

# RESOURCE RECOVERY MAXIMISATION IN REGIONAL NSW

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## Paper Summary

The recovery of discarded resources has been an emerging issue within major Australian cities for the last decade or so. However there has, until recently, been little incentive for regional centres to apply the same effort to resource recovery. Wingecarribee Shire Council, through its forward thinking Waste Management Strategy, saw the need to maximise its resource recovery from both environmental and economic perspectives. To achieve this, it developed a state-of-the-art resource recovery centre at Moss Vale. This paper describes the development of the Resource Recovery Centre (RRC) and the impact that this facility has on the local community. It describes a model that would be suitable for replication by other similarly sized regional communities.

## Introduction

Since the development of a comprehensive Waste Management Strategy (1990-93), Council has implemented two waste/recycling collection systems 1994 & 2002 which are 'Winning the Game' of waste minimisation. It has also seen the closure of three landfills in that time.

The high and rapidly increasing cost of residual waste disposal to the community of Wingecarribee Shire, in both financial and environmental terms, caused Wingecarribee Shire Council to seek practical and affordable alternatives.

This paper sets out Council's response to this dilemma.

## History

Sole dependency on local landfilling ceased to be an option for Council in 1997. The concept of a Resource Recovery Centre had been identified during 1995.

Concept development and approvals took place between 1996 and December 1999, when Development Consent was issued.

Construction of the new Resource Recovery Centre commenced in October 2000, with the Centre opening on 1st July 2001.

## Process

The Technical Services Division of Council submitted a DA (Land Use Application), which was subjected to the standard approvals process for a designated development.

Consultants Gardner Willis and Associates in conjunction with Council staff developed the Concept Plan, which is considerably different from the final design. The Technical Services Division was responsible for turning the Concept Plan into reality.

## Constraints

The site was chosen after consideration of a detailed report by Consultants Maunsell Pty Ltd. They were

commissioned in 1994 to investigate potential landfill sites. Although landfills have a greater environmental impact than a resource recovery centre, there are many similar constraints that affect siting and design.

Changes to the design were mostly prompted by practical limitations of the site and input from various parties after public consultation.

Criteria for site selection included:

- Physical
- Accessibility
- Climate
- Environmental
- Financial viability

### ***Council's Waste Strategy***

#### ***Objectives of strategy***

A comprehensive range of objectives was developed following a detailed analysis of the Shire's needs. This resulted in a forward thinking strategy document, the main premise of which was that of resource conservation, re-use and recycling.

### ***Resource Recovery Centre***

#### ***Need***

The necessarily high cost structure of Council's waste strategy dictated that Council develop a facility for the benefit of both the Council and the community that provided the least cost waste solution, whilst maximising environmental responsibility, opportunities and user convenience. Council also recognised that the waste collection contract would be due for renewal shortly after the commissioning of the new facility, and was keen to design both the facility and the new contract in such a way that they were complimentary to each other.

It was seen that the only affordable solution for the Shire was the development of an integrated facility that would satisfy the Council's strategy through the maximisation of resource recovery, minimisation of waste to landfill and one that would introduce the concept of the "trip to the tip" as a rewarding experience. At the same time, it needed to be a one-stop shop for all of the solid waste requirements of the shire's residents and to centralise the Council's solid waste operations on the one site. In short, it was necessary to change the community culture from one of cast off materials being waste or rubbish, to one where these materials are seen as a valuable resource.

#### ***Process***

Following acceptance of the concept design, EIS and regulatory approvals, detailed design and construction was undertaken in-house, with some selected and specialised components sub-contracted (eg building construction). Construction commenced with the capping of the existing retired landfill during 1999, with the centre being finally commissioned on 1<sup>st</sup> July 2001.

#### ***Objectives***

The RRC was designed to satisfy the following objectives:

- ↻ Meet Council's legislative obligations
- ↻ Provide a "one stop shop" to the community for all solid waste management related activities
- ↻ Demonstrate environmentally responsible solid waste management practices to the community and the government
- ↻ Foster innovation and new technology/business opportunities for local waste management companies

- ↻ Minimise the costs and maximise the returns to the community through the application of sound waste management principles i.e. reduce waste to landfill and maximise resource recovery

To achieve these objectives the RRC was designed to meet strict environmental and operational requirements. Even though it is situated on an old landfill, it was necessary to create an environment that was totally different to the traditional “tip” experience. The site had to look clean, active, be easy to navigate and not create litter, dust, odours or noise for either customers or surrounding industrial and farming areas. Notwithstanding this the site is on high ground and is subject to strong winds during various times throughout the year, particularly during winter. It is also adjacent to the Moss Vale cattle saleyards.

Strict environmental controls were also required for landfill gas, leachate and stormwater control.

### **Facility Environmental Management Plan**

A Facility Environmental Plan (FEMP) was commissioned to address in detail the environmental controls that would be required. This document was a precursor to detailed design and addressed in detail issues such as:

- Capping of the existing landfill
- Stormwater management
- Leachate management
- Airborne emissions (dust, litter, odours)
- Landfill gas management
- Vector control

The FEMP set limits for various parameters, such as stormwater quality and the required testing regimes to meet and verify these requirements.

Much of the detail within the Management Plan was drawn from the FEMP

### **Business Plan**

Council’s Waste Budget is self funding, given this fact, Council commissioned the preparation of a Business Plan. This plan examined a range of issues including the overall business context, strengths and opportunities, weaknesses (threats) and strategies to overcome them, waste volumes, a marketing plan, funding sources and application, as well as detailed financial analysis and forecasts.

As part of the Business Plan a balance sheet, budget plan (profit & loss statement) and cash flow projections were prepared for the first three years of operation. This data was used to test a range of disposal fees and sensitivities. The analysis was found to be very sensitive to waste quantities, with a break-even point at 13 300 tonnes to landfill per annum. Thus, Council was in the position that it had conflicting objectives – on the one hand it was trying to reduce overall waste quantities and particularly waste to landfill whilst minimising disposal costs and charges, and on the other the unit cost would increase as the waste quantities reduced.

Finally, a depreciation schedule was developed. Full depreciation charges were included within the financial analysis.

### **Management Plan**

The Management Plan was prepared to give Council a detailed “Operations Manual” for the facility. The Plan contains the following major headings:

- Introduction
- Human Resource Management
- Functional Area Operational Management Plan

- Site Service Management Plan
- OHS&S and Emergency Management Plan

The RRC is laid out in an oval pattern (see Appendix 1) with the various functions located in a logical sequence around the central drop-off area. The Functional Area Operational Management Plan details each of these in sequence. They are described in some detail below.

The Site Service Management Plan details specific requirements for the management of issues such as landfill gasses, sewerage services, surface water drainage, leachate collection, litter, dust, vermin and noxious weeds, odours, and monitoring and reporting requirements.

### **Layout**

The functions of the RRC in sequential order are:

- **Gatehouse and weighbridge** (a single bridge is installed at this time, but there is provision for a second bridge in the event that future traffic warrants this). The gatehouse utilises a sophisticated computerised recording and reporting system that was developed in conjunction with a local software house. All vehicles entering the site are logged, including administration staff and visitors to the dog and cat impounding facility that uses part of the site as a tenant
- **Plant shed and waste contractor's depot**
- **Waste oil, paint, and batteries.** This function also accepts small quantities of asbestos by arrangement
- **Administration, amenities and education centre**
- **Revolve Centre.** This is presently functioning to only a limited degree
- **Recyclables (domestic).** Coded containers are available for various colours of glass, paper and cardboard

and beverage containers (steel, aluminium and plastics)

- **Recyclables (C&D and C&I).** This facility is located mainly within the central area of the circular path and divided up into a number of bays that receive timber, metals (ferrous and non-ferrous), concrete rubble, bricks & tiles, plasterboard, asphalt and tyres.
- **Green waste**
- **Mixed inert waste**
- **Trial composting/vermiculture area.** A contract has been let for the construction of a Vertical Composting Unit (VCU) to treat food and grease trap sludges, mixed with shredded green waste. This facility is presently under construction.
- **Reclaimed bulk materials storage and sale area.**
- **Solid waste transfer station.** This was originally designed with 2 bays, 1 for small vehicles and 1 for commercial sized loads, including Council's collection contractor. However, it has been modified and also now serves as a recyclables transfer station. Walking floor transfer trailers are utilised for haulage to either landfill or the MRF at Jacks Gully, Narellan.
- **Inert transfer station.** Although designed exclusively as an inert transfer station, this is now used for the transfer of various inert and recyclable materials.

### **Strategies**

The strategies of the RRC are all aimed at maximising resource recovery and minimising waste to landfill. Charging regimes are designed to reflect this, with substantial reductions for sorted recyclable materials (down to \$34/t as opposed to \$103/t). Mixed inert wastes are also cheaper than putrescible or mixed wastes (\$103/t as opposed to \$130/t)

Wherever possible, resources are modified to improve their value and

resold. For example, mixed inert waste is passed through a vibrating screen. This results in the separation of more valuable materials such as metals, timber and soils. The screened soils are then mixed with other materials such as composted green waste or ground plasterboard to provide soil conditioners or various blends of topsoils.

Timber and greenwaste are both shredded. The shredded timber is sold as boiler fuel. Greenwaste is windrowed and either used in other processes such as the preparation of soil conditioners or compost (see VCU trial above) or sold to the public as mulch. Council provides no guarantee as to its quality but is working toward AS4454.

Concrete and brick/tile rubble are crushed and blended for use as engineering materials, although more development work remains to bring the product into line with the specification for recycled pavement materials.

### ***Unique features***

The RRC possesses many unique features, both in its construction and operation, which demonstrate the sound use of recovered resources:

- Recycled landfill – the site makes use of an old landfill that would otherwise have been sterilised for any other beneficial use. Some parts of the landfill were exhumed to form the grade separation required for the transfer stations. The exhumed material was utilised as the core of the perimeter mounding.
- Use of recycled materials – wherever possible, quality recycled materials have been utilised within the construction of the RRC. Some that are particularly innovative are listed below. Others include the use of discarded conveyor belting to form a gasket between the transfer station and the top of the transfer trailers to prevent the escape of wind-blown litter, reject (but otherwise new) timber and concrete railway sleepers used as borders and edging and re-use of the plant shed from the former Welby waste depot
- Tyres – discarded tyres were used to construct a retaining wall in a successful demonstration of a new proprietary system. Similarly, they can be used to form on-ground waffle slabs, provided that the loadings aren't heavy.
- Masonry products – crushed masonry products were used as select fill and as base-course material and a surface course for some roads within the site
- Soil and mulches – as indicated above, much work has been conducted into developing successful soil mixes and mulches. All topsoil and mulch used in the extensive site landscaping is recycled material.
- Sorting features (streaming) - domestic recyclables delivered by residents are sorted directly by the residents into the appropriate containers, although the domestic recycling collection contractor collects co-mingled recyclables (except glass), which are transferred to the MRF at Jacks Gully. Segregated inert wastes are placed into the appropriate bay of the central receival area. Council has been trialing a separate glass collection service as part of its domestic waste collection. The glass is sorted into colours on the run. This has resulted in large volumes of high quality product.
- One way circulation – the site has been designed for one way traffic circulation in a clock-wise direction around the central receival area. This reduces conflicts and enhances the logical sequencing of functions within the RRC

- Colour coding – the various drop-off points are all colour coded. The signs, markings and dockets referring to a particular function are all coloured alike. This coding assists customers and makes it relatively easy for RRC staff to verify that the material being deposited is what was declared and paid for on entry
- Signage – distinctive signage has been provided that is easy to read and colour coded. Every sign contains the distinctive RRC logo



**Figure 1: RRC Logo**

### ***Organic processing unit***

An organics processing unit is being established on the site. This will be a pioneering plant that is aimed at demonstrating VCU technology as well as vermiculture. The unit is presently under construction and will utilise food organics, grease trap waste and mulched green waste as feedstock.

The introduction of this technology provides opportunities to establish new collection regimes, particularly concentrating on food organics from restaurants, accommodation houses, retirement villages etc. It has the potential to ultimately substantially reduce the Shire's waste to landfill requirements

### ***Revolve Centre***

The Revolve Centre is designed to sort, repair and sell any re-usable items such as household goods, white goods,

lawn mowers etc. A large (20m x 30m) shed has been provided for this purpose.

The Revolve Centre is seen as an important component in the development of the RRC, both from the perspective of returning valuable resources into the community and also from a community education viewpoint. Once issues surrounding the long term processing of domestic recyclables are resolved, it is likely that Council will operate the Revolve Centre itself

### ***Integrated facility***

The RRC is an integrated facility that also incorporates the collection contractor's depot, animal shelter facility (as a tenant), Resource Recovery administration and a waste education centre. Relocating the Waste Services administration to the RRC has not only made staff less remote from the operation, but has also relieved pressure on valuable space within the Civic Centre.

Council took the opportunity to design the new waste contract to be integrated around the facilities at the RRC. The collection regimes are tailored to the various RRC functions. This minimises delays in unloading and material processing. It also ensures high participation rates and minimal contamination in recyclables.

### **Results**

#### ***Reduction in waste to landfill***

Figures 3 and 4 in Appendix A demonstrate that, despite a rapidly increasing population base, (greater than 2% pa) Council has been successful over the past two years in its objective of reducing waste to landfill. The dark band for the past 12 months represents inert material that has been disposed at the Bowral brickworks. This facility only became available in

2001 and much inert material that had been stockpiled in anticipation of its opening has since been transferred there. However, landfill of mixed waste has continued to decline.

### **Community perceptions and attitudes**

With the opening of the RRC came a major increase in waste disposal fees. This was partly because full cost recovery of the RRC is built into the fees, but also because of the increase in charges levied by Waste Service NSW. The fact that legislation forces Council to pay the full EPA waste levy of \$18.20 per tonne has exacerbated this problem. Waste now deposited at Bowral only attracts a \$9.50 per tonne levy. However, the imposition of these levies is a strong incentive to divert waste from landfill.

A result of the high fees was an initial resistance to the RRC, particularly from commercial operators. This seems to have been now largely overcome, although there remain one or two commercial operators who have chosen to direct haul to other facilities.

### **The Future**

Notwithstanding that the RRC is innovative, and that it certainly sets the benchmark for resource recovery within regional NSW, there is still much that can be done.

There are opportunities for further processing of recyclables, particularly masonry products. The IPWEA's Recycled Materials Specification is leading to increased acceptance of this valuable material, and also increased control over its quality.

Consideration is presently being given to the long term processing and disposal of domestic recyclables. A major factor is the long haulage to markets. This has prompted investigation into the establishment of a

streaming MRF at the RRC, with a view to consolidating loads into material streams, thereby allowing greater densities and reduced unit transport costs. It will also allow greater local control over contamination. A decision on this is imminent.

As indicated above, the Revolve Centre is also high on the agenda.

The location of some industries in the vicinity that are not commonly found elsewhere has prompted investigation into some alternative material uses.

### **Conclusion**

Wingecarribee Shire Council has responded to the financial and environmental pressures of solid waste disposal by developing a state of the art resource recovery centre. This facility, which is a model for Regional NSW, has resulted in substantial reductions in waste to landfill by diverting valuable resources and reintroducing them into the economic cycle.

Council is 'Winning the Game' in 21<sup>st</sup> Century Waste management and setting a benchmark for local authorities in Australia.

The Centre is a community asset where a vast range of materials can be purchased for re-use and which is a valuable educational tool for present and future generations.

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### **Author Biographies**

**Phil Hawley** is the principal of Phil Hawley & Associates. Prior to establishing the firm in 1999 he worked in local government for a period of 30 years in various metropolitan and regional councils.

He has since worked with a number of local government clients on a diverse range of engineering and management projects. Many of the projects have a waste management focus.

Phil holds a Diploma in Civil Engineering (NSWIT) with postgraduate qualifications in Local Government Engineering and in Management. He is a Fellow of both the IE Aust and the IPWEA and a member of the Waste Management Association of Australia.

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During that period, he has been involved with a range of projects including: Landfill Environmental Management Planning; Development and Tendering for 3 major Contracts; Concept Plan & Environmental Impact Statement for the Resource Recovery Centre.

Miles has a Masters Degree in Applied Science (UWS Hawkesbury), has completed a short course in Solid Waste Management at UNSW and is a Member of the Waste Management Association of Australia

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