Waste Management Strategy 2013-2021

Tenterfield Shire Council

February 2013

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Adopted: Council Resolution 42/13 – 27 February 2013

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1. Executive summary

Tenterfield Shire Council operates a waste management service including residential kerbside collection, commercial collection, waste transfer stations and landfills. The service has not been sustainably delivered with significant underinvestment over the last 50 years. No funds have been put aside for the remediation of old and current landfills and these will require significant investment in the next decade.

Recent environmental incidents including a fire at the waste transfer station, asbestos contaminated mulch, remediation of small rural landfills and noncompliance with closure and operational plans at transfer stations and landfills have exacerbated the financial pressure adding costs of $1.25M in emergency works and identifying remediation liabilities in the order of $1.5M.

The EPA has clearly stated that a plan for the short term closure of the Boonoo Boonoo landfill is required. The Boonoo Boonoo landfill is in an environmentally sensitive area and is totally unsuitable for use as a landfill due to its proximity to Basket Swamp National Part and natural features including a high and fluctuating water table. Tenterfield Shire Council are negotiating a solution with EPA for the reopening of the Sunnyside Loop Road Transfer Station as a landfill, rather than identifying a new landfill. The expected savings in reopening the landfill are in the order of $4.25M, but will still come at significant cost.

There are four main cost pressures on the existing budget;

1. The requirement to identify and open an alternative landfill to Boonoo Boonoo and manage other small rural landfills;
2. Implementation of best practice landfill management including the construction of lined cells with proper leachate controls, and associated remediation to existing sites;
3. The need for waste minimization through recycling and waste avoidance due to the likely introduction of the NSW Waste Management Levy;
4. Repayment of the loan funds expended to complete the emergency work directed by the EPA.

The cost of reopening the Sunnyside Loop Rd landfill is estimated to be in the order of $1.85M, or **$46/rates notice per year** over 20 years. The alternative of a completely new landfill is expected to cost at least $6.5M, or $162/rates notice per year, but may be as much as $10M.

The requirement to improve landfill management practices will cost in the order of an additional **$71 / rates notice per year**, while the cost of repaying the loan for the recent emergency remediation work will be $162,995 per year, or **$36.22/ rates notice per year** over 10 years.

An analysis of the actual cost of landfill vs. the cost of implementing a recycling program has indicated that implementation of a kerbside recycling program would be approaching cost neutral in the current regulatory environment. If the NSW Waste Management Levy is implemented in Tenterfield Shire as is largely expected, this will cost Tenterfield Ratepayers an additional **$81/ rates notice per year**. A recycling program will reduce the increase to ratepayers to **$48/ rates notice per year**.

The development of a sustainable waste management service will create a significant increase in cost to Tenterfield residents but is the unavoidable consequence of half a century of neglect.

2. Overview

2.1 Introduction

Tenterfield Shire Council's main landfill is located at Boonoo Boonoo approximately 18km North East of Tenterfield. Transfer stations operate at Drake and Tenterfield. Rural landfills are available at Urbenville (manned), Liston, Legume, Dalman and Torrington. The Tenterfield Waste Transfer Station, Boonoo Boonoo landfill and Urbenville landfill are all being closely monitored by the EPA due to environmental issues. There is also pressure being applied by the regulatory authorities to close some, and preferably all of the small rural landfill sites.

This document provides a strategic pathway towards waste sustainability over the next 8 years and concentrates on landfill sites, waste minimisation, operational improvements and recycling options. Short term (next 2-3 years), medium term (next 10 years) and long term management strategies for our landfill locations and operations have been identified.

Essential to achieving the outcomes of this strategy is establishing sustainable waste disposal practices and determining the actual costs for landfill cell construction and end of life site remediation to completed landfills.

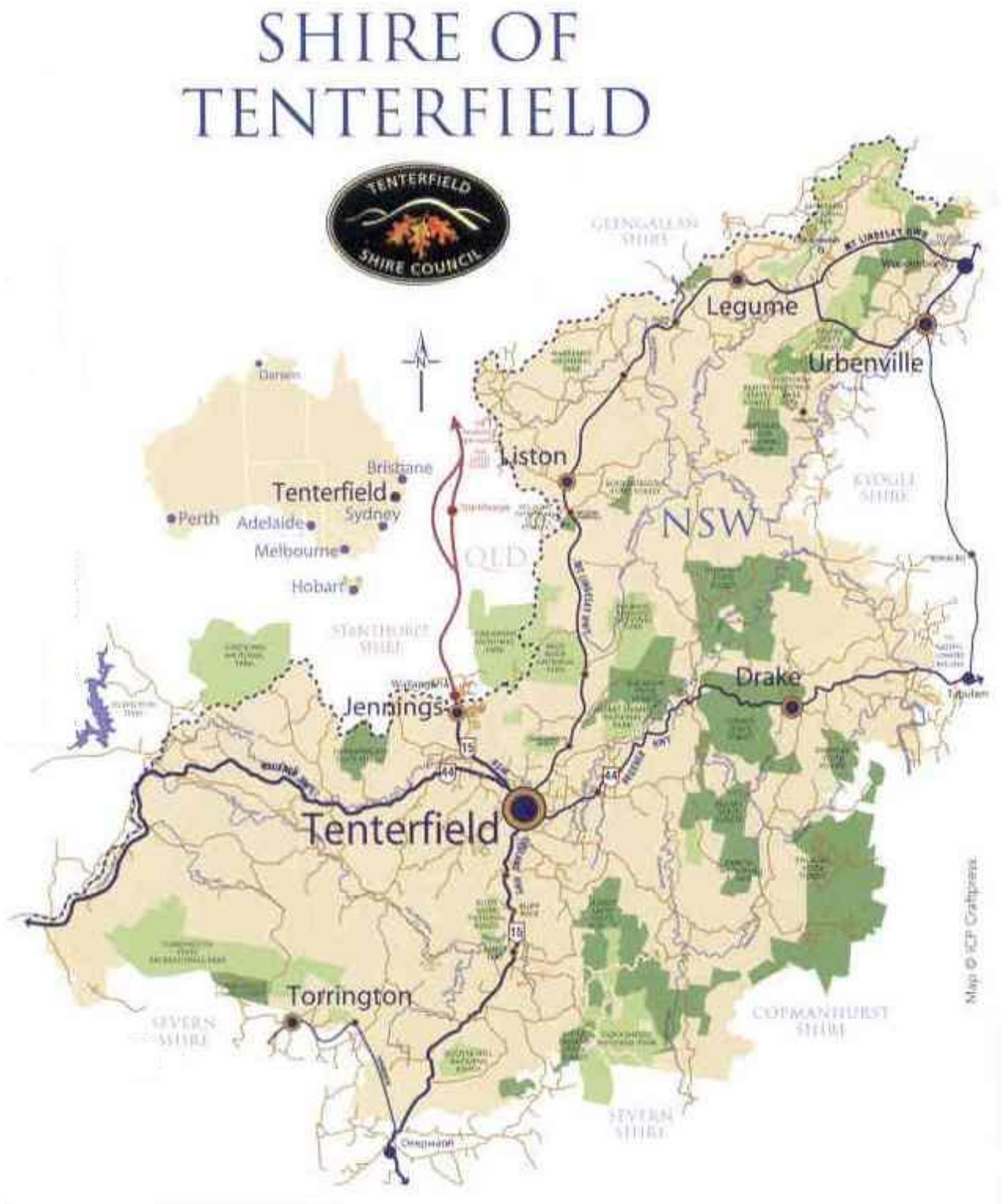
2.2 Tenterfield Shire Profile

Tenterfield Shire is located in the north east of NSW and covers an area of 7,177km2. Tenterfield's mean maximum temperature is 24.1C with a mean minimum temperature of 8C. The annual mean rainfall is 852.1mm (Bureau of Meteorology 2012).

Tenterfield Shire generally consists of undulating to hilly landscape and its altitude ranges from approximately 150m to 1500m above sea level. The Shire is located in the New England Tableland, NSW North Coast, Nandewar and South East Queensland Bioregions (under the Interim Biogeographic Regionalisation of Australia) and contains high levels of biodiversity, a large proportion of endemic species and threatened species that are no longer found in other areas of Australia.

Straddling the Great Dividing Range, Tenterfield Shire drains into the catchments of the Clarence Basin on the east and the upper Murray-Darling Basin on the west.

Tenterfield is the main township within the Shire. Other centres within the shire include the villages of Drake, Jennings, Legume, Liston, Torrington and Urbenville.


SHIRE OF
TENTERFIELD
TENTERFIELD
SHIRE COUNCIL
Legume
Urbenville
Liston
Tenterfield
Brisbane
Perth
Adelaide
Sydney
Melbourne
Hobart
NSW
QLD
Drake
Jennings
Tenterfield
Torrington

2.2.1 Population and demographics

In 2011, Tenterfield Shire had a population of approximately 6811 (2011 Census), an increase from 6,580 in 2006 (2.4%). The rate of unemployment is 7.0% (down from 7.8% in 2006, a decrease of 0.8%). The main industries of employment include agriculture, forestry and fishing, health care and social assistance and retail trade (ABS 2011).

Tenterfield Township and immediate rural surrounds is the major centre in the Shire with a population of 3966. Of these 2997 people live within the town boundary.

The median age of the Shire population is 47. 30% of the population is older than 60.

72.6% of the population live in a dwelling that is owned outright or owned with a mortgage, with 65.8% of people living with other family members. Aboriginal and Torres Strait Islander people make up 6.8% of the population.

Only slight population growth is expected over the coming years, mostly in semi-rural areas of the shire.

2.2.2 Commercial and Industrial Activity

The four main occupations in Tenterfield Shire are labourers & related workers (22.1%), clerical, sales & service workers (16.5%), professionals (13.6%) and tradespersons & related workers (10.7%). [Our Community Strategic Plan 2011-2021]

Tenterfield's economic base is centred primarily on retail, tourism and farming. Cattle grazing is the main farming activity. Timber, some crops (organic garlic, berry farms, stone fruits, grape growing and table wine production) and other livestock activity are also practised.

The New England Highway still travels directly down Tenterfield's main street with truck and car movements exceeding 7500 vehicles per day.

2.2.3 Events

Tenterfield holds a number of events including:

- Rotary Fishing Classic
- Tenterfield Agricultural Show
- Oracles of the Bush
- German Beerfest
- Wintersong
- Tenterfield Food and Wine Festival, and
- Numerous golf tournaments

These events all attract large numbers of visitors to the town and, whilst providing positive input to the local economy, also increase waste generation which is processed by Tenterfield Shire Council and currently mostly goes to landfill.

2.2.4 Topography

Tenterfield Shire straddles the Great Dividing Range, with approximately half spilling east into the Clarence catchment area and half pilling west into the Upper Murray-Darling Basin [Tenterfield Biophysical Mapping Study, 2003].

The Shire generally consists of an undulating to hilly landscape and ranges from approximately 150m to 1500m above sea level. Generally, the east of the Shire shares geological and topographical features with Kyogle and Richmond Valley Councils. Soils in the area are diverse from basalts in the east to granite soils in the west which support a range of ecosystems such as sub-tropical and warm temperate rainforests and/or sclerophyll forest (basalts) and open forests and woodlands (granitic soils).

2.2.5 Land

Most areas on the New England Tableland have been developed for agriculture. Typical enterprises within the Tenterfield Shire include pasture production for grazing and mixed cropping. Viticulture is also a modest industry. Grazing of pastures by cattle and sheep are the primary livestock activities. These tend to be dryland activities, which depend on natural rainfall or stored soil moisture from long fallows.

Within the town of Tenterfield, there is mostly low density residential area, as well as a small low density commercial area (the main street) and several small industrial areas containing industries including RTA, Council depot, Townes contracting (roadworks), SES and mechanics. There is also a large area of parkland through the centre of town along Tenterfield Creek.

The New England Tableland contains Palaeozoic rocks (older than 200 million years) including consolidated and deformed sediments and igneous and volcanic rocks. Soil types are derived from the parent material and are influenced by climate and time of weathering. There are 2 major geological sub-divisions in the Tenterfield region - granite and trap. Granite parent material gives rise to coarse sandy soils - these are yellow solodics. Soils derived from sediment or trap rock commonly include grey podzolics and stony lithosol. In Tenterfield there are yellow solonetzic soils, with some podzolics. There is also fine to medium grained solodic soils. Most commonly occurring is red-brown earths with a duplex profile. The topsoil is clay loam that changes to a light to medium clay in the sub soil. The topsoil is hard setting whilst the subsoil is moderately well structured. The profile is moderately well drained throughout. The soil has is generally acidic to neutral, with pH values from 5-7.

2.3 Relevance to the Integrated Management Plans

The Waste Management Strategy is part of Tenterfield Shire Council's integrated management planning works in conjunction with the following:

- TSC Our Community Strategic Plan 2011-2021
- Operational Plan 2012-2013
- State of the Environment Report 2012
- TSC 4 year Delivery Program

The Community Strategic Plan 2011-2021 provides an outline of Council's structure and how the Community's values and expectations for future operation and improvements are delivered by Tenterfield Shire Council.

2.3.1 Vision and Mission

TSC has as its mission statement: "Quality Nature, Quality Heritage and Quality Lifestyle"

The mission is supported by Tenterfield Shire's Vision:

- To establish a shire where the environment will be protected and enhanced to ensure sustainability and inter-generational equity,
- To recognise and actively develop our cultural strengths and unique heritage,
- To establish a prosperous shire through balanced, sustainable economic growth managed in a way to create quality lifestyles and satisfy the employment, environmental and social aims of the community,
- To establish a community spirit which encourages a quality lifestyle, supports health and social well-being, promotes family life and lifestyle choices,
- To establish a community spirit which promotes opportunities to participate in sport and recreation, promotes equal access to all services and facilities, and
- To encourage all people to participate in the economic and social life of the community with a supportive attitude towards equal life chances and equal opportunity for access to the Shire's resources.

This Waste Management Strategy provides a pathway to increased sustainability of waste management by outlining how Tenterfield Shire Council will responsibly manage landfill and reduce the amount of waste sent to it. The strategy highlights plans to increase recycling, increase community awareness of the economic and environmental costs of landfill, encourage community wide reduction in waste and provide ongoing education to all community sectors about waste minimisation and recycling options.

2.4 Stakeholders

As waste is linked to most people's daily activities, this strategy recommends relationships with the following:

- Local residents
- Local businesses including farmers
- TSC
- Neighbouring councils
- Northern Inland Regional Waste (NIRW)
- NSW state government
- Waste contractors and processors
- Waste employees
- Visitors
- Schools

2.5 Government Legislation

The following legislations are relevant to Waste:

- Protection of the Environment Operations Act 1997
- Waste Avoidance and Resource Recovery Act 2001

- Environmental Hazardous Chemical Act 1985
- Contaminated Land Management Act 1997
- Protection of the Environment Operations (Waste) Regulation 2005
- State Environmental Planning Policy (Major Development) 2005 (the MD SEPP)
- Waste Avoidance and Resource Recovery Strategy 2007
- State Environmental Planning Policy (Infrastructure) 2007 (the I SEPP)
- Dangerous Goods (Road and Rail Transport) Act 2008

2.6 Regional Opportunities and Alliances

Tenterfield Shire shares borders with a wide range of councils in both QLD and NSW. Tenterfield also belongs to several regional groups including Border Region of Councils and the Northern Inland Regional Waste group (NIRW).

2.6.1 Northern Inland Regional Waste

Tenterfield sits within the Northern Inland Regional Waste group. NIRW is a voluntary local government group formed to specifically address waste management issues on a regional level. The group's membership consists of 13 local government councils in the New England and Northern West regions of NSW. NIRW was formed in July 1998 and meets quarterly to discuss waste management issues and to organise regional initiatives. Other member councils are Armidale Dumaresq, Glenn Innes – Severn, Gunnedah, Gwydir, Inverell, Liverpool Plains, Moree Plains, Narrabri, Tamworth, Uralla and Walcha.

2.6.2 Neighbouring Shires

Tenterfield borders several other councils being Kyogle, Glen Innes-Severn, Clarence Valley, Richmond Valley, Inverell (NSW) and Southern Downs Regional Council (SDRC) and Goondiwindi Regional Council (GRC) in QLD.

The Tenterfield Shire township of Urbenville is located close to Woodenbong in Kyogle. Jennings borders Wallangarra in SDRC, while Legume is in close proximity to Killarney (SDRC).

2.7 Current Waste Management Services – Tenterfield township

Tenterfield Shire Council operates a number of waste services including weekly kerbside collection to Tenterfield, Urbenville and Jennings, weekly commercial garbage collection, weekly trade waste skip bin collection, local access only landfill sites and transfer stations with some recycling.

2.7.1 Domestic Waste Collection

Tenterfield town, Jennings and Urbenville residents have weekly kerbside collections.

Tenterfield east residents' collection is on Tuesdays and Tenterfield west on Thursdays, with approximately 2 loads each collection day going to Boonoo Boonoo landfill. These collections are conducted by Tenterfield Shire Council employees using Council's own side lift truck. Jennings residents are serviced Thursday mornings.

Table 2-1 Number of weekly domestic kerbside collections

Collection area	120L Bin	240L Bin
Tenterfield	1070	541
Jennings		85
Urbenville		117

Tenterfield and Jennings services are provided by Tenterfield Shire Council with waste taken to Boonoo Boonoo landfill. Urbenville residents' service is provided by Grelie Waste and is taken to Urbenville landfill.

2.7.2 Commercial Waste Collection

TSC provides a kerbside waste collection service to commercial premises (Table 2-2).

Table 2-2 Number of weekly commercial kerbside collections

Bin Size	Number collected (weekly)
120L	43
240L	170

TSC also operate a front end lift truck servicing industrial skip bins from industrial and commercial premises in the Shire. The majority of services are in town.

Table 2-3 Number of commercial and industrial skip collections

Bin Size	No Bins	Services per year
2.4m^3	41	1656
3m^3	25	960
4m^3	41	640

The total quantity of waste collected from commercial premises is 118,136m^3 uncompacted.

2.7.3 Street, Parks and Community Facilities

There are approximately 10 community, 25 park and 17 main street bins that are collected by TSC. Park and main street bins are collected daily by Parks and Gardens staff. Community bins are included in the weekly collection cycle.

2.7.4 Other Collections

Council also offers additional or special collections during many of the towns "events". This can consist of up to 20-30 additional bin collections.

2.8 Transfer Stations

Tenterfield Weekly Waste Activity across the Shire.

Day	Site/Town	Activity
Mon	Tenterfield	Commercial waste collection – 1 drop
		WTS open 10-12, 1-4pm
Tues	Tenterfield	East Tenterfield domestic collection – 2 drops 10.30/3.30
	Drake/Sandy Hills	Waste bins emptied FEL every 1st and 3rd Tues
	Drake	WTS open 8-12, 2-3.30pm
	Urbenville	Landfill open 9-12
	Mingoola	Waste bins emptied FEL every 2nd and 4th Tues
Wed	Tenterfield	WTS open 10-12, 2-5pm
Thur	Tenterfield	West Tenterfield domestic collection – 2 drops 10.30/3.30
		Commercial waste collection – 2 drops every Thurs
		WTS open 10-12, 2-5pm
	Urbenville	Domestic collection, 1 drop
	Drake	WTS open 8-12, 2-3.30pm
Fri	Tenterfield	WTS open 2-5pm
	Urbenville	WTS open 9-12
Sat	Tenterfield	WTS open 10-12, 1-5pm
Sun	Tenterfield	WTS open 10-12, 1-5pm
	Urbenville	WTS open 10-4pm
	Drake	WTS open 8-6pm
Daily	Legume, Dalman, Liston, Torrington	Open by key access only

Skip bins are provided for the smaller communities at Sandy Hills and Mingoola.

2.9 Disposal

TSC has several landfill sites across the Shire, some of which are closed but still included on EPA registers.

2.9.1 Landfill sites

- Boonoo Boonoo
- Legume
- Urbenville
- Liston
- Torrington
- Dalman
- Drake (closed)
- Stannum (closed)
- Tenterfield (closed)

2.9.2 Licencing Requirements

Boonoo Boonoo Landfill is located on Mount Lindesay Road in an area surrounded by National Parks and considered to be an environmentally sensitive site. Section 55 of the Protection of the Environment Operation Act, 1997, licences Boonoo Boonoo landfill as a Solid Waste Class 1 Environmentally Sensitive or Inappropriate Landfill.

The licence is required to be reviewed every 3 years. Refer to Environment Protection Licence 11435 for further information.

Allowable Wastes:

- Approved putrescible waste – refer Technical Appendix 1 POEO Act 1997
- Less than 2000 tonnes per annum
- Asbestos that complies with clause 29 POEO (waste) regulation
- Less than 50 tonnes of tyres may be received and piled separate to general waste in a pest and fire safe manner.

Closure:

A plan must be developed and provided to the EPA three months prior to the final waste being landfilled on the site.

2.10 Human Resources

Tenterfield employs four site supervisors:

- Tenterfield WTS – 2
- Drake – 1
- Urbenville -1

Tenterfield also employs two drivers for the domestic and commercial waste collections. The drivers also operate the Compactor.

2.11 Collection and management resources

TSC currently has 1 side lift truck for collection of 120L and 240L bins and 1 front lift truck for collection of 2.4m^3, 3 m^3 and 4 m^3 commercial bins.

2.12 Financial Resources

The waste fund is a restricted fund. This means that income generated through waste levies, kerbside collection, commercial, trade waste and on site fees can only be spent on waste management activities.

A shire wide $50 waste charge was introduced in 2006/07. This has been incrementally increased over time and as at 2012 was $100 per rates notice. The charge was introduced to assist Council maintain current and fund future waste related activities. Kerbside collection fees are $225/120L bin/year or $290/240L bin/year. In addition, since July 2012, transfer station fees have been re-introduced at Tenterfield, Drake and Urbenville

which range in price from $1.50 for a sorted 120L wheelie bin to $93 for a 6 tonne vehicle with unsorted waste. This enables rural, commercial and excess waste customers to self-haul their waste to the transfer station.

2.13 Resource Recovery

In line with TSC's 10 year strategic plan objectives of:

- Promote waste minimisation and sustainable waste disposal
- Review, improve and implement waste education programs

TSC has recognised the need to reduce waste and recover resources, and sees educating and involving the community as fundamental to the success of the plan. Figure 2-1 shows the internationally recognised approach to provide a framework for setting strategic directions for waste and resource efficiency in order of priority. All tiers of government across Australia seek to align their waste management strategies and policies to the waste hierarchy.

Figure 2-1 The Waste Hierarchy

2.14 Waste Minimisation

TSC has taken steps to provide self-haul recycling options for the community including:

- Glass
- Cardboard
- Metal
- Aluminium
- Green waste
- Drum muster
- Engine oil, and

- Lead batteries

Tenterfield's main waste streams have been identifies as:

- Agricultural waste
- Biosolids
- Commercial and Industrial (C&I)
- Construction and Demolition (C&D)
- Garden/organic
- Mining waste
- Municipal waste – domestic waste (kerb collected); other domestic waste (transfer stations), other Council waste (parks, streets, public spaces, events etc)

TSC also allows disposal of dead animals at the Boonoo Boonoo landfill site. Boonoo Boonoo is closed to the public with Council permission required to enter the site.

2.15 Engagement and Education

Information is provided to the public via the TSC web site about waste transfer site locations and operating hours, garbage collection days and the DrumMUSTER program.

3. The current state of waste management

While the key focus for reducing waste management costs is the introduction of waste minimisation and diversion strategies, there are many additional legacy issues that must be addressed concurrently. These issues have mostly been identified through a number of incidents at both Tenterfield Transfer Station (and its prior use as the Sunnyside Loop Road landfill) and at Boonoo Boonoo which have resulted in clean up notices and other directions from the EPA. These issues include:

- The landfill closure plan has not been implemented at Tenterfield's Sunnyside Loop Road site despite it ceasing operation as a landfill nearly 10 years ago;
    - Cells have not been capped correctly;
    - Existing landfill cells are non-compliant;
    - Surface drainage and leachate management are;
    - Recent use of landfills and transfer stations are contrary to licenses.
- The Boonoo Boonoo site has similar issues.

The landfill site at Urbenville also needs some remediation work albeit of a significantly reduced nature.

3.1 Legacy issues

There are two main categories of legacy issues. Those resulting from a number of distinct incidents which required urgent remediation and those affecting Tenterfield's long term waste management operations.

3.1.1 Incidents and emergency works

On 2 January 2012, a fire broke out at the Tenterfield Waste Transfer Station in a poorly closed cell. The EPA was promptly advised of the fire and conducted a site inspection soon thereafter. As a consequence of the site inspection, TSC were advised that there were areas of the site operating outside the operating parameters for a Waste Transfer Station. The EPA later issued TSC with two penalty infringement notices (May 2012) for issues relating to Waste Management regarding;

- Asbestos
- Oil
- Batteries
- Chemicals, and
- Pesticides

A further incident where mulch given to the public from the transfer station was found to contain asbestos occurred, triggering a Clean-up Notice from the EPA in July 2012.

As a result of the ongoing issues with waste management, the EPA has advised of a number of steps they required to be immediately taken to bring the Tenterfield Waste Transfer Station back within its allowable operation conditions. These steps included;

- Removal of tyre stockpile;
- Treatment and removal of green waste;
- Provide a report on green waste management;

- Provide a fire management plan;
- Provide a WTS management plan;
- Provide a report on how TSC was going to meet its obligations under the 2002 closure plan;
- Prepare and Implement a Waste Management Strategy that includes strategies on diverting recyclable and reusable materials away from landfill;
- Recover and replace the asbestos contaminated mulch;
- Include in the Waste Management Strategy plans for locating and constructing a new site for future landfill requiring the closure of Boonoo Boonoo.

At the time of the development of this strategy progress on the emergency works includes:

- Asbestos contaminated mulch had been removed and reclaimed from all gardens, with all contaminated mulch being buried;
- A contract has been established for a supplier for removal of tyres from the waste transfer station;
- Preliminary earthworks have been undertaken to improve surface water drainage at Tenterfield and Boonoo Boonoo;
- A large stockpile of green waste has been removed from the waste transfer station;
- This waste management strategy document has been prepared.

A $1.25M loan was taken out to meet these expenses and has been totally committed to activities to address the EPA requirements. This loan is sufficient only to deal with the emergency requirements and is not enough to resolve the long term remediation requirements of the closed and open landfills.

3.1.2 Long term complying use and remediation

In addition to the emergency cleanup work, significant additional work is required at both the Waste Transfer Station and at the Boonoo Boonoo landfill. The WTS is to be operated in accordance with regulations governing a transfer station which include:

- Site risk assessment plan required
- Site fire management plan required
- Limiting the storage of tyres
- Limiting the storage of green waste
- Limiting storage of general waste
- Providing adequate stormwater management
- Providing adequate leachate management and regular leachate testing from appropriately located bores
- Remediating the site in accordance with the 2002 closure plan including:
    - Converting surrounding crown road to TSC land
    - Investigating the purchase of adjoining land
    - Capping the northern and western batters
    - Removal of dam
    - Drilling new sample bores
    - Improving drainage
    - Reshape the closure of the northern cell
    - Dig leachate interceptor trench

- Provide earth or similar bunded areas for waste separation
- Generally clean up site and keep clean during operation

Boonoo Boonoo's operations are to be modified to comply with its license conditions:

- Site risk assessment plan required;
- Site fire management plan required;
- Drainage and leachate systems to be improved;
- Eastern fence to be removed and old cell batters to be remediated;
- Previously closed cells to be capped and revegetated;
- 2 new sampling bores for water quality testing to be drilled;
- Sediment dam to be upgraded;
- Cell 6 to be closed an capped;
- Plant used for landfill management to be reviewed;
- Operators to be trained in best practice waste management.

It is estimated that the cost of the remediation and monitoring work required will be around $1.5M (additional to the existing $1.25M loan), depending on site conditions revealed upon detailed planning of the activities. Additional costs would also be incurred as a result of the requirement to close the Boonoo Boonoo landfill site and establish a new landfill.

4. Costs of waste disposed in landfill

Regardless of the physical location of a landfill site there are significant costs associated with the construction, leachate management, waste management and closure of a landfill cell. In addition, the landfill site must be fully remediated and revegetated at the end of the landfill life, which is again a significant expense.

4.1 Landfill cost estimate

In order to dispose of waste in a landfill, a landfill "cell" must be constructed. The basic components of a landfill waste cell are;

1. The cell structure – involves construction of earth walls and, dependent on groundwater, and optionally excavation to recess the cell below the ground surface;
2. A clay or other impermeable liner;
3. A leachate management system and landfill gas venting;
4. Cell cap upon completion;
5. Vegetation.

In addition to this there are additional costs associated with the operation of the landfill cell.

1. Pushing out and compaction of waste;
2. Monitoring of groundwater and leachate;
3. Daily cover for pest and odour management;
4. Management of landfill site including collection of air-spread waste, sediment and erosion and clean water diversion.

The landfill site on which the cell is located also contributes to the cost. Each landfill site has significant costs associated with its establishment which must be attributed to the cells it contains. These include;

1. Land acquisition;
2. Procurement of licensing;
3. Preparation of sediment and erosion plans, drainage plans, emergency response plans and waste management strategies;
4. Construction of leachate and sediment dams;
5. Fencing;
6. Access roads;
7. Storage sheds.

Upon completion of a landfill, the site must be closed and remediated. This requires;

1. Final site cleanup;
2. Preparation and EPA approval of the closure plan;
3. Removal of non-permanent infrastructure;
4. Revegetation.

4.1.1 Cell construction cost

For this costing exercise, we will assume a cell 60m long, 30m wide and 3m deep. The capacity of the cell is around 5,400m3 or 4,300t. This cell will last approximately 8 months. The cell services Tenterfield, Jennings, Drake and rural customers disposing of their waste at the Transfer station. This is estimated to be in the order of 3,500 rates notices. The remaining 1,000 rates notices are serviced by other rural landfills or the Urbenville landfill. The costs of maintaining these alternative arrangements are likely greater than the Sunnyside/Boonoo Boonoo network due to economies of scale, so the Tenterfield system is used for the basis of cost calculation.

When constructing a new cell, the outer wall of the cell should be at approximately 1:3 to allow for vegetation and future maintenance. The inside wall will be approximately 1:1 and there is a trafficable area 1m wide at the top of the wall. Assuming the material can be sourced locally without import or royalty, the costs to excavate, haul, compact and trim the material is in the order of $15/m3.

Upon completion of the superstructure of the cell, it must be lined. The cost of a clay liner is in the order of $14/m2 and it costs approximately $10,000 to install.

Once the basic cell is finished, the internal leachate system is installed. This involves a heavy duty slotted water pipe being installed in the base of the pit, through the cell wall and then extended until it connects into the rest of the leachate network.

Table 4-1 Wall construction

Bund Wall Material Volume	21	m3/m
Appr. Perimeter	180	m
Volume of Material to make bund	**3780**	**m3**

Table 4-2 Cost of wall

Volume of Material to make bund (m3)	3780
Rate/m3	$15
Total Cost for wall	**$56,700**

Table 4-3 Lining surface area

bottom	1800	m2
top	1800	m2
sides	540	m2
Total	**4140**	**m2**

Table 4-4 Cost of liner

Area of lining	4140
Rate/m2	$14
Installation cost	$10,000
Total Cost for liner	**$67,960**

Table 4-5 Leachate network pipes

Internal (including risers)	90	m
External connectivity network	150	m
Total	**240**	m

Table 4-6 Cost of cell leachate system

Length of pipe	240
Rate/m	$100
Sundry items i.e. ven supports	$3,000
Total Cost for leachate system	**$27,000**

Table 4-7 Capping

Cap area	1800	m2
Cap depth	300	mm
Total	**540**	m3

Table 4-8 Cost of cap

Volume of Material to make cap (m3)	540
Rate/m3 to install cap	$15
Area to revegetate	1800
Rate/m2 to revegetate	$3
Total Cost for cap	**$13,500**

Table 4-9 Cell construction cost summary

Cost of Wall	$56,700
Cost of Liner	$67,960
Cost of cell leachate system	$27,000
Cost of Cap	$13,500
Total Cell Cost	**$165,160**

4.1.2 Cell operating cost

Modern landfill management requires that our cells are compacted (to maximise cell capacity) and covered on a daily basis. Additionally, because we run a transfer station, the waste must be moved from the WTS to the landfill.

Table 4-10 Waste Cell Operational Costs

Hours for 963D Waste Handler (12 months x 2 hrs/ day x 5 days/week)	520
Rate for 963D - incl. operator	$150
	$78,000
7 Trips from WTS/week	364
Cost per trip - front loader with operator - 1.5hr cycle	$187.50
	$68,250
Monitoring and reporting - water sampling, EPA compliance reports	$15,000
Annual License Fee	$5,000
Cost of daily cover material (soil/mulch mix)	$10,000
Total Cost	**$176,250**

4.1.3 Landfill site costs

Each cell is part of the larger landfill. Landfills are expensive to establish and require a certain amount of infrastructure including leachate ponds, pumps, land purchase, fencing and access roads. The establishment of a modern landfill costs at least $5M. The expected life for a landfill is 50 years.

The costs of the landfill would need to be debt financed. The repayments on a $5M loan over 50 years are $315,842 annually. Even in the case that we successfully reopen the Sunnyside Landfill, this will cost at least 1.25M for a total of $79,000 per year.

Costs for closure will be at least of the same scale if the site is maintained in accordance with the license.

4.1.4 Total Estimate of Annual Landfill Cost

Table 4-11 Summary of landfill cost estimate

Cell Construction Cost (1.5 cells/yr)	$247,740
Cell Operational Cost	$176,250
Administration (20% of total 2012/2013 waste admin budget)	$61,600
Landfill establishment contribution	$79,305
Landfill remediation contribution	$79,305
	$644,201

Table 4-12 Distribution of cost of landfill

Capacity of 60x30x3m cell (m3) x 1.5	8100
Compacted weight (t)	6885
No. of rates notices	3500
Cost / m3	**$79.53**
Cost / t	**$93.57**
Cost per rates notice	**$184.06**

It is expected that the current NSW Waste Management Levy, currently set at $41.20 will be extended to additional local government areas. The impact of the levy is shown in Table 4-13.

Table 4-13 Costs including the NSW Waste Management Levy

Levy rate/t	$41.20
Annual Levy costs	$283,662
Total waste cost/tonne incl. levy	**$134.77**
Total waste cost/m3 incl. levy	**$114.55**
Total waste cost/rates notice incl. levy	**$265.10**

5. Tenterfield shire waste profile

In developing the Waste Management Strategy, it is important to understand the nature of the waste currently being sent to landfill. In this case a waste audit was considered an appropriate method of determining the breakup of waste. The most recent waste audit was conducted in 2007 and is still considered relevant given minimal population growth and insignificant increases in public education programs regarding waste that have been conducted to date.

5.1 Establishment of profile

The waste audit was conducted 3-5 May 2007. The time was chosen as it was considered to be an average yearly time. The audit involved four different assessments gathering information on waste types, behaviours, beliefs, current practices and approximate volumes.

The process considered four components being:

- Photographic log of sites and activities
- Site assessments
- Visual audits
- Customer surveys

5.1.1 Profile Limitations

The process contained some constraints and limitations.

a) Calculation of results is volumetric and no physical weighing of the waste has occurred
b) Estimates are based on sample testing, observations of behaviours and pre disposed items
c) Is a snapshot in time that does not all for seasonal variation.

All audit and surveys:

- Included parameters and codes
- Were an overview of current activity
- Benchmarked receivables on actual dates of audits at transfer stations and landfill sites
- Were a visual estimate of incoming waste to the nominated transfer stations and landfill sites based on the capacity of vehicles
- Counted vehicles entering nominated transfer stations and landfill sites

Note: at the time of the audit many photographs were taken at each site, however since this time remediation work has been undertaken at each site with the photographs taken during the 2007 audit no longer representative of the site. It is however estimated that the data collected on waste disposal is still relevant meaning a more current survey is not warranted.

5.1.2 Profile Sampling Techniques

The following techniques were used to reduce human subjectivity that may influence results:

- Maintain confidentiality of patrons
- Allocated a survey number
- Describe the audited site and use pictorial representation where relevant
- Estimated waste types, volumes, sources and industry on all incoming vehicles
- Nominated how waste arrived
- Nominated town of origin of waste
- Provided options on vehicle capacities to assist with estimation of waste volumes
- Described where auditees put items for disposal, resale or recycling
- Complies with WHS practices.

5.2 Site Profiles

The following section provides information specifically related to each site.

5.2.1 Drake Waste Transfer Station

DTS is located on the Bruxner Highway about 53km from Tenterfield, 73km from Casino and about 18km from Tabulum (Kyogle Shire). It is a small community of about 150 residents. The transfer station is a supervised site open 3 part days per week.

Waste is disposed into skip bins which are regularly transferred to the Boonoo Boonoo landfill site. There are separate bunded areas for green waste and metal and also separate glass collection skips.

5.2.2 Boonoo Boonoo Landfill

Boonoo Boonoo is a closed landfill site located approximately 18km from Tenterfield on the Mt Lindesay Road. It accepts municipal waste from kerbside and commercial collection in Tenterfield as well as other loads with approval from TSC.

5.2.3 Tenterfield Waste Transfer Station

Tenterfield WTS is the main transfer point in the Shire accepting:

- Glass (coloured and clear)
- Metal
- Green waste
- Engine oil
- Batteries
- drumMuster
- cardboard
- tyres
- and general waste

General waste is dropped into below floor level skip bins and transported regularly to Boonoo Boonoo for disposal to landfill.

There is an onsite baler for cardboard.

Northern Inland Regional Waste partnership provides TSC with regional pricing for metals and green waste. Green waste is chipped biannually by external sub contractors.

The Tenterfield WTS is a manned site open 6 part days per week. Residents pay a waste charge as part of their yearly rates as well as paying to dispose of general waste at the waste transfer station. Recyclable items can be disposed of free of charge.

5.2.4 Urbenville

Urbenville (pop approx. 244) is 141km from Tenterfield township but only 13km from Woodenbong (Kyogle Shire). It has a supervised trench landfill site open 3 part days per week.

Greelie Waste conducts Urbenville and Woodenbong's weekly kerbside waste collection service, disposing alternately at Urbenville and Woodenbong landfills. Common items in the trench include:

- Garbage bags
- Cardboard
- Glass bottles
- Bulk building
- Household items
- Mixed plastics and metals

Urbenville has since made distinct bunded areas for segmentation of green waste and metals, which has reduced the amount of waste being put in the trench.

5.2.5 Legume

Legume (pop approx. 187) trench site is located 94km from Tenterfield and 10km from Killarney (Southern Downs Regional Council)

The Legume landfill site is currently the communities only waste disposal and recycling option. The site is a locked site with residents being provided with an access fee. There is evidence of the trench being set on fire on a regular basis.

Separate bunded areas are provided for separation of green waste and metals.

5.2.6 Liston

Liston landfill is located on the Mt Lindesay Road, 51km North of Tenterfield township and approximately 17km from Stanthorpe (Southern Downs Regional Council).

The site is currently locked with residents provided with keys. Relatively undefined areas are available for disposal of green waste and metal. The main trench is used for disposal of general waste. There was a mix of general waste, cardboard, glass, metals and building waste.

5.2.7 Other sites

Other sites include Torrington & Dalman, with Sandy Hills and Mingoola being provided a locked skip bin for their waste disposal.

5.3 Customer Surveys

Surveys and observational audits were conducted at Tenterfield's Transfer Station in 2007.

The surveys and audits were conducted during one afternoon and one morning shift with 39 surveys and audits conducted.

Where visitation rates allowed site users at other sites were approached and surveyed.

NB: Customer surveys were intended at all sites. Only one person, who was approached, appeared at Legume with no-one else at other sites. Tenterfield Transfer Station was therefore the only site where customer surveys took place.

Community attitudes

The following responses provide insight to community attitudes and expectations towards issues regarding waste services.

- 63% don't want to pay more;
- 53% surveyed at the TWTS don't have a kerbside service and nearly 40% of these people would like a kerbside service;
- 94% surveyed are regular users of the TWTS, with 40% visiting weekly;
- 73% said they do recycle (cardboard 54%) the most commonly mentioned item, (glass 24%) and (metal 18%);
- 40% said they would like a kerbside recycling service, 64% of these currently receive a kerbside garbage service;
- While accurate data isn't available, there seemed to be significant discontent with the $50 waste charge. The charge has since been increased to $100 and will increase further under this strategy.

5.4 Percentage Distribution of Waste

Kerbside collected waste was found to have the following approximate breakup of waste by volume:

- Metals – 5%
- Plastics – 26%
- Glass – 4 %
- Paper and cardboard – 34%
- Organics – 29%
- Other – 2%

The distribution of waste indicates that if the community would recycle all metals, glass, plastic and paper and cardboard, landfill reduction of 69% could be achieved. By incorporating organic composting, this figure could be increased to 98%. In reality this level of community buy in is unlikely, however it does prove that significant waste reduction can be achieved.

5.5 Summary of findings/recommendations

Urbenville	• Volumes of materials that could be recovered are disposed to landfill • Woodenbong is located nearby and further investigation is needed to determine if using Woodenbong landfill is viable or practical • Cost savings might be achieved by forming agreement with Kyogle Shire Council and Greelie Waste • Minimal staff amenities are located on site • Landfill lacking appropriate water management processes ie leachate control and the trench is located too close to a water coarse • Opportunities exist for increased recycling
Legume	• Volumes of materials that could be recovered are disposed to landfill • Cost of managing the site outweighs real value • Potential safety issues and community costs with fires • Landfill lacking appropriate water management processes ie leachate control • Opportunities exist for increased recycling • Cost savings might be achieved by forming agreement with Southern Downs Regional Council (Killarney)
Liston	• Landfill lacking appropriate water management processes ie leachate control • Potential environmental and safety issues from inappropriate site use • Volumes of materials that could be recovered are disposed to landfill • Boonoo Boonoo and Stanthorpe are located nearby • Manning of site might reduce recoverable waste going to landfill • Opportunities exist for increased recycling • Cost savings might be achieved by forming agreement with Southern Downs Regional Council (Stanthorpe)
Drake	• The site is well supervised with strong linkages to the local community • Opportunities exist for increased recycling
Tenterfield WTS	• The site is well supervised with strong linkages to the local community • Significant volumes of recoverable items ie plastic, glass, steel, paper, cardboard and Aluminium are still ending up in general waste. • Structure of fees appears to have made some residents further consider how they dispose of their waste • Opportunities exist for increased recycling • Better public education and site signage required • A review of site layout to be conducted to make disposal of recoverable materials easier • Site remediation needed urgently as per the Bailey and Amaral reports • Cost savings might be achieved by forming agreement with JJ Richards, Cleanaway or another private contractor
Boonoo Boonoo	• Unnecessary volumes of waste ending up at this site causing increased maintenance through new cell development, litter control etc.

	• Site under significant EPA scrutiny • Site remediation needed urgently as per the Bailey and Amaral reports
Dalman	• The entrance gate is regularly left open • The location is close to Urbenville and Legume • Recoverable materials are disposed to landfill • Cost of managing the site outweighs real value • Landfill lacking appropriate water management processes ie leachate control • Cost savings might be achieved by forming agreement with Southern Downs Regional Council (Killarney)
Sandy Hills & Mingoola	• Locked bin only provided • No recycling
Torrington	• Is located close to Stannum (13km), Deepwater (28km), Emmaville and Glen Innes • Landfill lacking appropriate water management processes ie leachate control • Recoverable materials are disposed to landfill • Potential safety issues and community costs with fires • Cost savings might be achieved by forming agreement with Glen Innes Severn Council

6. Cost of recycling

For recycling, there are two main options.

1. Council provides a recycling service;
2. Recycling services are provided by a contractor.

6.1 Council operated recycling

Where Tenterfield Council provides a waste service, the cost of recycling needs to be considered in parts;

1. Cost of kerbside collection services;
2. Sorting costs;
3. Revenue/costs of recycled products net of transport costs.

6.1.1 Cost of kerbside collection services

Kerbside collection of recyclables can be achieved through either an additional collection service, or alternative collection of general waste and recycling.

6.1.1.1 Additional collection service

The option for an additional collection service is the highest cost option and would cost in the order of an additional $200 per collection / year using existing resources. For household recycling this cost alone would be in the order of $400,000.

6.1.1.2 Alternating collection of General Waste and Recycling

As the amount of waste generated in each household remains unchanged, the alternative collection will only require the purchase of additional bins for recycling, a one off cost of less than $50 per household.

6.1.2 Costs of sorting

The value of most recyclables is generally quoted as a packed, sorted and delivered product. As a result, the costs of sorting and packing recycling needs to be considered. An approximation of the costs are in Table 6-1

Table 6-1 Sorting and packing recycling costs

Packing Equipment - $100,000 capital over 10 years	$10,000
Infrastructure for sorting location - $100,000 over 10 years	$10,000
Operating costs for equipment	$20,000
Wages – 1 additional full time sorter	$40,000
	$80,000

6.1.3 Net revenue /costs of recycled products

The following section provides information on the major items that can be recycled and constitute the majority of waste currently being disposed on to landfill in Tenterfield. These items form the high priority items to divert from landfill to recycling. Following successful diversion of these items, TSC can look towards diverting some of the lower volume items.

The main problem with revenue from recycling is that the market varies largely, and is for a delivered product. As Tenterfield is a long way from the destination for the products, very few recyclables can be profitably sold, and the net revenue and cost is therefore very difficult to estimate.

Table 6-2 Recyclable material summary

Product	Currently Recycled	Current Practice	Revenue	Challenges
Glass	Y	Bottle banks behind Tenterfield Pool, separated drop off points at Drake WTS, TenterfieldW TS	$10/t visy grade, $77/t for amber or flint	To achieve maximum revenue separation is vital
Paper/cardboard	N	Repairs needed to baler at WTS before recycling can continue, currently self drop bins at WTS for cardboard but cardboard goes to landfill, no other collection points	indicative $225/t	Restricting paper and cardboard items to those that can be recycled, minimising contamination
Metals	Y	Separate bunded areas at Tenterfield WTS, Drake WTS, Legume, Liston, Urbenville, Torrington, Dalman for large metal items	indicative $400/t	Collecting smaller metal items, reducing contamination, dealing with refrigerant gases
Plastic	N		Indicative $250/t	Providing separate area for plastics, reducing contamination from non 32ecyclable plastics
Tyres	Y	Collected tyres can be recycled at a cost to TSC	cost ranges from $2.20 to $150 per tyre to dispose	Collecting all disposal revenue for later use in offsetting cost to dispose of tyres
E-Waste	N		cost of transport to recycling facility	providing weather proof location and holding on site until full load received
Green/Organic	Y	Separate bunded areas at Tenterfield WTS, Drake WTS, Legume, Liston, Urbenville, Torrington, Dalman for green waste	cost of mulching by Regen, has resale potential	reducing contamination, making saleable end product
Batteries	Y	Separate collection area at Tent WTS	sold with scrap metal	increasing collection
Gas Bottles	Y	Separate collection area at Tent WTS		holding on site until they can be disposed of
Engine Oil	Y	Separate collection area at Tent WTS	cost neutral	increasing collection
Drums/chemicals	Y	Separate collection area at Tent WTS	cost neutral	DrumMUSTER Program

6.1.3.1 Glass

- Producing glass from recycled material uses 75% less energy than procuring glass from raw materials
- Glass products in Australia use about 40-70% recycled content
- For every tonne of glass recycled there is a saving of 225kg of Greenhouse gasses
- Using recycled materials conserves more than 1.2tonne of raw materials per tonne
- All glass jars and bottles are recyclable including wine, beer, soft drink, jam etc
- Window glass, drinkware, ceramics, light globes, oven proof glass and pyrex are not recyclable with jars and bottles due to the higher melting temperature
- To recycle bottles and jars, lids should be removed and excess content removed. Rinsing and label removal is not necessary
- [source Planet Arc]

6.1.3.2 Paper and Cardboard

Paper and cardboard waste materials which are clean and unsoiled can be recycled and reused. This includes:

- Office paper
- Cardboard
- Envelopes
- Magazines
- Phone books
- Folders
- Reports
- Coloured paper [source: Veolia Environmental Services]
- Using old paper to make new paper uses 30 to 50 percent less energy than making paper from trees.
- Pollution is also reduced by 95 percent when used paper is made into new sheets.
- 40 percent of all waste going to landfills is paper. Cutting down on paper waste will extend the lives of our landfills.
- Newspaper can be recycled into egg cartons, game boards, new newspaper, gift boxes, animal bedding, insulation and packaging material.
- Office paper is recycled into paper towels, tissue paper and toilet paper.
- Corrugated cardboard is created into new cardboard and cereal boxes.[source: green living]

6.1.3.3 Metals

A range of metals can be recycled. These include:

- Aluminium
- Stainless steel
- Iron
- Lead
- Copper
- Brass
- Bronze

- Car Batteries
- Catalytic converters
- Plus some of the rarer metals

6.1.3.4 Plastic

PET and HDPE are the most common items of plastic discarded and also those which are recycleable.

6.1.3.5 Tyres

Tyres can be recycled for re-use in road base and soft fall for playgrounds.

6.1.3.6 E-Waste

Electronic waste is considered to be any household item that plugs into a power point. This waste is likely to be a growing area as consumers and producers head more towards disposable electronic items. Many components within electronic equipment are recyclable. It is reported that in 2007-08, 106000 tonnes (16.8 million units) of televisions, computers and computer products reached the end of their life in Australia, close to 5kg (one unit) per person. This is expected to grow to 181,000 tonnes (44 million units) by 2027-28, a 171% increase. It is estimated that only 10% were recycled, with the remainder sent to landfill.

6.1.3.7 Green/organic Waste

Organic waste included anything that was once alive and can include:

- Paper and paper products
- Food scraps
- Wood and related products
- Animal carcasses and derived products
- All other plant and animal sourced waste
- Biosolids from the Sewerage treatment plant

Organic waste has been identified as being the critical source of environmental impact from the waste sector, principally through the generation of methane as the waste breaks down.

6.2 Contract recycling services

Other Councils in the region have adopted a whole-of –service contract for recycling where a contractor organises a kerbside collection, sorting, freight, and sale of recyclables, and also mans the waste transfer station. The indicative cost for such a service for Tenterfield is around $250,000, a net change in the existing situation of approximately $200,000 (allowing for certain existing operating costs of the transfer station that would no longer be required).

There would be additional costs to include commercial recycling and sorting of waste from Mingoola and Drake collections and an allowance in the order of $50,000 should be made.

7. Long term waste management strategy

7.1 Landfill strategy

Calculation of the costs per rates notice in this section are based around the costs of the Boonoo Boonoo / Tenterfield waste transfer network with an estimated catchment of 3500 notices. The costs of managing other rural landfills is significantly higher on a per rates notice basis and will be incorporated into cost estimates for future revisions of this strategy.

TSC has a significant liability in the remediation of its old landfill at Sunnyside Loop Road and the remediation and proper operation of the current landfill at Boonoo Boonoo. The total cost of the loan funded emergency works, the future remediation works and procuring a new site will be in the order of $8.25M which will need to be debt financed.

The repayments for such a loan amortized over 20 years will be **$566,700 per year**, or **$162/rates notice per year**. This will be in **addition to existing rates for waste**. The details for this calculation are shown in Table 7-1.

Table 7-1 Landfill costs for new landfill site

New Landfill	$5,000,000
Boonoo Boonoo Remediation	$450,000
Sunnyside Remediation	$1,050,000
	$6,500,000

Repayment Schedule – 20 years @ 6%	$566,700
Number of rates notices *	3500
Cost per rates notice	**$162**

* The number of rates notices for this calculation are an estimate of the number falling within the Boonoo Boonoo catchment. Other properties are assumed to be serviced by small rural landfills.

A more cost effective solution

Tenterfield Council has begun negotiation of an alternative to the opening of a new landfill site and the near term closure of Boonoo Boonoo. Under this plan Council starts the process of reopening the Sunnyside Loop Rd Transfer Station (a 2 to 4 year process) during which the Boonoo Boonoo landfill continues to operate by extending previously closed cells and therefore reducing remediation costs by correcting batters and installing caps as part of the new works. Upon reopening Sunnyside Loop, the closure plan for Boonoo Boonoo can be implemented at far lower cost.

Subsequently, the Sunnyside Loop site can be operated in a similar fashion, with extensions to existing cells negating the expensive work of reforming finished batters. The leachate management systems will address existing issues that would still need to be done, but which would otherwise occur without the benefit of production in waste storage.

Table 7-2 Estimate of costs to re-open Sunnyside Loop Rd as landfill

Reopen Sunnyside	
Reopen sunnyside landfill	$1,250,000
Annual contribution to ongoing remediation of existing sites - 20 years * 30000	$600,000
	$1,850,000

Repayment Schedule - 20 years @ 6%	$161,291
Number of rates notices *	3500
Cost per rates notice	**$46**

* The number of rates notices for this calculation are an estimate of the number falling within the Boonoo Boonoo catchment. Other properties are assumed to be serviced by small rural landfills.

It is estimated that the additional costs to the rate to reopen Sunnyside Loop Rd will be in the order of **$46 / rates notice per year**.

This alternative proposal has in-principal support from the EPA and will result in a decreased cost to ratepayers of **$116 / rates notice per year**, or a total of **$4.75M.** There will be further reductions in cost due to operational efficiencies of no longer transporting waste to Boonoo Boonoo.

The downside to the proposal is the return of the landfill to a location closer to town. Thankfully, many of the practices for which this would have been a major issue are no longer practiced, for example landfills are no longer burned or left open. The license requirements for reopening the site will be very strict with requirements for daily cover of waste and odour management. Essentially, the issues which would prevent the reopening of the landfill are manageable and strategies for management would be required by the EPA to grant a license. It will be far easier for Tenterfield to maintain one waste processing site servicing Tenterfield than the two it currently manages.

7.1.1 Short term (next 2 to 4 years) – Reopening of Sunnyside Loop Rd and operation of Boonoo Boonoo

In the short term we will continue to use Boonoo Boonoo landfill. The only alternative is transfer of waste to another Shire. The continuation of landfill at Boonoo Boonoo is the better option as continued operations facilitate cost effective improvement to existing leachate and sedimentation management. This is necessary for identified remediation actions, and transition to the future closure of the landfill. This option also results in far lower vehicle emissions than transfer to other regions.

During this term Tenterfield Shire Council will make preparations for the reopening of the landfill at the Sunnyside Loop Transfer Station. It is anticipated that the requisite steps of procuring the adjacent land and gaining EPA approval can be completed in this time. While waiting for approval to reopen, emergency works at the Sunnyside Loop site will be finalised (only the disposal of tyres remains), and monitoring of the site continued. Other works previously identified in association with the site's closure plan, including correction of landform, removal of the sedimentation basin and batter correction will be completed in the next phase and incorporated in the planning for the reopening of the site. This will enable reallocation of funding to the operations and remediation at Boonoo Boonoo over the short term period.

Continuation of operations at Boonoo Boonoo requires completion of the existing cell 6, which is expected to be at capacity in around April 2013.

Following this, we propose to rebuild the northern walls of existing cells 2 and 3 at manageable grades, addressing existing leachate issues and increasing the capacity. The contents of cells 1-4 will be pushed out to new boundaries which are extended on the southern side, and recompacted further increasing the capacity the existing cells. Upon completion of cell 6, filling operations will commence in these reconfigured cells which can also be raised. This will also allow the correction of the landform necessary in these cells to reduce stormwater infiltration and allow future maintenance. Rebuilding the northern wall allows us to redirect stormwater around the cells as there will no longer be leachate contamination.

The existing cell 5 (the pond) will be remediated during this phase. This will be achieved by constructing a wide channel from the cell towards Dismal Swamp Creek, but leaving a bund preventing the pond from draining. The channel will be revegetated and allowed to establish, after which, the water from the pond will be tested and if complying, released. The pond will be monitored after the release to determine whether any leachate from the adjacent cells is entering the basin. If contamination is identified, the channel can be blocked off until leachate interception can be constructed. Once dry, the leachate collection pipes will be relocated as necessary and the dam walls reshaped to their final profile. Excavated material from the channel will be integrated into the management of cells 2, 3 and 4. Once filled the final cap will be shaped and landfill will continue through a new cell south of Cell 6.

7.1.2 Medium term (up to 7 years)

In the medium term, landfill operations will recommence at the Sunnyside Loop site pending EPA approval. Should this approval not be forthcoming, operations will need to continue at the Boonoo Boonoo site until the long term option is finalised.

In order to reopen the Sunnyside Loop landfill, the reasons for its original closure will be addressed. The most obvious issue with the landfill is space restriction. This will be resolved through the purchase of adjacent land and its dedication as operational land for the purpose of landfill, Sundry issues associated with the original closure such as odour, vermin and air pollution from pit burning are largely addressed by changes in waste management practices and any remaining impacts are only incrementally different to the current issues with the operation of the site as a transfer station. The reopening of Sunnyside Loop will be planned to incorporate the remediation, activities identified in previous reports including stabilisation of batters, site water management and leachate treatment, while establishing a planned, operational landfill. The benefits of the site as a medium term solution compared to the ongoing use of Boonoo Boonoo are;

- Significant reduction in the costs of waste transfer;
- Sunnyside is a far less environmentally sensitive site;
- Access to better soil for infrastructure and cover;
- Reduction in the number of sites to manage;
- efficiencies of scale;
- Integration of remediation and operational activities.

Once the Sunnyside Loop site is reopened, the closure plan for the Boonoo Boonoo site will be enacted, remediation completed and the landfill closed.

7.1.3 Long term

In the event that the Sunnyside Loop option is approved, the long term option will consist of the continuation of the site as a landfill, with all remediation work having been completed.

In the instance that the Sunnyside Loop site is not approved, the long term will commence with the opening of a new approved landfill. It is expected that this process will take up to ten years during which time Boonoo Boonoo will have continued as the operation landfill. If a new site is required, once it becomes operational, the closure plan for the Boonoo Boonoo site will enacted, remediation completed and the landfill closed.

7.2 Recycling

The potential benefit from recycling is the reduction in material committed to landfill. Effective reuse of recyclable products is an obvious environmental benefit, but the case is strengthened if there are also economic benefits.

7.2.1 Economic assessment of recycling

For the cost benefit analysis, we are need to make a number of assumptions;

- Approximately 40% of existing waste can be redirected from landfill;
- That the contract recycling option is used for the purposes of costing as it is the only estimate with a reasonable “whole of service” cost.

While we can pro-rata the costs of cell construction to reflect the reduction in waste, there is not necessarily a direct pro-rata reduction in operational costs. The revised annual cost for the general waste with recycling is in Table 7-3. This corresponds to a $211,000 reduction in annual cost, or 33% of the estimated $644,200.

Table 7-3 Cost for landfill with 40% waste diversion

Cell Construction Cost (0.9 cells/yr)	$148,644
Cell Operational Cost	$113,300
Administration (20% of total 2012/2013 waste admin budget)	$61,600
Landfill establishment contribution	$55,000
Landfill remediation contribution	$55,000
	$433,544

Comparing the cost of recycling of around $200,000, **implementing a recycling programme is expected to be nearly cost neutral** if the right recycling program is implemented, even allowing for an additional service. Incorporating an allowance of $50,000 to deal with management of commercial recycling and other collection points including Drake and Mingoola would result in a slight cost for the implementation of recycling.

This makes no consideration for the likely implementation of the NSW State Waste Management Levy of $41.20/t. In this case the diversion of 40% of landfill waste will result in a reduction of $113,000 of the

$283,662 that would otherwise be paid. **There would be a net benefit in the order of $100,000 in implementing a recycling program when the NSW Waste Management Levy is applied to Tenterfield Shire**.

7.3 Waste transfer

No significant changes are proposed to the principal of collection, sorting and subsequent distribution of waste from centralised transfer stations. This option provides better control of contamination and implementation of user pays systems for waste collection. If the Sunnyside Loop Transfer Station is reopened as a landfill, the principle of receipt at the transfer station will remain the same.

It is expected that the efficient processing of recycling will require some changes to infrastructure at the waste transfer station but these are expected to be relatively minor and mainly targeted at improving the separation of waste streams and the reduction of contamination of recyclables.

In the instance that a contract service is provided for recycling, some efficiency gains may be available through the contract management of the transfer station. It is generally accepted that higher quality segregation of recyclables, and therefore reduced contamination and a better return is available where the net beneficiary is also receiving and sorting the input waste stream.

Any decision regarding the operation of the WTS will be made on the commercial, environmental and community benefits of available options.

7.4 Waste collection

There are few opportunities for efficiency gains to be made in the collection of waste through kerbside collections. Regardless, the market will be tested to ensure that the current solution of Council operated garbage collection is the most effective solution in providing the service. Any decision regarding the kerbside collection service will be made on the commercial, environmental and community benefits of available options.

If Council continues to operate a waste collection service, GPS monitoring of all vehicles similar to that in other Engineering departments will be implemented.

8. Waste management funding

Waste Management is funded from a restricted fund. This means that all funds collected for waste management can only be used for this function, and that the costs of performing the function should be met by revenue collected into the fund.

Many of the previous calculations have focused on rates for the largest landfill system operating between Tenterfield and Boonoo Boonoo. The cost estimates in this section may rely on a pro-rata extension of these costs to the management of small rural landfills. Although small rural landfills incur more cost per user, the significance of these costs will be included in future revisions of this strategy.

8.1 Current Revenue

All of the fees for waste are published in the Council budget but are summarized in Table 8-1.

Table 8-1 Waste revenue budget 2012-2013

Residential waste management charge	$190,700
Rural waste management charge	$260,100
Commercial waste management charge	$20,900
Tip Fees	$52,500
Pensioner Rebate	-$33,750
Total Landfill/WTS Management Income	**$490,450**
Residential Bin Collection	$442,000
Commercial Bin Collection	$64,827
Other Income (Mingoola Skips)	$2,100
Commercial Skip Bins	$164,800
Total Collection Income	**$673,727**
Recycling Income	$60,000
Total	**$1,224,177**

8.2 Costs

The 2012-2013 budget is not suitable for calculating the cost of managing waste in Tenterfield Shire for a number of reasons including;

1. No allowance is made for the long term remediation for the Boonoo Boonoo and Sunnyside Loop Road landfills which is required;
2. No allowance is made for the costs of establishing an alternative landfill to Boonoo Boonoo which the EPA has advised is an unacceptable long term landfill;

3. There has been a $1.25M loan taken out to undertake the emergency works required as a result of EPA cleanup notices and other issues. The cost of this loan will need to be included in the costs of managing waste over the next 10 years.
4. An accurate assessment of the true costs of operating a compliant, licensed landfill has not been made in determining the budget.
5. No consideration has been made for a waste reduction strategy to minimize the likely impact of the introduction of the NSW Waste Management Levy.

As there is no credible baseline for assessing the costs of waste management, we have developed a cost estimate for the waste management function based on a combination of the detailed costing information contained in this report and those elements of the existing budget which are more likely to be accurate.

The cost estimate allows for the introduction of kerbside recycling and sorting of recycled waste at the Tenterfield Waste Transfer Station.

Table 8-2 Estimated sustainable cost of waste management

Total cost of landfill management (assuming 40% diversion) including 20% of administration.	$433,544
Urbenville landfill	$70,000
Cost to operate waste transfer station and provide recycling sorting	$145,000
Tenterfield Waste Transfer Station (no transport - in landfill cost)	$60,000
Drake transfer station (including transport)	$90,000
Total Cost - waste to landfill	**$798,544**
Kerbside recycling service to Tenterfield	$75,000
Additional recycling costs for commercial and remote transfer stations/ remote bin pickups	$50,000
Commercial Waste Collection (Bulk Bins)	$60,300
Domestic and Commercial Wheelie Bin Collection	$135,000
Remote collections - Mingoola and Sandy Hill	$20,000
Greenwaste management	$80,000
Depreciation	$40,000
Commercial bin replacements/repairs	$40,000
Total Cost Collection	**$500,300**
Administration charge (80% of 2012/2013)	$246,400
Total sundry expenses	**$246,400**
Total costs for waste management	**$1,545,244**
Extraordinary Items	
Loan repayment	$162,995

2004 Loan repayment (final)	$7,000
	$169,995
Total costs for waste management (incl extraordinary)	**$1,715,239**

8.3 Financial sustainability of the waste service

In its current form the waste service is financially unsustainable. Additional revenue is required for the service to cover its costs. The total revenue for the service needs would need to increase by $320,000 (26%) to be sustainable in the long term ($71/rates notice), excluding extraordinary items. Unfortunately the situation is actually more severe as there is a long term extraordinary commitment for the recent emergency works as a result of the EPA cleanup notices ($36/rates notice). For the next 10 years, an increase of 40% is required – an additional $491,062 ($107/rates notice). The problem is not a general issue as the waste collection services are close to balanced, the problem lies in the long term neglect and underfunding of the landfills. Nearly all of the additional non-extraordinary costs are attributable to the management of waste and should be distributed across the rate base.

8.4 Budget Recommendations

8.4.1 Significantly increase the waste management charge

The shortfall in waste revenue must be urgently addressed to meet the expectations of regulatory authorities and satisfy our license conditions. As the majority of the costs relate to the management of waste generally, these should be distributed across the ratepayer base through the existing waste management charges. If possible under legislation, an explanatory note should be applied to the waste management charge to identify the component attributable to the repayment of the emergency remediation loan.

8.4.2 Introduce increases to the waste management charge over 2 or 3 years

The service charge increase will have a significant impact on ratepayers. It is important that it is introduced gradually if possible.

8.4.3 Investigate the imposition of penalties for the failure to sort waste

Effective recycling is essential for minimizing landfill and maximising the return from recycling. It is recommended that Council investigate significant fines be implemented to support effective separation of waste streams.

8.4.4 Implement a round of information sessions to support the public display of the Waste Management Strategy

The recommendations of the waste management strategy will be very unpopular. Residents are not familiar with the real costs of managing waste as it has historically been a poorly regulated function of rural Councils where waste was tipped directly at the landfill and buried in unmanaged and unlined cells. Waste was burnt and pest minimisation was minimal.

It is essential that significant effort be made to communicate the underlying issues of waste management.

9. Waste Strategy Implementation

The implementation of the waste strategy is essential for establishing trust with the community and authorities, especially considering the Shire's recent history of non-compliance. While the task of correcting waste management practices is significant and involves some important regulatory planning and improvements in practices, there are many smaller tasks that will have big results in the long term sustainability of the waste service.

9.1 Opportunities for Improvement

In implementing the waste strategy there are a number of large and small considerations that will improve the performance of the waste service;

a. Maintain & improve waste management service delivery;
b. Improve communication with TSC residents, workers, businesses & visitors;
c. Minimise waste generation;
d. Increase diversion of waste from landfill, littering or illegal dumping;
e. Introduce affordable kerbside recycling in key areas;
f. Improve commercial collections including cardboard recycling;
g. Increase recovery & re use of secondary materials eg C&D, greenwaste;
h. Improve links with neighbouring councils' services & regional activities eg NIRW;
i. Improve management of waste from toxic products & materials;
j. Use of incentives and financial instruments to improve waste environmental management performance;
k. Introduce triple bottom line reporting of waste management performances.

9.2 Partnership Opportunities

Tenterfield's geographic spread and diversity provides significant costs and logistical challenges in delivering the same level of waste service across the Shire.

There are opportunities to improve efficiency through linkages with nearby towns from neighbouring shires, both in NSW and across the border into Queensland. These opportunities require further exploration and include:

- Contract sharing
- Equipment sharing
- Links to service provision
- Receipt of services from other councils
- Provision of services to other councils
- Knowledge & improved communications

9.3 Waste Minimisation

Involving the community will be a vital step in achieving waste minimisation objectives. Community involvement and education will encompass the following:

- Approach strategic community groups to be ambassadors for change
- Involve community groups in education programs
- Attract a major sponsor to help share the message
- Involve school groups in education programs
- Encourage people to think about disposal of waste when making shopping choices
- Actively advertise re-use strategies for everyday items
- Assist households in setting up their recycling practices
- Appoint a recycling educator/co-ordinator for a 12 month period to visit transfer stations, households, community groups, schools to offer advice, education and assistance in minimisation, reuse and recycling.
- Have open days at landfill centres
- Open each rural landfill one day per month for collection of recyclables

9.4 Collection Services

9.4.1 Domestic

Township	Recommendation	Partners	Implementation Timeframe		
			2013-2015	2015-2018	2018-2021
Tenterfield Town / Legume / Jennings / Liston	Determine opportunities to link a kerbside general waste collection by neighbouring waste collector	TSC, SDRC, GISSC, waste contractors	→		
	Determine opportunities for kerbside recycling collection in house	TSC, recycling processors	→	→	
	Determine opportunities for kerbside recycling collection by neighbouring waste collector	TSC, SDRC, GISSC, waste contractors, recycling processors	→		
Urbenville	Continue with current weekly service	TSC, KSC, Greelie waste contractors	→	→	→
	Determine opportunities for kerbside recycling collection by neighbouring waste collector	TSC, KSC, Greelie waste contractors, recycling processors	→	→	→
Dalman	No domestic collection, determine if neighbouring council/contractor interested in providing service	TSC, KSC, Greelie waste contractors, recycling processors	→		
Drake / Mingoola / Stannum / Torrington / Tabulum / Sandy Hill	no domestic collection				

9.4.2 Commercial

Township	Recommendation	Partners	Implementation Timeframe		
			2013-2015	2015-2018	2018-2021
Tenterfield Town / Legume / Jennings / Liston	Determine costs/opportunities to improve commercial waste collections in Tenterfield town & Jennings that links to a business waste wise program. Also review need for Legume	TSC, other SC, waste contractors, recycling processors, NIRW	→		
	Determine costs/opportunities to establish a commercial cardboard & other material recycling collection system in Tenterfield town & Jennings that links to a business waste wise program.	TSC, other SC, waste contractors, recycling processors, NIRW	→		
	Promote drop-off recycling options & incentives to local businesses in the Shire targeting specific waste items that can be diverted from landfill. Monitor over time.	TSC, other SC, waste contractors, recycling processors, NIRW	→	→	→
Urbenville	Determine opportunities (with Kyogle) to increase recycling	TSC, KSC, Greelie waste contractors	→		
Dalman / Liston / Drake / Mingoola / Stannum / Torrington / Tabulum / Sandy Hill	No commercial collection				

9.5 Transfer Stations

Township	Recommendation	Partners	Implementation Timeframe		
			2013-2015	2015-2018	2018-2021
Tenterfield Town / Drake / Urbenville	Investigate, determine costs/opportunities to improve recycling in Tenterfield. Investigate inhouse collection and outsourcing.	TSC, other SC, waste contractors, recycling processors, NIRW	→		
	Establish clear bunded areas for disposal of each recyclable source, ensure signage clear and areas visible to staff	TSC	→		
	Rearrange site so that recycling drop off is made easier to the public	TSC	→		
	Provide training to staff to assist staff enforce and encourage proper waste management practices	TSC	→	→	→
	Monitor activity, volumes and diversion rates	TSC	→		
all landfill sites	Investigate providing bins for recyclable separation of waste ie glass, cardboard	TSC	→		
	Increase bunded areas for designated recyclable disposal	TSC, waste contractors	→		
all small collection points	Investigate providing bins for recyclable separation of waste ie glass, cardboard	TSC	→	→	→
	Erect signs advising of closest collection point for other recyclables	TSC	→		
all sites	Increase & standardise signage, increase education and public awareness about recycling options and their availability	TSC	→		

9.6 Disposal

Township	Recommendation	Partners	Implementation Timeframe		
			2013-2015	2015-2018	2018-2021
Boonoo Boonoo	Monitor, measure & implement diversion, education, activities & programs to achieve a 40% reduction in waste	TSC, local businesses, community, tourists etc	→	→	
	Maintain & monitor appropriate litter, cover, water management & volume controls to ensure waste is contained within the cell and doesn't impact upon the surrounding environment	TSC	→	→	→
Legume / Liston	Assess opportunities & costs to provide kerbside garbage & recycling services to Legume & Liston linked to SDRC activities in Stanthorpe & Killarney	TSC	→		
	If feasible, close Liston & Legume for general waste disposal	TSC, SDRC waste contractors	→		
	Provide options for residents to bring bulk separated items ie green, tyres, metal, hazardous to neighbouring councils	TSC	→		
	If above options are not feasible, set up supervised sites such as at Urbenville and Drake with allocated space for bulky items	TSC	→		
Urbenville / Dalman	Liaise with Kyogle Shire regarding opprtunities for inter shire recycling	TSC	→		
	Close Dalman and redirect people to Urbenville	TSC	→		
Mingoola / Stannum / Torrington / Sandy Hill	Monitor activity and volumes, look to special bins in future	TSC	→	→	→

9.7 Human Resources

Recommendation	Partners	Implementation Timeframe		
		2013-2015	2015-2018	2018-2021
It is important that appropriate support & incentives (signage, training, education, public awareness & financial) are provided to all waste employees to ensure maximum waste volumes are diverted from landfill. Site supervisors and collection staff have great potential to deliver the massage for council	TSC, NIRW, businesses, community, recycling processors	→	→	→
Ensure each site is kept in a quality and professional manner. Litter, non contained recyclables eg glass unbunded batteries, oil spills, non flattened cardboard etc are all potential safety hazard & send a conflicting message to the community. Site employees hours (especially Tenterfield WTS) should be extended to outside public access hours to provide uninterrupted time for proper site maintenance.	TSC	→	→	→
Resources must be considered when looking to use private contractors for waste collection or recycling	TSC	→		

9.8 Financial Resources

- Significantly increase the waste management charge;
- Introduce increases to the waste management charge over 2 or 3 years;
- Investigate the imposition of penalties for the failure to sort waste;
- Implement a round of information sessions to support the public display of the Waste Management Strategy.

9.9 Resource Recovery

Recommendation	Partners	Implementation Timeframe		
		2013-2015	2015-2018	2018-2021
Implement kerbside recycling in Tenterfield, Jennings and perhaps Urbenville	TSC, NIRW, neighbouring coucils, waste contractors	→		
Review options for increased recycling at Liston, Legume and Dalman (kerbside or dropoff)	TSC, NIRW, neighbouring coucils, waste contractors	→		
Ensure recycling facilities are available for glass containers, plastic containers, aluminium cans, paper & cardboard, green waste, metals, e-waste, oil, lead batteries and gas cylinders at Tenterfield WTS, Drake, Legume and Urbenville and that these sites are maintained professionally	TSC, NIRW, neighbouring coucils, waste contractors	→	→	→
Ensure bulk areas are provided for green waste, metals and inert waste on a supervised part time basis at Liston & Legume	TSC	→	→	→
Review options to also separate inert waste at Tenterfield WTS ie concrete, bricks etc and determine options for reuse into road base. Refer NIRW EOI for C&D service providers	TSC, NIRW, waste contractors	→	→	
Determine opportunities for setting up mixed bulk plastics recovery eg stretch wrap, ag plastics, containers etc (also refer NIRW on farm plastics program)	TSC, NIRW, neighbouring coucils, waste contractors	→	→	
Review street litter bins & consider public event and public place recycling in select areas that links into domestic &/or commercial infrastructure and collection services.	TSC	→	→	→
The NIRW annual chemical collection campaign is very successful & should be continued	TSC, NIRW	→	→	
Increase promotion of drumMuster to maximise drop-off volumes. Coulc also increase drumMuster services to Urbenville and Drake	TSC, NIRW	→	→	→
Link to other pending NIRW activities ie, engine oil, e-waste, gas cylinder, etc	TSC, NIRW	→	→	
Work with businesses to reduce waste and link in with NIRW C&I business waste reduction toolkit	TSC, NIRW, businesses	→		

9.10 Waste Minimisation

Recommendation	Partners	Implementation Timeframe		
		2013-2015	2015-2018	2018-2021
Promote sustainable purchasing targeting the four key areas of home, work, tourism and council. Encourage change to waste creating behaviours, Provide sustainable purchasing information to the general business community	TSC, NIRW, businesses, community	→	→	
Ensure that TSC has a purchasing policy for Goods, Works and Services with sustainability, reducing environmental harm & waste minimisation key criteria. Demonstrate high levels of purchasing of environmentally preferred products & strengthen contractors commitment to environmentally aligned strategies and actions	TSC, NIRW, businesses, community	→	→	
Continue to develop & implement strategies for improvement in waste reduction & recycling across Councils operations and afilliated sites	TSC, NIRW	→	→	→
Develop an integrated strategy to manage & reduce litter and illegal dumping	TSC, NIRW, businesses, community	→		
Develop business programs linked to activities in the NIRW C&I business waste reduction tool kit. Inspire & support retailers/businesses to use sustainable products and packaging	TSC, NIRW, businesses, community	→	→	
Implement, monitor & promote alternatives to plastic bag use, purchase recycled paper products and other itemsto encourage waste minimisation actions	TSC, NIRW, businesses, community	→	→	
Determine interest in reuse of products within Shire	TSC, NIRW, businesses, community	→	→	
Link above interested individuals & businesses to the NIRW Reuse Directory & Network	TSC, NIRW, businesses, community	→		
Ensure new and renovated commercial properties have capacity to manage their waste in a responsible way, by requiring adequate space and infrastructure for the storage of waste and recycling bins on the premises are a condition of planning permits	TSC, NIRW, businesses, community	→	→	→
Develop waste management construction guidelines linked to Development Approvals & provide incentives that encourage builders & developers to separate materials on construction & demolition sites for reuse, recycling & where applicable, disposal.	TSC, NIRW, businesses, community	→		

9.11 Engagement and Education

Recommendation	Partners	Implementation Timeframe		
		2013-2015	2015-2018	2018-2021
The time is suited to TSC improving its corporate & operational performance linkages to issues such as the environment, climate change & natural resources such as water. A number of key programs & activities ie sustainable purchasing, waste minimisation & recycling, water use etc could then be developed & implemented to create community awareness & behavioural change	TSC, NIRW, businesses, community	→		
TSC should upgrade their web site to include information on climate change, biodiversity, sustainable purchasing, waste and recycling information, activities, publications, link to NIRW, resources and infrastructure	TSC, NIRW, businesses, community	→		
Set-up a TSC program to provide support, incentives, advice etc to local businesses, community groups and residents explaining waste costs and envirnmentally sustainable alternatives.	TSC, NIRW, businesses, community	→		
Engage with local groups/individuals to gauge acceptance and determine opinion	TSC, NIRW, businesses, community	→	→	→
Use & promote NIRW and other potential partnerships as much as possible. This will provide increased resource opportunities - people, costs, equipment, knowledge & demonstrate a shared approach to the community	TSC, NIRW, businesses, community	→	→	→
Attend NIRW meetings regularly	TSC, NIRW	→		
Determine opportunities to link events with promoting waste minimisation and promote & encourage participation in NIRW Waste into Art competition	TSC, NIRW, businesses, community	→		
Participate in future NIRW Landfill operator training	TSC, NIRW	→		
Participate in the annual Waste Conference to get information on lastest trends, technologies and directions in waste management and recycling	TSC	→	→	→
Develop comprehensive awareness program including providing more information in TSC foyer, on web site, regular activites in local paper, engage schools and greater site signage	TSC, NIRW, businesses, community	→	→	
Work with local schools to improve their on-site waste minimisation ie paper use, end of year cleanout by teachers, earthworks, recycling etc	TSC, NIRW, schools	→	→	
Engage with regular site users at drop-off sites to determine needs, issues & identify opportunities & activities that increase waste diversion & reduce environmental, health and safety impacts.	TSC	→		
Utilise the NIRW waste education trailer linked to key events, community and school activities.	TSC, NIRW	→	→	→

Appendix A: Waste Profiles

Visual Profile

A visual volumetric sample audit of Tenterfield Shire Council's domestic and commercial waste truck loads to Boonoo Boonoo landfill was conducted.

A sample (average 6.07m^3) was randomly scooped from each of the following waste streams brought to Boonoo Boonoo for disposal;

- Tenterfield East
- Tenterfield West
- Comercial
- Tenterfield Transfer Station
- Drake Transfer Station

The samples were then sorted by waste type into MGBs or where this was not possible into manageable piles. An estimated volume and photographic observation was then made of each waste type. The charts on the following pages show the estimated volumes from the five waste streams delivered to Boonoo Boonoo landfill.

Table A1: Tenterfield Municipal & Council Collected Commercial Waste to Boonoo Boonoo Landfill (by type & volume)

Waste Type	Percentage
Ewaste	0.07%
Household hazardous	0.28%
All metals	4.13%
All Plastics	30.95%
Glass	2.54%
Wood, Timber, textiles, rubber, oils	6.65%
Organic Compostable	24.62%
Paper and Cardboard	25.53%
Others	5.23%

The audit found the following key points regarding municipal and Council collected commercial waste to Boonoo Boonoo.

- Mixed plastics constituted the largest volume
- Paper products, including cardboard were the next highest group followed by organics.
- Tenterfield Waste Transfer Station receives and separates recyclable metals, cardboard, organics and glass. This therefore explains why mixed plastics constitute a higher volume than paper and organic matter.
- 61.62% of all waste received from these five audited streams was delivered in garbags.

Table A2: West Tenterfield Collected Waste (by type & volume)

Waste Type	Percentage
Ewaste	0.34%
Household hazardous	0.02%
All metals	4.77%
All Plastics	28.76%
Glass	4.07%
Wood, Timber, textiles, rubber, oils	5.70%
Organic Compostable	22.13%
Paper and Cardboard	33.41%
Others	0.80%

The audit found the following key points regarding Tenterfield West domestic collected wastes.

- Paper and cardboard constituted the largest volume at 33.41%, with 12% newsprint and 11% cardboard
- Mixed plastics, were the next highest group at 28.76% with LDPE stretchwrap 8.72% and HDPE containers being 7.93%
- Organic material again made up the third highest category
- 54.7% of all waste received was delivered in garbags

Table A3: East Tenterfield Collected Waste (by type & volume)

Waste Type	Percentage

Ewaste	0.00%
Household hazardous	0.03%
All metals	5.14%
All Plastics	24.18%
Glass	2.72%
Wood, Timber, textiles, rubber, oils	4.99%
Organic Compostable	34.44%
Paper and Cardboard	27.39%
Others	1.11%

The audit found the following key points regarding East Tenterfield domestic collected wastes.

- Organic material made up the highest category at 34.44% with nearly 22% being food and kitchen waste and over 12% being garden waste;
- Paper and cardboard constituted the second largest volume at 27.39%, with 10.4% being cardboard and newsprint under 8%;
- Mixed plastics, were the next highest group at 24.18% with LDPE stretchwrap nearly 12% and PET and HDPE containers collectively 10.25%
- 72.3% of all waste received was delivered in garbags perhaps reinforcing the high level of putrescibles.

Table A4: Tenterfield Commercial Waste Stream (by type & volume)

Waste Type	Percentage
Ewaste	0.00%
Household hazardous	0.89%
All metals	1.70%
All Plastics	23.86%
Glass	2.09%
Wood, Timber, textiles, rubber, oils	11.11%
Organic Compostable	23.87%

Paper and Cardboard	25.33%
Others	11.15%

The audit found the following key points regarding Tenterfield commercial collected wastes.

- Paper and cardboard constituted the largest volume at 25.33%. Surprisingly, with newsprint nearly 10% and cardboard just over 7%;
- Organic material and mixed plastics equally made up the next category with nearly 17% being food and kitchen waste and nearly 10% stretchwrap;
- C&D and C&I type wastes registered at 11.11%
- 60.9% of all waste received was delivered in garbags.

Table A5: Tenterfield Waste Transfer Station (by type & volume)

Waste Type	Percentage
Ewaste	0.10%
Household hazardous	0.19%
All metals	2.88%
All Plastics	45.04%
Glass	1.85%
Wood, Timber, textiles, rubber, oils	2.93%
Organic Compostable	18.09%
Paper and Cardboard	20.17%
Others	8.75%

The audit found the following key points regarding Tenterfield Waste Transfer Station waste.

- Mixed plastics were nearly half the volume with 45.04% with polystyrene being nearly 24% of that volume and stretchwrap over 8%;
- Paper and cardboard were 20.17% with cardboard the largest component at nearly 8%;
- Organic material was 18.09% with 15% being food and kitchen waste;
- Inert wastes made up the major percentage of the Other category being 6.66%
- 53.2% of all waste received was delivered in garbags.

Table A6: Drake Transfer Station Waste Stream (by type & volume)

Waste Type	Percentage
Ewaste	0.00%
Household hazardous	0.00%
All metals	8.00%
All Plastics	37.00%
Glass	2.00%
Wood, Timber, textiles, rubber, oils	9.00%
Organic Compostable	19.00%
Paper and Cardboard	23.00%
Others	2.00%

The audit found the following key points regarding Drake Waste Transfer Station waste.

- Mixed plastics were the highest at 37% - HDPE milk bottles >7% and stretchwrap film >9%;
- Paper and cardboard were 20.17%. Cardboard was the largest component at nearly 10% with newsprint virtually not existent;
- Organic material was 19% with almost all of it being food and kitchen waste;
- Timber and textiles were a reasonably high volume at 9%;
- 60.3% of all waste received was delivered in garbags