, will be covered using material of low permeability, such as plastics (ie high density polyethylene) or geomembranes (such as Bentofix) or similar material to prevent infiltration of stormwater and dust suppression. Covers will allow for stormwater runoff, which will be directed to the temporary detention pond.</p>

OUTER METROPOLITAN REGION	
<i>Form of Development</i>	Comment
	<p>Stage 2 of the development includes the addition of a roof structure over part of the storage area.</p> <p>Water resources and coastal areas are protected from hazardous waste, discharges and storage uses by the implementation of Section 5 'Groundwater and Leachate Management Plan', Section 6 'Soil Erosion Management Plan', and Section 7 'Surface Water and Drainage Management Plan' of the LEMP.</p>
<p>Objective 38:</p> <p>Control the export of sediment, suspended solids, organic matter, nutrients, bacteria and litter in stormwater run-off.</p>	<p>Stormwater that falls upon the shed will be collected in rainwater tanks and utilised at the site with any overflow directed into the stormwater drainage system. This water may subsequently be utilised on-site for processing, dust suppression or the watering of the plants that form the environmental screens.</p> <p>The stockpile areas are located within the shed and this prevents export of sediment via stormwater. The concrete pad where processing occurs is protected from surface water inflow via a perimeter bund. The roof line of the shed extends over the concrete pad.</p> <p>Any moisture present on the concrete pad will drain to the central interception drain and sump. The area surrounding the pad is also gently contoured to direct surface water flows around the infrastructure along natural drainage lines wherever possible and artificial drainage lines where necessary. Section 6 'Soil Erosion Management Plan' and Section 7 'Surface Water and Drainage Management Plan' within the LEMP have been modified to incorporate this proposed facility. The surface water control system is provided in Figure 5.</p>
<p>Objective 40:</p> <p>Hazardous substances handled, stored and used with extreme care and appropriate safety precautions.</p>	<p>All materials will be stored and handled in compliance with the material safety data sheets, relevant legislative controls and IWS standard operating procedures including site induction and training. A 'Hazardous Chemical Management Plan' has been incorporated into the LEMP.</p>
<i>Conservation</i>	
<p>Objective 43:</p> <p>Conservation and reuse of stormwater using such method of aquifer recharge, swales, holding ponds, on-site storage, irrigation and seepage trenches.</p>	<p>Stage 1 of the development will not be using water in its operations, as such there are limited opportunity for conservation and reuse of stormwater.</p>

OUTER METROPOLITAN REGION	
<i>Form of Development</i>	<i>Comment</i>
	<p>It is proposed that stormwater will be captured from the roof of Stage 2 of the development and stored on-site in two 100,000 litre concrete rainwater tanks and utilised on-site for dust suppression, within the soil treatment processes or used to support the on-site plantings of indigenous vegetation until established, in accordance with Section 10 'Vegetation Management and Revegetation Plan' of the LEMP.</p> <p>The soil treatment processes incorporate water saving and reuse principles into their design to minimise water use. Use of the rainwater collected from the roof of the facility will reduce the amount of groundwater required.</p>
<p>Objective 45: Development sensitive to the preservation of the natural environment for future generations.</p>	<p>This development involves the treatment of contaminated soil so that contaminants may be reduced to a level or otherwise made safe. The materials can then be reused or safely disposed in the low level contaminated soil cell that exists on-site.</p> <p>The treatment of this contaminated material reduces the environmental and health risks posed by such material, and enables areas of urban and other land to be made safe. The co-location of this facility at the existing landfill site does not impact on the natural environment and the service provided affords significant environmental, social and economic benefit.</p> <p>Overall site revegetation carried out as part of current operations is anticipated to result in a significant environmental benefit at the site.</p>
<i>Catchment Water Management</i>	
<p>Objective 46: Protection of the quality and quantity of South Australia's surface waters (inland, marine and estuarine) and underground waters.</p>	<p>Section 5 'Groundwater and Leachate Management Plan' within the LEMP is modified to include the proposed development. It should be noted that the soil will be stockpiled and covered and therefore should not have any impact upon the quality of the surface or underground waters.</p> <p>All materials stored on-site will be within bunded areas or upon bunded pallets and there will be no uncontrolled water flow onto or from the floor of the facility. Many of the proposed treatment processes are contained systems with no discharge. Chemicals are expected to be utilised in Stage 2 of the development.</p>

OUTER METROPOLITAN REGION	
<i>Form of Development</i>	Comment
<p>Objective 47:</p> <p>Development designed, located and managed to prevent or minimise the generation of waste (including wastewater) by applying the following waste management hierarchy in the priority order shown below:</p> <p>a) avoid waste production;</p> <p>b) minimising waste production;</p> <p>c) reusing waste;</p> <p>d) recycling waste;</p> <p>e) recovering part of the waste for re-use;</p> <p>f) treating waste to reduce potentially degrading impacts; and</p> <p>g) disposing of waste in an environmentally sound manner.</p>	<p>The operation will include treatment processes attune with the waste hierarchy and systems designed to avoid discharge, reuse water and treating agents, and produces products that may either be reused or are rendered safe for disposal. The details of these processes are discussed in detail within Section 7.2 of this application.</p> <p>This variation will therefore facilitate:</p> <ul style="list-style-type: none"> • reuse of waste; • treatment of waste to reduce potentially degrading impacts; and • disposal of waste in an environmentally sound manner.
<p>Objective 48:</p> <p>Development which:</p> <p>a) ensures that surface run-off promotes the restoration of natural flow regimes;</p> <p>b) prevents soil erosion and water pollution;</p> <p>c) protects stormwater from pollution sources;</p> <p>d) protects environmental flows required to meet the needs of the natural environment;</p> <p>e) protects water quality and riparian zone by providing adequate separation distances from watercourses, and other water bodies;</p> <p>f) protects water quality from problems associated with salinity;</p> <p>g) maintains natural hydrological systems and existing indigenous vegetation;</p> <p>h) maintains natural water storage capacity whether temporary or permanent; and</p> <p>i) protects aquifers, particularly recharge zones and their dependant ecosystems.</p>	<p>Section 6 ‘Soil Erosion Management Plan’ and Section 7 ‘Surface Water and Drainage Management Plan’ in the LEMP provides the necessary management techniques for the protection of surface water. It should be noted that there are no existing natural watercourses or water bodies within the vicinity of the proposed site of this development. Stormwater is protected from contamination by the presence of interception drains that prevent the flow of surface water onto the treatment area. The entire facility is covered to avoid rain falling directly onto stockpiles. Revegetation work undertaken at the site utilises indigenous vegetation and will create a net gain of habitat.</p>
<p>Objective 53:</p> <p>Dams, walls or other water collection or diversion mechanisms constructed and managed in a manner which:</p> <p>a) protects catchment water quality and quantity;</p>	<p>As far as is practicable, the surface water drainage system maintains the natural flow regime and is designed in a manner so as to avoid mobilisation of sediment. Low flow velocity drains that maintain a cover of vegetation are employed.</p>

OUTER METROPOLITAN REGION	
<i>Form of Development</i>	Comment
b) provides sufficient water during low flow periods for downstream dependent ecosystems; c) allows migration of aquatic biota; and d) protects and enhances amenity.	<p>There are no existing watercourses or water bodies within the vicinity of the proposed development, although control measures have been developed to protect the environment.</p>
Objective 54: Integrated stormwater management at the catchment level, drainage system level and site level including incorporation of water sensitive design in all development.	<p>The utilisation of closed operating systems is a mechanism by which water is conserved and water will be recycled throughout the treatment processes. In addition, stormwater is collected and utilised on the site from two 100,000 litre concrete storage tanks, thereby reducing the demand upon water derived from the deep aquifer.</p>
Objective 55: Storage and/or use of water including treated waste water and/or imported water which avoids adverse impact on public health, water and soil and their dependent ecosystems.	<p>The amenities on-site include shower, toilet, hand washing and kitchen facilities for up to six workers. These facilities are constructed in accordance with the Building Code of Australia, Plumbing and Drainage Code and Public and Environmental Health Act 1987.</p> <p>Due to the small number of workers located at the site and the nature of the processing undertaken, a 1,620 litre septic tank and soakage trench will be installed to manage wastewater generated by on-site staff. The generation of such a low volume of wastewater and the irregular utilisation of the facilities is deemed not suitable for the installation of a biocycle type system. The wastewater system will be subject to approval in accordance with the Public and Environmental Health Act 1987.</p>
Objective 56: The sustainable use of natural water resources (including groundwater, surface water and watercourses).	<p>Sustainable water use principles have been incorporated into the design of the proposed development in order to protect water resources within the vicinity of the development from any potential contaminants and to minimise water use throughout the treatment process. Stage 1 of the proposed development is not anticipated to use water or impact natural water resources. Stage 2 includes utilising rainwater, recovering treatment water and recycling this water and utilising treatment technologies that reduce the volume of water required. Details of the treatment processes are provide in Section 7.2.</p>
<i>Appearance of Land and Buildings</i>	
Objective 62: Improvement of the appearance of all land and buildings throughout the district.	<p>The buildings will be constructed of materials (sheet metal) that are typically associated with similar structures, such as animal production sheds or machinery sheds, within the general farming zone.</p>

OUTER METROPOLITAN REGION	
<i>Form of Development</i>	Comment
	The finish of the shed will be sympathetic to the environment and be non-reflective. Appearance of the land will be improved through the establishment of the vegetation screens, vegetated mounds and general landscaping, utilising indigenous plants. The site of the proposed buildings is a disturbed and formerly cleared site with little natural vegetation cover. The proposed plantings will restore structure to the vegetation community at the site and represent a significant increase in the diversity of habitat available.
Objective 63: Sympathetic blending of development with the built and natural environment in the locality.	The architectural style of the buildings and materials blend with the surrounding and typical general farming characteristics. The revegetation and landscaping undertaken at the site will blend with the existing landscaping and further restore indigenous vegetation on-site.
<i>Bushfire Protection</i>	
Objective 79: Development should minimise the threat and impact of bushfires on life and property while protecting the natural and rural character.	Section 14, 'Fire Risk Management Plan' within the LEMP has been modified to include this facility. The siting of this facility takes advantage of the firebreak provided by the main access road, and an additional break is provided around all site infrastructure providing fire and emergency access and egress along the perimeter of the infrastructure.
Objective 80: Buildings and the intensification of non-rural land uses directed away from areas of high bushfire risk.	The area of the proposed development is not zoned as high bushfire risk according to Figures Mal(BPA)/4 and 6 (Mallala District Council, 2007).

PRINCIPLES OF DEVELOPMENT CONTROL

<i>General</i>	
Principle 1: Development should take place on land which is suitable for the intended use having regard to Mallala (DC) Structure Plans Mal/1 (Overlay 1) including Enlargements A and B, and Mal/1 (Overlay 2), and with regard to the location and condition of that land and the objectives for the zone or policy area concerned.	The intended site of this development is an existing well established landfill site and is ideally suited to the proposed development.

General	
Principle 2: Development should take place in a manner which will not interfere with the effective and proper use of any other land and which will not prevent the attainment of the objectives for that other land.	The proposed development will not impact upon the effective and proper use of any other land and will not prevent the attainment of the objectives for that other land.
Principle 5: Development should be of a high standard of design, layout and appearance, and be sited, designed and operated so as to be compatible with and cause minimal impact to, adjoining development and the environment.	The development will not impact upon the adjoining general farming land and potential environmental impacts will be managed by the implementation of the modified LEMP. Significant environmental benefits are achieved through this development both on and off-site.
Vehicle Access and Parking	
Principle 59: Sufficient provision should be made on the site of development for the loading, unloading and turning as such vehicles as are expected to be used in connection with the provision of services or the movement of people, goods or wastes in connection with such development.	The facility is designed and sited to maximise use of the existing traffic management infrastructure and provides all necessary provisions for vehicular movements.
Principle 60: Access to public roads should be safe and convenient and not cause conditions that interfere with the safe and efficient movement of traffic on adjoining roads. Access to Port Wakefield Road should be restricted.	The existing site access is to be utilised for this facility, and traffic movement is consistent in nature with that presently experienced. Traffic movement to and from the facilities will not cause interference with the safe and efficient movement of traffic on adjoining roads.
Principle 69: All other development not listed in Table Mal/1 should provide adequate off-street car parking facilities, having regard to anticipated demand, availability of on-street car parking and safety.	<p>The anticipated staff numbers are initially 1 full-time employee, at the soil storage and laydown area, with an increase to a maximum of 4 full-time employees once the facilities are fully operational. A total of 6 car park spaces will likely be required. Provision is made for the temporary parking of soil transport vehicles.</p> <p>Given the nature of the operation and the fact that it is not available for public visitation, car parking specific to the waste management facility needs is appropriate.</p>
Chemical and Materials Storage	
Principle 96: All raw materials, products and waste materials should be stored under cover or in airtight containers and within bunded areas constructed from impervious material or, where applicable, stored in accordance with AS 1940 – 1993, to prevent any spilled material from migrating off-site.	Chemicals utilised on-site will be stored undercover within bunded areas or upon bunded pallets. Bunds will be constructed in accordance with EPA guidelines. Soils stored on-site will be kept covered at all times.

General	
	The facility will include an interception drain incorporated into the concrete pad so that any chemical spill or contaminated liquid waste is collected for treatment or disposal to an appropriately licensed facility.
Principle 97: Contaminated water associated with the storage of hazardous substances should be contained within a bund prior to its collection and transportation off-site to a licensed liquid waste facility.	Stockpiles of material will be stored undercover during Stage 1 of the operation and undercover within a shed, as part of Stage 2 of the operations. It may be possible that some storage of contaminated soils on the concrete pad produces a small volume of contaminated water during rainfall and this potentially contaminated water is collected by the interception drain and will be stored prior to testing, treatment or disposal to an appropriately licensed facility.
Principle 98: Storage areas for dangerous and/or hazardous materials should be protected from the weather and access to them secured.	The entire site will be secured by a perimeter 1.8 metre high chain mesh fence that is locked daily upon completion of activity at the facility. Stores of any hazardous or dangerous goods will also be secured by a separate chain mesh enclosure. The contaminated soil is stored within the shed and many of the treatment processes involve closed or covered containment units.
Principle 99: Outdoor storage areas should be screened from public view by a fence of materials matching those of the main buildings or a combination of solid fencing and screen landscaping.	The entire facility is screened from public view by the perimeter vegetated mounds and vegetation screens and by virtue of its location, approximately 700 m set back from Port Wakefield Road.
Principle 100: Outdoor storage areas should be designed and managed to ensure that waste is contained within the areas. Emergency site access and protection measures should be provided.	The presence of a perimeter access around all site infrastructure provides emergency access and egress to all parts of the facility and also acts as a fire break. Additional protective measures are provided in accordance with BCA requirements. Within the receiving shed the contaminated soil is contained by moveable bunding to form discrete stockpiles or is contained within the two pit areas. Where soil treatment is undertaken outside of a contained unit temporary bunding may be employed to ensure soil is contained within a designated area.
Waste Management	
Principle 111: Waste management facilities should be located, sited, designed and managed to minimise adverse impacts on both the site and surrounding areas due to generation of surface water and ground water pollution, traffic, noise, odours, dust, vermin, weeds, litter, gas and visual impact.	The proposed site is an operational waste management facility with an existing LEMP to ensure that all activities that may have potential to give rise to adverse impacts are managed. This LEMP has been modified to incorporate the proposed facility and processes.

General	
<p>Principle 113:</p> <p>Waste management facilities should be provided with appropriate separation distances to minimise adverse impacts on the surrounding area and land uses.</p> <p>Principle 115:</p> <p>Land uses and activities which are not compatible with a waste management facility should not be located within any separation distances established.</p>	<p>The proposed facility to store and process contaminated soil is compatible with the existing operation, and the existing separation distance to the nearest sensitive receivers has been retained in this proposal.</p>
<p>Principle 117:</p> <p>Landfill and associated facilities for the handling of waste, should be located at least a distance of 500 metres from the boundaries of the landfill site. A lesser distance may be provided within the landfill site where the land-fill facility is considered compatible with the surrounding area, land uses and activities so that an effective minimum separation distance of 500metres can be provided and maintained between the land-fill facility and potentially incompatible land uses and activities.</p>	<p>The facility is co-located on the existing landfill site. A separation distance of more than 520 metres is maintained from the nearest sensitive receivers to the facility and the facility is located approximately 700 metres from Port Wakefield Road. The surrounding area is general farming and the proposed facility is considered to be compatible with this surrounding zone designation and existing land uses.</p> <p>It is noteworthy that there is no change to the landfill location and hence its separation from sensitive receivers. The lateral separation between the soil treatment facility and the adjoining agricultural land is less than 500 metres, however it is considered acceptable due to the nature of this land use, the establishment of the vegetated mounds that act to provide additional buffering and the nature of the processing undertaken at the facility.</p>
<p>Principle 119:</p> <p>The area of the organic waste processing facilities on a site should:</p> <p>a) be located a minimum distance of 100 metres from any dam, river, creek, natural watercourse, channel or bore and not within the area of a 1 in 100 year flood event; and</p> <p>b) not be located on areas with ground slopes of greater than 6 percent; and</p> <p>c) not be located on land subject to land slipping; and</p> <p>d) not be located within 3.0 kilometres of an airport used by commercial aircraft. If located closer than 3.0 kilometres the organic waste processing operations should incorporate bird control measures to minimise the risk of bird strikes to aircraft; and</p>	<p>The proposed development may store soil contaminated with organic compounds. It meets all of these criteria.</p>

General	
e) not be located within 250 metres of a public open space reserve, a forestry reserve, a National Park, a Conservation Zone or a Policy area.	
Principle 120: The waste management site should be landscaped to screen views of the processing facilities and operational areas.	<p>The entire proposed facility will be screened by a combination of vegetated mounds, vegetation screens and landscaped plantings. This revegetation will link into the existing plantings on the site, affording some established screening of the proposed facility during construction and effectively screening the facility upon completion.</p>
Principle 121: Sufficient area should be provided within the waste management site to ensure on-site containment of potential groundwater contaminants and for the diversion of stormwater.	<p>Leachate is not an issue of concern for this proposal, however, the runoff from any exposed soil stockpile can be managed in the same manner as for leachate. Sufficient physical space is provided in order to site the two 100,000 litre rainwater tanks and to construct the surface water drainage system around the facility.</p>
Principle 122: Noise reduction treatments comprising separation distances and the incorporation of on-site treatments should be provided to ensure noise generation associated with the waste management operation does not result in an adverse impact to any existing or future development on an adjacent allotment.	<p>The existing separation distance of 520 m to the nearest sensitive receptors are retained in this proposal, with additional vegetated earth mounds to be constructed around the facility that will act to attenuate noise from the processing area, although this is not the primary reason for their presence. The containment of contaminated soil within the shed will act to attenuate noise associated with unloading soil from vehicles and other soil moving equipment.</p> <p>Many of the soil treatment processes are undertaken within closed systems and involve limited operation of heavy machinery. The development is sited beyond the existing separation distances (520 metres) from the nearest sensitive receivers, as such adequate protection from potential noise sources exists. The walls of the receiving shed have a reinforced concrete base section approximately 2.1 metres in height that will attenuate noise.</p>
Principle 123: Litter control measures which minimise the incidence of windblown litter should be provided on the site of a waste management operation.	<p>Blown litter is not considered to be an issue associated with the operation, although the perimeter cyclone mesh fence will act to catch any blown litter as will the environmental fencing (shade-cloth) that is primarily incorporated into the design to trap dust. The LEMP includes the management of litter within Section 9 'Air Quality and Noise Management Plan'.</p>

General	
Principle 124: Leachate from waste management activities should be contained within the property boundary of the waste management site and should not contaminate surface water or ground water.	Leachate from contaminated soil stockpiles will be collected and retained for disposal, reapplication to stockpiles for dust suppression or reprocessed as appropriate. Leachate is contained on site for appropriate treatment and disposal.
Principle 127: Surface water run-off from the waste management operations should not cause unacceptable sediment loads in receiving waters.	There will be no direct discharge from the facility or surrounds into a watercourse. Total vegetation cover at the site will be increased from the pre-development level that will act to reduce the movement of sediment from the area. Stormwater will be retained on site within the existing sediment retention/evaporation pond system as shown within Section 7, 'Surface Water and Drainage Management Plan' of the LEMP.
Principle 129: Fencing to a minimum height of two metres should be erected on the perimeter of a waste management site to prevent access other than at appropriate entries. For landfill sites, the fencing should be of chain wire mesh or pre-coated painted metal construction. Principle 130: Plant, equipment or activities that could cause a potential hazard to the public within a waste management site should be enclosed by a security fence.	No change to the existing boundary fencing is proposed as part of this variation. Additional security fencing is to be placed around the facility.
Principle 132: Waste management sites should be accessed by an appropriately constructed and maintained road.	The existing service road and main access road into the landfill will be utilised by this development.
Principle 133: Traffic circulation movements within the waste management site should be adequate in dimension and construction to support all vehicles hauling waste and to enable forward direction entry to an exit from the site.	The vehicular access and egress is sufficient for the size of vehicles transporting soil and plant. Unidirectional flow has been established through the facility with adequate turning space provided at the entrance and exit of the facility. This facilitates the safe movement of traffic through the facility.
Principle 134: Suitable access for emergency vehicles to and within the waste management facility should be provided.	Emergency vehicle access exists on the site.

General	
<p>Principle 135:</p> <p>A proposal to establish, extend or amend a waste management operation should include an appropriate Environment Management Plan that addresses the following:</p> <ul style="list-style-type: none"> a) The prevention of ground water and surface water contamination; b) The need to protect and enhance native vegetation; c) Litter control, dust control and salinity conditions generally; d) Odour and noise control; e) Fire safety; f) Security; g) Maintenance of landscaping and the general condition of the site; and h) Final contour plan and rehabilitation proposals including soil cover, landscaping, drainage, the removal of any contamination waste, restoration and the like to ensure compatibility with the surrounding landscape and to enable a suitable after use of the site. 	<p>The existing LEMP addresses all of these requirements.</p>
Environment Protection	
<p>Principle 138:</p> <p>Building siting, design and construction and the use of land should take place in a manner which:</p> <ul style="list-style-type: none"> a) will minimise interference with biodiversity on the land and in surrounding localities; b) will enhance the longer term protection and management of biodiversity; c) does not cause coastal erosion, soil erosion or the silting of watercourses, or create any unstable embankment or cutting; d) is not liable to contribute significantly to pollution of air, water or land; e) will not interfere with the utilization or quality of water resources; and f) provides opportunities for maintaining or establishing vegetated corridors to link key areas of native vegetation. 	<p>The site of the proposed development has historically been cleared of vegetation and very little of this original vegetation cover remains on the property. The development will therefore cause no interference with existing biodiversity on the site and in the surrounding localities. The proposed revegetation work associated with the development will result in a net gain of native vegetation and an increased complexity of habitat structure as the site is comprised of exotic grassland and sparse low shrub layers only.</p> <p>The proposed revegetation will link existing stands of revegetation to improve the movement of species across the site. Activities undertaken at the site are targeted at reducing pollutants within contaminated soil thereby reducing the overall environmental pollutant burden. Potential environmental issues associated with the development are managed through the LEMP.</p>



<i>General</i>	
Principle 139: Development that is connected to a septic tank or has a low pollution potential should be located at least 50 metres from any watercourse. Development with a high pollution potential should be located at least 100 metres from any watercourse.	The development is not located near a watercourse.
Principle 140: Waste from any development should be disposed of at least 100 metres from any bore or well.	No waste from this development will be disposed of within 100 metres of a bore or well. Effluent will be disposed of via the septic tank and soakage trench system that is located at least 100 metres from a bore or well.
<i>Stormwater Management</i>	
Principle 157: Development of stormwater management systems should be designed and located to: <ul style="list-style-type: none"> a) improve the quality of receiving waters; b) prevent impacts on natural drainage systems; c) protect existing native vegetation; d) prevent erosion; e) protect receiving waters from high levels of flow; f) avoid adverse impacts on built structures; g) protect human health and safety; and h) not adversely affect groundwater, and groundwater recharge areas. 	<p>The surface water, water courses and water bodies are protected by the management strategies embodied within the modified LEMP. It should be noted that there are no existing natural watercourses or water bodies within the vicinity of the proposed site of this development. Stormwater is protected from contamination by the presence of interception drains that prevent the flow of surface water onto the treatment area, while the facility itself is roofed.</p> <p>Human health and safety will be protected through this system of avoiding contamination. Natural patterns of surface water flow are maintained as far as is practicable and the use of vegetated drains is designed to slow the movement of water to reduce erosion and sediment transport. The proposed site for this development is highly disturbed and the original vegetation structure was destroyed prior to the site being purchased by IWS. Existing native vegetation where it exists and revegetation has been protected by the careful location of the stormwater system and the vegetation in turn will reduce the surface volume of stormwater.</p>
Principle 158: Development should prevent the discharge or deposit of waste (including waste water) into any waters or onto land in a place from which it is reasonably likely to enter any waters (including by processes such as seepage or infiltration or carriage by wind, sea spray, or stormwater or by the rising of the water table).	<p>Contaminated soil will only be stored or processed within a contained system or otherwise on the concrete pad or concrete storage shed, at no time shall contaminated soil be stored directly onto natural land. Waste or waste water will not be discharged onto land. Effluent will be discharged through an approved septic tank system in accordance with the regulations of the Public and Environmental Health Act 1987. Treated soil may be transported from the facility for disposal at an approved licensed facility or disposed of on site in accordance with the EPA license conditions that would allow disposal within the Landfill (Cell 31).</p>

General	
	The placement of materials within the proposed site and the potential for any discharge from the site is managed by the LEMP.
<p>Principle 159:</p> <p>Development should incorporate stormwater management techniques to contain the quality, velocity, variability and quality of run-off to as near pre-development levels as practical, by means of but not limited to:</p> <p>a) directing roof stormwater overflow from rainwater tanks to soakage tranches or to retention/overflow wells or sumps where large roof catchments are involved;</p> <p>b) utilising grassed swales or natural drainage lines to accommodate the major flows from the land development; and</p> <p>c) incorporating stormwater systems designed to prevent entry of pollutants such as sediment, pesticides, herbicides, bacteria, animal wastes and oil, grease and waste water from vehicle cleaning processes, air conditioners and fire protection services pipe work testing into receiving water.</p>	<p>Stormwater collected from the roof of the facility will be directed into two 100,000L rainwater tanks and any overflow will then be directed to a sump to slow the velocity of discharge into the stormwater system. The natural flow regime is maintained as far as is practicable with revegetation across the site and grass within the stormwater channels to slow the velocity of water while still carrying the required capacity.</p>
<p>Principle 160:</p> <p>Development should incorporate a stormwater treatment system capable of removing pollutants.</p>	<p>Management of stormwater will be undertaken in accordance with the Section 7 'Surface Water and Drainage Management Plan' of the LEMP. The facility has been designed such that stormwater will not be polluted with rainwater stored in the two 100,000L concrete tanks and utilised in processing and available for landscaping use. Revegetation around the facility and the use of grassed drains will act to slow the movement of stormwater decreasing sediment load.</p>
<p>Principle 161:</p> <p>The rate and duration of stormwater discharged into a watercourse or a public stormwater system should:</p> <p>a) ensure retention for reuse; and /or</p> <p>b) use detection mechanisms and/or detention in a detention basin.</p>	<p>This facility will not discharge stormwater into a watercourse or public stormwater system.</p>
<p>Principle 162:</p> <p>Detention and or retention basins should incorporate good design techniques that:</p>	<p>This facility will not discharge stormwater into a watercourse of the marine environment and high velocity drainage points do not occur on the site. Wetlands will not be utilised for the cleaning of stormwater.</p>

General	
<p>a) allow sediments to settle so as to treat stormwater prior to discharge into watercourses of the marine environment;</p> <p>b) ensure human health and safety, particular with respect to high velocity drainage points;</p> <p>c) ensures control of mosquitoes and nuisance insects (eg midges); and</p> <p>d) where wetlands are used for the cleaning of stormwater it is advisable that the storage is able to retain the 25 year, 24 hour rainfall event.</p>	
<p>Principle 163:</p> <p>Development should incorporate water sensitive design techniques to assist in the sustainable use of water.</p>	<p>The technologies utilised at the facility incorporate water conservation design principles and these are provided within Section 5.2 of this report. The incorporation of rainwater into the production process reduces the demand for groundwater and is an example of water sensitive design.</p>
<p>Principle 164:</p> <p>Where permitted by any Water Allocation Plan in prescribed areas under the Natural Resources Management Act development design and construction should maximise the potential for stormwater harvesting.</p>	<p>Stormwater is harvested from the roof of the facility and stored in two 100,000L concrete rainwater tanks for use at the site. Additional production water will be drawn from a deep aquifer and is subject to the necessary approvals.</p>
<p>Principle 165:</p> <p>Stormwater should not be discharged directly into a watercourse, but rather through a mechanism to reduce the stormwater energy so that it does not:</p> <p>a) cause erosion;</p> <p>b) adversely affect ecosystems;</p> <p>c) adversely alter the flow regime;</p> <p>d) adversely affect the quality of receiving water; or</p> <p>e) adversely affect the migration of aquatic biota.</p>	<p>Stormwater is not directly discharged into a watercourse. Stormwater is managed through Section 7 'Surface Water and Drainage Management Plan' and Section 6 'Soil Erosion Management Plan' of the LEMP.</p>
<p>Principle 167:</p> <p>Stormwater drainage systems should preserve rather than eliminate natural drainage systems.</p>	<p>The natural drainage system is retained as far as is practicable on the site. It should be noted that the site is flat with only a gentle slope and water typically draining via runnelling or moving as a sheet with no significant higher order drainage features.</p>

<i>General</i>	
<p>Principle 168:</p> <p>Areas for activities such as loading, wash down of vehicles, plant or equipment, or storage of waste refuse bins should be suitably paved, bunded to exclude stormwater run-off from external sources, and designed so that water that has made contact with such areas is either:</p> <p>a) directed to a sediment trap, separator or other appropriate treatment device and then to sewer; or</p> <p>b) directed to a waste water holding tank.</p>	<p>There is an existing site wheel wash facility that will be utilised during Stage 1 of the development and upgraded as part of Stage 2 of the development. The management of the water and sediment from this facility is established within the existing LEMP 'Facilities Management Plan'.</p>
<p>Principle 169:</p> <p>Development should prevent erosion and stormwater pollution before, during and after construction and associated works by:</p> <p>a) appropriate control of surface water entering or leaving the land;</p> <p>b) installing and maintaining erosion control works and measures;</p> <p>c) installing and maintaining sediment collection devices to prevent the export of sediment from the land; and</p> <p>d) rehabilitating disturbed areas.</p>	<p>The existing stormwater drainage system on the site affords the development a degree of protection during the construction phase. This will be aided by the utilisation of temporary flow diversion and sediment collection devices such as hay bales and plastic sheet fencing as required. These structures will be monitored and adjusted throughout the construction phase prior to removal.</p> <p>Following construction, disturbed areas will be reinstated and additional revegetation works undertaken to control erosion. The LEMP Section 7 'Surface Water and Drainage Management Plan' and Section 6 'Soil Erosion Management Plan' guide the ongoing management of these issues.</p>
<p>Principle 170:</p> <p>A soil erosion and drainage plan should be prepared where:</p> <p>a) there is a high risk of sediment pollution to adjoining lands or receiving water, or;</p> <p>b) the total area to be disturbed, or left disturbed, at any one time exceeds 0.5ha.</p>	<p>The existing Section 7 'Surface Water and Drainage Management Plan' and Section 6 'Soil Erosion Management Plan' of the LEMP have been modified to incorporate this development.</p>
<i>Treated Waste Water and Imported Water</i>	
<p>Principle 171:</p> <p>The use of treated or partially treated wastewater should not result in:</p> <p>a) environmental nuisance or harm;</p> <p>b) adverse impacts on human health; and</p> <p>c) adverse impacts on the amenity of a locality.</p>	<p>Waste water associated with this development can be categorised in accordance with the source. Effluent produced on site is treated via an approved septic tank and soakage trench system and therefore will not present an environmental nuisance or have an adverse impact upon the environment, human health or the local amenity.</p> <p>Waste water from the treatment process is recycled on site.</p>

<i>General</i>	
<p>Principle 172:</p> <p>Use of treated wastewater or imported water should not:</p> <p>a) cause a rise in groundwater level sufficient to detrimentally affect structures or ecosystems;</p> <p>b) adversely affect the natural flow of water or the quality of surface or groundwater; or</p> <p>c) adversely affect the productive capacity of the land by causing nutrient accumulation, heavy metal contamination or increasing salinity, water logging, perched water tables, unlocking toxic elements in the soil or other such impacts.</p>	<p>Waste water will not be discharged directly to the environment and therefore will not affect the natural flow of water at the site or the quality of surface or groundwater.</p>
<i>Storage of Chemicals and Other Materials</i>	
<p>Principle 173:</p> <p>Development involving or requiring storage of chemicals or other materials should incorporate suitable cover, bunding storage, security and other measures to prevent:</p> <p>a) polluted water discharge from the site;</p> <p>b) contamination of land;</p> <p>c) dispersal of litter or other materials or substances; and</p> <p>d) airborne migration of pollutants.</p>	<p>The control of stormwater and any potentially polluted water on the site is outlined in the LEMP. Soil brought into the site will be stored under covers, contained during processing by either being held within an enclosed treatment chamber or retained on the concrete slab by means of temporary bunding and the interception drain. Prevention measures with respect to soil contamination are described within the LEMP.</p> <p>Minimal volumes of chemicals will be stored long term on the site. Chemicals utilised on site will be stored in a covered bund and the site is to be secured by a 1.8 metre high cyclone mesh fence within the existing IWS Northern Balefill facility that is also fenced. Control of airborne particulates is outlined within the LEMP and includes the use of enclosed receiving shed, enclosed treatment chambers, vegetated mounds, an interception fence and the actual siting and orientation of the buildings.</p>
<i>Appearance of Land and Buildings</i>	
<p>Principle 185:</p> <p>Building development should be located and designed in respect of its form, siting, bulk, colour, finishes, architectural style and materials of construction to harmonize with the desired character described by the objectives for the zone or policy area or otherwise the predominant character of other building development in the locality.</p>	<p>The character of the buildings associated with this development are sympathetic to the rural character of the surrounding land use, being consistent with larger machinery or poultry sheds. The materials employed will be of galvanised steel with a painted exterior that is light green in colour and sympathetic to the surrounding landscape and other on site buildings.</p>

<i>General</i>	
<p>Principle 191:</p> <p>Building development particularly in rural zones should be located and designed so that it is not prominently visible from a primary or secondary arterial road as shown on the Structure Plan, Map Mal/1 (Overlay 1).</p>	<p>The soil receiving shed is located approximately 700 metres from the access road and Port Wakefield Road and is screened by the perimeter vegetation and vegetated mounds, so that it will not be prominently visible.</p>
<i>Building Setbacks</i>	
<p>Principle 197:</p> <p>Buildings and structures excluding advertisements or advertising displays are to be setback:</p> <p>a) at least 50 metres from the road boundary of the Port Wakefield Road outside defined township and settlement zones;</p> <p>b) at least 20 metres from the road boundary (other than Port Wakefield Road) in any area outside of a defined township, settlement or rural living zone boundary; and</p> <p>c) at least eight metres from the road boundary within defined township, settlement or rural living zones, unless otherwise stated within the specific zone or policy area provisions.</p>	<p>The buildings are approximately 700m from the property boundary that is adjacent to the access road and Port Wakefield Road.</p>
<i>Bushfire Protection</i>	
<p>Principle 293:</p> <p>Buildings and structures should be located away from areas that pose an unacceptable bushfire risk as a result of one or more of the following:</p> <p>a) vegetation cover comprising trees and shrubs;</p> <p>b) poor access;</p> <p>c) rugged terrain;</p> <p>d) inability to provide an adequate building protection zone; or</p> <p>e) inability to provide an adequate supply of water for fire-fighting purposes.</p>	<p>The facility is not located within an area that poses an unacceptable bushfire risk. Access is provided for emergency vehicles and the facility has an adequate supply of water for fire fighting purposes.</p>

GENERAL FARMING ZONE

OBJECTIVES

Objective 1: Maintenance of general farming activities and land use on large property holdings.	The site is maintained as a single large holding and the proposed facility is located entirely within this property. The surrounding land use as general farming remains unaffected by the proposed facility.
Objective 2: Reinforcement of the existing open rural character of the area.	The character of the area will not be altered by this development as the facility is located within the boundary of the existing landfill site. The existing and proposed landscaping and revegetation at the site improves the local amenity while retaining the rural character.
Objective 3: Preservation of features of scenic or environmental significance.	There are no features of scenic or environmental significance at the site.
Objective 4: Recognition of the flooding potential of the Light River, Gawler River and Templers Creek.	The location of the proposed development is not identified as being prone to flooding from these waterways. The proposed site is beyond the area likely to be subject to coastal inundation.

PRINCIPLES OF DEVELOPMENT CONTROL

Principle 1: Development should be primarily for cereal production and livestock grazing on large land holdings with associated buildings.	The proposal does not affect the use of land or land in the locality. The proposed development is entirely within an existing waste management facility.
Principle 2: Development of a business/commercial or industrial nature should not take place unless it: a) is associated with the processing or handling of primary produce, is for the purpose of organic waste processing and would be of significant benefit to the rural community; b) would not cause traffic problems or ribbon development along roads; c) would not prejudice the use of the land in the locality for primary production and associated residential use; d) would not impair the amenity of the locality;	<p>The proposed site of this facility is entirely within the existing IWS Northern Balefill facility. It will not result in ribbon development nor will it cause traffic problems, as the rates of flow and physical arrangements are such as to be entirely within the capacity of the existing design.</p> <p>The development is proposed on a site that is currently used for waste management purposes and will not prejudice agricultural pursuits of adjoining land.</p> <p>The location is suitable as it is well separated from established residential areas and townships where it would be inappropriate. Co-location of this facility within the existing waste facility is entirely appropriate.</p>

<p>e) cannot be accommodated on alternative sites within the defined township, settlement or industrial zones; and</p> <p>f) would be more effectively and appropriately located in this zone.</p>	
<p>Principle 6:</p> <p>New buildings and structures or alterations and extensions to existing ones should, where possible, be of traditional style and appearance and be clustered with other buildings, and in all respects designed and landscaped to enhance the amenity and complement the existing character of the locality.</p>	<p>The style of building and infrastructure is consistent with the style of buildings located within the General Farming Zone and are positioned close together to improve efficiency and amenity. Landscaping undertaken at the facility will be consistent with the existing landscaping for the site and will utilise locally collected plant source material.</p>
<p>Principle 14:</p> <p>The external walls and roof of buildings should be of subdued colours which complement the predominant colours of the land and vegetation in the locality, or, in the case of outbuildings, have an unpainted galvanised iron finish which will weather to a dull grey.</p>	<p>The shed and worker amenity buildings will be light green in colour complementing the local environment.</p>
<p>Principle 18:</p> <p>Development involving the reception, storage, treatment or disposal of waste, except for the processing of organic waste should not occur.</p>	<p>The application is entirely encompassed within the area of the current land use and involves the storage and treatment of contaminated materials within the existing IWS Northern Balefill waste management facility. Accordingly there is no change of use.</p>
<p>Principle 19:</p> <p>The following kinds of development, including:</p> <p>a) change of use to the listed use; or</p> <p>b) the erection, conversion, alteration, addition or extension of listed buildings, with the exception of building work to an existing retained building on its existing site, are non-complying in the General Farming Zone:</p> <p>Disposal, treatment and/or storage of contaminated soil and waste referred to in Schedule 2 of the Waste Management Regulations, 1998.</p>	<p>The site has been the subject of approvals as part of a Major Project and accordingly approvals pursuant to Section 46 of the Development Act 1993.</p> <p>It is also noted that the Waste Management Act 1987 was repealed following the proclamation of the Environment Protection Act 1993, Schedule 2 of the Waste Management Regulations 1988 referred to in this Planning Principle, which has effectively been incorporated into Schedule 1 of the Environment Protection Act 2003.</p> <p>The development approval has been varied to include the receipt of contaminated soil and therefore this proposal to receive contaminated soil for treatment so that it would be rendered either suitable for disposal on-site in compliance with the present development approval and EPA licence conditions, or treated on the site so that it could be utilised off-site for landfill means that no contaminated soil that does not meet the existing criteria will be disposed of on-site.</p>

	This proposal is for the receipt and treatment of additional waste types at the existing site and therefore a variation to the existing approval.
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The site is currently licensed by the EPA to receive LLCW, that includes waste soil or other industrial and commercial waste that meets the chemical criteria specified in Table 3 (attached to the EPA licence) and LTPR. The development approval has been varied to include the receipt of contaminated soil, and therefore this proposal to receive contaminated soil for treatment so that it would be rendered either suitable for disposal on-site in compliance with the present development approval and EPA licence conditions, or treated on the site so that it could be utilised off-site means that no contaminated soil that does not meet the existing criteria will be disposed of on-site.

7 CONCLUSION

This variation application for a soil storage and laydown area will form part of the proposed Multi-Purpose Waste Treatment Facility. The facility will enable IWS to offer a suite of waste management services at a single consolidated location within the existing IWS Northern Balefill site.

This proposal encompasses key objectives of South Australia's Waste Strategy 2005-2010 in that it will contribute to development of the multi-function waste treatment operation which will **foster sustainable behaviour** by providing a mechanism by which contaminated material can be treated and re-used, resulting in **better managed treatment of wastes** in South Australia and hence reduced waste to landfill.

The proposal is able to integrate into the existing IWS Northern Balefill site, utilising much of the existing infrastructure and the landfill environmental management program. Further, the proposal has addressed the relevant planning provisions and does not prejudice the design or function requirements of the Development Plan.

The removal of this type of material from populated urban areas will reduce potential environmental effects on the local environment and communities.

This proposal to vary the existing Development Approval for the IWS Northern Balefill to incorporate the contaminated soil storage, treatment and laydown area has significant merit and offers substantial community benefit.

For these reasons, the proposal warrants most favourable consideration.

8 REFERENCES

District Council of Mallala Consolidated (2007) Development Plan. Planning SA, Government of South Australia [<http://www.planning.sa.gov.au/edp/pdf/MAL.PDF>], 18 January 2007.

P & M Borrelli & Sons Pty Ltd (1996) Mallala Solid Waste Landfill Environmental Impact Statement, February 1996.

Integrated Waste Services Pty Ltd (1997) EIS Solid Waste Balefill, Response to Submissions, May 1997.

IWS (current) Northern Balefill EPA License

IWS (2006) Northern Balefill Landfill Environmental Management Plan (LEMP)

APPENDIX A

APPENDIX B

APPENDIX C

APPENDIX D

APPENDIX E

APPENDIX F

APPENDIX G

APPENDIX H

APPENDIX I

APPENDIX B

PUBLIC AND GOVERNMENT SUBMISSIONS

