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WASTE MANAGEMENT STRATEGY

MARANOA REGIONAL COUNCIL

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EXECUTIVE SUMMARY

Pacific Environment Limited business unit, Waste Solutions Australia (Pacific Environment), was commissioned by Maranoa Regional Council (MRC) to undertake the drafting of a Waste Management Strategy (WMS). Under the new Draft Queensland Waste Avoidance and Resource Productivity Strategy 2014-2024 (DQWARPS (2014-2024)), this is now referred to as a Waste Reduction and Recycling Plan (WRRP). Throughout this document, the reference to a WRRP will be used.

This WMS satisfies MRC's statutory obligations under the *Waste Reduction and Recycling Act 2011* for a WRRP, which must be periodically updated. This plan will assist the Maranoa community to make the transition from 2014 to 2024 to a more sustainable waste management approach consistent with the region's development profile. While there are a number of workers camps for the oil and gas industry within the region at present, many of these are scaling back from construction phase to production and maintenance phases, with a subsequent short term increase in waste generated, particularly Construction and Demolition (C&D) waste, being deposited at local landfills. This C&D waste is expected to then decrease substantially in the near future. The numbers of persons employed within these camps is also expected to decrease and many of these persons, not having residential addresses within the region, are not included in the population statistics for the region. These workers are often referred to as fly in – fly out (FIFO) and drive in – drive out (DIDO) workers.

The management of waste is a rapidly changing regulatory environment in Queensland, with a high expectation that MRC will manage more of its waste streams as secondary resources. This regulatory regime will use new economic instruments and associated legislative requirements to promote waste minimisation in all sectors of the community. Despite behavioural changes that residents may make, investing in additional MRC infrastructure will also be required to make significant gains in recovering secondary resources and meeting regulatory compliance in managing hazardous wastes. The Queensland legislation may lead to cost increases for all waste generators unless waste diversion performance is improved.

MRC must provide effective policies and waste education to engage the community in relation to the importance of changing current behaviour, to mitigate the financial exposure of all stakeholders should growth in waste generation continue. MRC will also need to continue with its established partnerships with local community groups and businesses, waste industry service and technology providers and other local governments. The Maranoa region will benefit from participation in relevant forums, including the formation of a Regional Organisation of Councils (ROC), to develop the best mix of local and regional infrastructure to support the diversion of waste from landfill.

The WRRP has considered a variety of strategic options and concluded that several key elements are essential to achieve the necessary changes to make future waste management sustainable. To fully integrate this program with MRC's corporate and community plans a range of strategies are required:

- Seek to reduce per capita waste generation by increasing waste diversion and recycling in appropriate stages to work towards state objectives and targets;
- Development of integrated waste collection and recycling contracts for the region;
- Tailor solutions to the needs of each local community, including collection services, upgrading facilities and the improved management of local waste facilities;
- Provision of the most practical resource recovery infrastructure to service the Maranoa region;
- Develop an efficient regional bulk transfer capacity to allow centralised disposal of residual materials;
- Development of local reuse options for appropriate diverted materials; and
- Development of regional partnerships for sharing essential long term waste treatment and disposal infrastructure where possible.

Feedback was sought via a workshop with Council members conducted on 21 October 2014. This WRRP is intended to be released to the public for additional comment following the presentation of the draft WRRP to Council and prior to the formal adoption of the WRRP by MRC. A series of feedback consultations will be undertaken at that time leading to the finalisation of the WRRP.

To initially assess the capacity of several strategic options to deliver such outcomes, preliminary financial modelling over the first 20 year period of the WRRP was undertaken. It confirmed that the most suitable long term option, based on a 20 year net present value (NPV), is the scenario described as Scenario 2.

This scenario includes:

- The development of amalgamated waste and recycling contracts utilising a two bin system within Roma and drop off recycling collection points across the remaining Maranoa region;
- Delivery of a limited range of household recyclable materials to a local Materials Recovery Facility (MRF) located at the Roma landfill;
- Delivery of all the household waste to a single, efficiently managed regional landfill located at Roma;
- Investigate provision to reserve a new landfill facility located within the MRC region and future development of the landfill facility;
- Phased upgrading of the rural bin sites and landfills to transfer stations with closure of the landfills, These sites are to be retained and converted to appropriately sized transfer stations to continue to service the region;
- Institute supervision of the new transfer stations and compaction of the loads to achieve a high level of waste density for bulk waste transfers and reduce servicing frequencies;
- Implementing technologies such as a pit burner, glass crusher and construction and demolition (C&D) sorting, and re-instatement of the tip shop at the Roma landfill;
- Minor upgrading of the Roma landfill to use bulk haul bins for transferring waste to the landfill cells, reorganisation of the recycling drop-off areas; and
- Continuing the green waste diversion, mulching and composting arrangement for the diversion of organic matter from landfill. This arrangement should be reviewed at regular intervals to ensure that performance and value for money are being achieved.

The above steps would be complemented by an education campaign and source separation initiatives at the household and business level to divert recyclables from the bulk waste stream. It has been assumed that all of the strategic options modelled are compatible with any regional treatment and disposal facilities that may become available in the longer term.

It is anticipated that the bulk transfer infrastructure proposed will allow MRC to participate in suitable regional alternative waste technology initiatives in future. MRC will however retain the choice to use any one or more facility destinations, as deemed most appropriate for bulked waste in the future. Also, it is important to the local community, in employment and resource availability terms, that local processing and markets are part of the overall waste management solution. Merely exporting materials to a large private sector facility elsewhere is not consistent with the MRC's broader objectives.

While a refuse derived fuel use is proposed for the hygienic disposal of dead animals, it is noted that no other large scale alternative waste technology such as a waste to energy facility will be feasible to meet the short term needs of MRC, due to the due diligence, planning approvals and construction lead times required. Any alternative treatment option would be even more complex in a regional negotiating environment.

The WRRP describes a number of supporting policies that are able to positively influence the outcomes of this plan. These include the litter strategy, sustainable procurement plan and the review of specifications to allow recycled materials to be more widely used in the Council Works Program. In addition, the wider use of planning powers to condition the requirement for waste management plans for major developments and community events is proposed.

The WRRP outlines strategic action items in four program areas as follows:

- Waste minimisation;
- Resource recovery;
- Facility upgrades; and
- Residual disposal.

The above programs are strongly aligned with the new National Waste Policy (2009) and Queensland's *Waste Reduction and Recycling Act 2011*. MRC will also accommodate any new end of life recovery of televisions, computers and tyres in accordance with roll-out of NWP initiatives in Extended Producer Responsibility (EPR), Stewart Smith, (2005) and the Australian Packaging Covenant (2010). While energy recovery has been evaluated at the present time as being an unsuitable option, it should be continuously monitored as this industry grows and develops new products.

These programs will help MRC to improve its overall diversion rate performance over the 20 year period. The overall expenditure associated with the WRRP is not significant over the next 20 years, at over $9.098M, and leads to overall community benefits. This is slightly greater than the Business As Usual (BAU) case estimated as $7.7M. In the future, MRC is likely to be required to have greater transparency in full cost pricing for its waste services. Given the resulting cost recovery pressures expected, MRC should consider using a mixture of users pays fees such as gate fees, rates and a local government levy to cover such costs.

Specifically, it is recommended that MRC use gate fees as one of their appropriate price signals to the community and the business supply chain concerning sustainable outcomes through waste minimisation, and to encourage source separation and local resource utilisation. Those voluntarily opting into such schemes can be provided incentives to do so in this pricing environment. This measure reduces the use of flat rates that may send limited behavioural signals to the community and allows for a gradual transition to the level of pricing anticipated for future regional infrastructure facilities. It has been noted that the Roma landfill already uses gate fees and a weighbridge; however the outlying waste facilities have no gate fee applied as they have been unsupervised in the past. The full cost accounting approach is consistent with that being applied in a number of other sectors and is supported by the Draft Queensland Waste Avoidance and Resource Productivity Strategy 2014-2024.

It is proposed that MRC generally continue to use external contractors for its waste management services with a single contractor for the entire region. However, the implementation of Scenario 2 will include separable portions of the contract and the possibility of MRC itself tendering for any day labour or waste/recycling activities that it may be capable of carrying out in a cost effective manner. These could include the collection of recyclables, operation of the recyclables MRF and/or C&D MRF and the bulk transfer of waste collected at the regions transfer stations to the regional landfill facility.

Key target dates for the roll-out of this WRRP are as follows:

- Implementing a schedule for the conversion of the rural bin sites at the commencement of the WRRP in 2015;
- Regional waste and recycling collection contract commencing 1 July 2016;
- Upgrades to the Roma landfill to be completed by the end of the financial year 2015/16, including the bin transfer station, recycling MRF, C&D MRF and inclusion of a tip shop;
- Minor transfer station upgrades to be completed by the end of 2020;
- Roll out of the two bin system to all ratepayers of Roma at the commencement of the new collection contract in 2016; and
- Selection of a reserve landfill site before 2016 with zoning passed to protect the site for future development.

It is recommended that:

- MRC tenders a waste collection contract for the entire region with separable portions that individuals, businesses or MRC may bid for, commencing at the expiry of the current contracts. The new contract should include provision for educational activities and regular waste auditing at set intervals;
- MRC considers the use of gate fees as one of their appropriate price signals to the community and the business supply chain concerning sustainable outcomes through waste minimisation, and to encourage source separation and local resource utilisation;
- Upgraded sites should be gated and manned with opening times negotiated with the local community and these sites should be locked outside of the set opening times;
- All sites should be set up as per a standardised design that provides for the drop-off of regulated waste materials and separated recyclable materials;
- An appropriately sized MRF for a range of high value recyclable materials, and a basic C&D sorting area be set up and operated at the Roma landfill site. C&D materials recovery should be considered as a condition of development application approval for major development works within the region;
- A full cost recovery model for waste services be implemented using a combination of gate fees, rates and a local government levy;
- MRC should apply for a licence to operate a pit burner at the Roma landfill facility for the disposal of dead animals, seek quotes for an appropriate sized pit burner and glass crusher and consider the contracting of a mobile tyre shredder for local reuse of these materials. MRC

should also maintain a watching brief on potential future Alternative Waste Technologies (AWT's) suitable for the region;

- A waste education campaign be included in the MRC waste reduction measures for homes and encourages the business sector to adopt 'EcoBiz' or similar programs for the reduction of commercial and industrial waste streams; and
- MRC carry out a round of public consultation on the future of the regions waste and recycling collection, reuse and disposal options.

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List of Acronyms/Abbreviations	
ABS	Australian Bureau of Statistics
ACCC	Australian Competition and Consumer Commission
AEP	Annual Exceedance Probability
ALOA	Australian Landfill Owners Association
APC	Australian Packaging Covenant
AWT	Alternative Waste technology
BAU	Business As Usual
C&D	Construction and Demolition waste
C&I	Commercial and Industrial waste
CTR	Carbon Tax Repeal
DCCEE	Department of Climate Change and Energy Efficiency
DEC	Department of Environment and Conservation
EfW	Energy from Waste
EHP	Department of Environment & Heritage
EIS	Environmental Impact Statement
EP Act	*Environmental Protection Act 1994*
EP Reg	Environmental Protection Regulation
EPR	Extended Producer Responsibility
ERA	Environmentally Relevant Activity
GHG	Greenhouse Gas
HDPE	High Density Polyethylene
IBC	Intermediate Bulk Containers
KPI's	Key Performance Indicators
MRC	Maranoa Regional Council
MRET	Mandatory Renewable Energy Target
MRF	Materials Recovery Facility
MSW	Municipal Solid Waste
NGERS	National Greenhouse and Energy Reporting System
NPC	National Packaging Covenant
NPV	Net Present Value
NWP	National Waste Policy
ORER	Office of the Renewable Energy Regulator
PET	Polyethylene Terephthalate
PIFU	Planning Information Forecasting Unit
QDRRA	Queensland Disaster Relief and Recovery Arrangements
RBS	Rural Bin Sites
RECS	Renewable Energy Certificates
ROC	Regional Organisation of Councils
RORO	Roll On Roll Off
RWMS	Regional Waste Management Strategy
RRF	Resource Recovery Forum
SEQ	South East Queensland
WMP	Waste Management Plan
WMS	Waste Management Strategy
WRR Act	Waste Reduction and Recycling Act 2011
WRRP	Waste Reduction and Recycling Plan

1 INTRODUCTION

Pacific Environment Limited business unit, Waste Solutions Australia (Pacific Environment), was commissioned by Maranoa Regional Council (MRC) to undertake the drafting of a new strategy for the delivery of waste services within the region. The best possible cost effective outcomes for residents and the environment were assessed by the strategy team, in consideration of the remote location of the council, existing industries, population distribution/growth and the infrastructure available within the region.

1.1 Background

Pacific Environment (formally Waste Solutions Australia Pty Ltd) was commissioned to develop a Regional Waste Management Strategy (RWMS) for the Maranoa region. This title has subsequently changed to a WRRP due to the introduction of new legislation. Under the *Waste Reduction and Recycling Act 2011* (WRR Act), each local government is required to have a WRRP in place. Since the formation of the MRC in March 2008 (named Roma Regional Council until July 2009) from the former shires of Bendemere, Booringa, Bungil and Warroo and the Town of Roma, the different waste management facilities, collection contracts and recycling operations that existed prior to the merger require assessment in order to design a WRRP that encompasses the needs of all areas and consolidates the existing systems in an efficient, cost effective manner.

1.2 Objective

The objective of this investigation is to compile a WRRP tailored for the MRC. In order to draft this strategy, Pacific Environment carried out a review of relevant legislation and regulations, an assessment of the facilities, collection contracts, waste streams, costs, projected waste tonnages and viable alternative waste technologies based on the current population and future population growth. Based on these findings and stakeholder feedback, the waste management options best suited to MRC were financially modelled and reviewed by MRC. MRC selected the most suitable option for detailed financial modelling. A WRRP was developed from all of the information assessed and the input of MRC.

The WRRP includes recommendations for immediate actions and both short term (10 year), medium term (20 year) and long term (50 year) planning objectives, although it is recognised that 50 year term planning may be inaccurate due to the variability of government policy, available waste and resource recovery technologies and regional growth.

The introduction of the WRRP will establish consistent waste management policies and practices throughout the region via revised waste contracts, agreements and co-operative arrangements which provide incentives to minimise the environmental, economic and social impacts of MRC's waste management activities. Alongside this is waste awareness education for the public and business managers in order to effect change that reduces waste to landfill while increasing recycling (household, commercial and industrial and construction and demolition) throughout the region. A monitoring and feedback system is incorporated into the WRRP review to gauge the effectiveness of the waste reduction efforts against Key Performance Indicators (KPI's) and change the focus of the awareness campaign where necessary.

1.3 Scope of Work

The consultancy brief supplied by MRC contained the following tasks, but is not confined to:

1. A review of the statutory requirements (both state and federal) including proposed state and federal legislation such as the Queensland waste levy and carbon tax and their implications for MRC;
2. Review of the current facilities and practices;
3. Visual waste stream analysis for verification of the current waste stream makeup and projected waste volumes. This is also to take into account the Draft South East Queensland Regional Plan (2009) and MRC's Draft Planning Scheme.
4. Strategy options are to be developed for suitable waste collection and disposal arrangements and recycling collection across the region;
5. Assess scenarios via whole of life financial analysis including a comparison with the current business as usual (BAU) costing and the consideration of volunteer labour verses day/contract

labour, community expectations, public/private partnerships, build/own/operate scenarios and funding opportunities from state and federal governments;

6. Other relevant issues, such as litter, odour, methane and carbon dioxide emissions;
7. Put forward a comprehensive and integrated set of recommendations with a preferred scenario or scenarios for waste management approaches in the regional area; and
8. Provide an implementation plan including cash flows for the preferred option.

2 REGULATORY FRAMEWORK REVIEW

A range of guidelines, regulations and acts apply to the management of waste materials in Queensland. The following is a summary of the relevant sections as they apply to the MRC WRRP. The relevant regulations and acts should be reviewed on an on-going basis for changes.

- Environmental Protection Act 1994
- Environmental Protection (Waste Management) Regulation 2008
- Guideline – Landfill siting, design, operation and rehabilitation 2013
- Waste Reduction and Recycling Act 2011
- Queensland Waste and Recycling Strategy, 2010-2020 (repealed)
- Draft Queensland Waste Avoidance and Resource Productivity Strategy (2014 – 2024)
- National Waste Policy Framework 2009
- Clean Energy Act 2011 (repealed)
- Clean Energy Act 2011 (Carbon Tax Repeal Bill 2013)
- National Environmental Protection Measure (used packaging materials) (repealed)
- Australian Packaging Covenant 2010, and
- Mandatory Renewable Energy Targets (currently under review)

2.1 *Environmental Protection Act 1994* (QLD)

This legislation has been reprinted (3 February 2012) and is in force. The *Environmental Protection Act 1994* (EP Act) is the primary legislation that controls waste management in Queensland. Additional strategic frameworks are provided through:

- The *Environmental Protection (Waste Management) Policy 2000*; and
- The *Environmental Protection (Waste Management) Regulation 2000*.

The aims of the EP Act and subordinate legislation are to clarify waste management practices and achieve the coordinated implementation of waste management across Queensland in a consistent manner. This is expected to lead to improved environmental outcomes.

Under the EP Act, waste storage, treatment or disposal, that is "storing, treating, reprocessing or disposal of regulated waste (other than at the place where it is generated), including operating a nightsoil disposal site or sewage treatment plant where the site or plant has a design capacity that is more than the equivalent of 50,000 persons having sludge drying beds or on-site disposal facilities" is defined as a Notifiable Activity.

The object of the EP Act is to protect Queensland's environment while allowing for development that improves the total quality of life, both now and in the future, in a way that maintains the ecological processes on which life depends (ecologically sustainable development).

2.2 *Environmental Protection (Waste Management) Regulation 2008*

The *Environmental Protection (Waste Management) Regulation 2008* is made under the EP Act and commenced on 1 January 2009 and was updated in August 2014. The regulation covers Environmental Impact Statements (EIS), Environmentally Relevant Activities (ERA's) and regulatory requirements. In addition, the regulation also addresses matters relating to environmental management and environmental offences which includes regulated waste and contaminated land.

The *Environmental Protection (Waste Management) Regulation 2008* also includes a chapter on the National Pollutant Inventory, which has the purpose of giving effect to, and enforcing compliance with

the National Environment Protection (National Pollutant Inventory) Measure 1998 (the NPI NEPM). The regulation defines reporting periods, reporting requirements and reporting thresholds.

The regulations administration chapter details matters devolved to local government, which includes "waste incineration and thermal treatment for incinerating waste vegetation, clean paper or cardboard."

MRC must ensure that a resolution has been carried for the declaration of a waste collection area. This is especially relevant if changes are to be made to ratepayer charges and the provision of services such as the provision of recycling services.

2.3 Guideline—Landfill siting, design, operation and rehabilitation - Version: 2, State of Queensland 2013

The *Guideline – Landfill siting, design, operation and rehabilitation* is applicable to the development of new landfill sites; however most of the criteria identified in this guideline are applicable to the best practice use of existing sites. The following criteria are taken, in part, from the guideline. The MRC landfill sites should be reviewed against these criteria to determine if they are appropriately managed. Note that bin/transfer stations and recycling facilities are not included in these guidelines and other specific criteria should be used for those sites.

The aspects that MRC require to be considered when screening for candidate landfill sites include:

1. Site layout
2. Landfilling methodology
3. Groundwater
4. Surface waters
5. Buffer distances
6. Encroachment
7. Geological setting
8. Flora and fauna protection.

2.3.1 Site Layout

The landfill and associated facilities should be designed to:

- Minimise potential environmental impacts;
- Minimise health and safety risks for landfill operators and the public;
- Encourage recycling in accordance with the waste management hierarchy; and
- Make the most efficient use of resources on site.

Where required, a transfer station with recycling and drop-off areas should be provided so that the public has no need to unload their vehicles at the tipping area. This reduces the mixing of both private and commercial vehicles at the tipping face thereby minimising safety risks to the public. Other infrastructure such as a weighbridge, manned gatehouse, surveillance systems and other aids for the safe access to the site are noted as being desirable.

2.3.2 Landfilling Methodology

An important aspect of screening for potential landfill sites is the type of landfilling operations to be developed. Some methods of landfilling include:

- Area method, where an existing hole such as a former quarry is filled;
- Trench-and-fill method, where a hole is dug and backfilled with waste using the excavated material as cover;
- Mound method, where most of the landfill is located above the natural ground level;
- Valley or change of topography fill method, where a natural depression is filled; and
- Bioreactor landfill (with or without energy recovery).

The most appropriate landfill methodology for a region will be determined based on local conditions and factors and these will be identified in the early stages of the site risk assessment process.

There are a range of proven engineering solutions that currently exist to overcome environmental issues and there is experience to show they can work. It is the job of the landfill designer to satisfactorily

demonstrate to the department that the proposed design will afford an acceptable level of environmental protection.

2.3.3 Groundwater

A preferred site for a landfill is one that minimises the risk of groundwater pollution by providing a natural, unsaturated attenuation layer beneath the liner for contaminants that may leach through it. This means that sites with naturally attenuating soils, such as those in clayey areas, are preferred to those that do not have such soils, such as in sandy areas.

Regardless of the location, landfills should only be sited in areas where the potential impacts on groundwater have been properly assessed. Part of this assessment process involves development of a hydrogeological risk assessment. The outcomes from the hydrogeological risk assessment are expected to outline the potential risks to the groundwater and the engineering controls that will provide protection of the groundwater.

This may include (but is not limited to) the following:

- Required separation from groundwater and attenuation layer;
- Groundwater recovery system;
- Containment barrier design; and
- Design and management practices to protect groundwater quality.

2.3.4 Surface Waters

Since leachate can be toxic to aquatic organisms and cause eutrophication (nutrient enrichment of a water body) in the waterways, it must be managed so that it cannot escape to surface waters. The distance a landfill is required to be from surface waters should be based on the outcome of a risk assessment.

Where landfills are within the 1% annual exceedance probability (AEP) floodplain, additional engineering and management controls must be in place to ensure that the facility will be protected from flooding, erosion by floodwaters and infiltration from perched water table. The controls should not cause adverse increases to upstream flood heights.

2.3.5 Buffer Distances

A risk assessment for the site should be undertaken to determine the appropriate buffer distances. This risk assessment should demonstrate that the environment will be protected and the amenity of the sensitive areas will not be adversely affected, based on the design or operational control measures proposed.

Some indicative buffer distances are listed below:

- 100 metres (m) from surface waters and the '100 year flood plain';
- 500 m from a noise, dust or odour sensitive place;
- 100 m from an unstable area;
- 1,500 m from an aerodrome for piston-engine propeller-driven aircraft; and
- 3,000 m from an aerodrome for jet aircraft.

Buffers are measured from the sensitive land use or impacted environmental value, to the edge of the closest cell. All cells, including closed cells, need to be considered in calculating buffers. For sites where there is uncertainty in the location of landfill cells, the boundary of the landfill site is the point of measurement.

2.3.6 Encroachment

Where the adopted buffer distance for a site has been, or is proposed to be, encroached, either by the site owner/operator or surrounding developments, the site risk assessment should be reviewed. Where additional design and management practices are identified through the risk assessment as being required to provide the same level of protection to sensitive land uses, these should be implemented.

For landfills with an anticipated lifespan exceeding 10 years, an analysis should be conducted of the anticipated changes in the zoning or land use of the surrounding area during the life of the facility.

Guidance on future land use intentions can often be found in the municipal strategic planning statement prepared by the local municipality (i.e. MRC's Draft Planning Scheme).

2.3.7 Geological Setting

Landfills should be constructed in areas where the landform is stable or engineering assistance can provide stability, thereby enabling the long term integrity of the landfill liner and cap system. An initial desktop hydrogeological risk assessment and stability risk assessment, together with local knowledge, should quickly identify at the initial site screening stage, the likelihood of any geological issues being present at the locality, including but not limited to:

- Seismic zones;
- Mines;
- Shafts;
- Bores;
- Fractured geology;
- Site geological considerations; and
- Acid sulfate soils.

In addition, the siting of landfills at former coal mines introduces the hazard of spontaneous combustion and underground fires.

2.3.8 Flora and Fauna Protection

Development of landfills may have an adverse impact on the flora and fauna of the local area. In particular, landfilling should not be carried out in:

- Protected areas or areas identified under conservation plans and critical habitats, whether or not special management considerations and protection are required, under the *Nature Conservation Act 1992*
- Areas where landfilling is likely to have a significant impact on threatened species and ecological communities as identified in the *Environment Protection and Biodiversity Conservation Act 1999*, except with the approval of the Commonwealth Environment Minister.

A survey of the site and collection of comprehensive baseline environmental data are essential steps in the assessment of potential impacts from proposed landfilling operations. The nature and extent of this data should be site-specific, taking into account the size of the proposed operation and the risks posed to adjacent, sensitive areas. An expert in the field should be consulted for an assessment of potential impacts from scavenger birds or predatory animals.

2.4 *Waste Reduction and Recycling Act 2011*

The key provisions of the WRR Act (WRR 2011) include:

- A waste disposal levy on industry waste sent to landfill (levy set to $0);
- A requirement for Queensland Government agencies and local governments to prepare waste management plans;
- Introduction of product stewardship arrangements for any waste products that are identified as a growing problem for landfill in the future (electronic waste or e-waste products); and
- Strengthened litter and illegal dumping offences, including public reporting of vehicle-related littering offences.

The WRR (2011) states, in part, that a local government must adopt a waste reduction and recycling plan for its local government area. It must, where reasonably practicable, include the following.

Waste reduction and recycling targets for:

- Waste generated by the local government in carrying out its activities;
- Waste generated by households in the local government's area; and
- Other waste generated in the local government's area other than by the local government.

Actions to be taken to improve waste reduction and recycling of:

- Waste generated by the local government in carrying out its activities;

- Waste generated by households in the local government's area;
- Other waste generated in the local government's area other than by the local government (i.e. construction and demolition (C&D) initiatives under the planning assessment process);
- Details of current and proposed waste infrastructure;
- The management and monitoring of the local government's performance under the plans;
- Information about achieving continuous improvement in waste management; and
- Other matters prescribed under a regulation about the requirements for a local government's waste reduction and recycling plans.

The waste reduction and recycling plan must regard:

- Current and predicted information about population profiles, residential, commercial and industrial development and waste generation types;
- The services, markets and facilities relevant to dealing with the different types and amounts of waste; and
- The waste management hierarchy and principles.

The WRRP must be reviewed every three years. Before adoption of a new WRRP or making a significant amendment to the plan, consultation with the public, especially households and businesses, must be undertaken with the comment period being at least 28 days.

There is also a duty to report on waste and recycling management annually. The report must include details of recycling activities, waste to energy facilities and waste disposed of to landfill. This report must address waste generated both within and outside of the local government's area.

Under the section on the objectives of the WRR Act, there is a reference to community involvement in waste management; this may include the provision of public place recycling facilities and major events recycling facilities. Public recycling facilities would contribute towards the reduction of littering and continuous improvement. MRC may also engage with community groups to provide support for community driven initiatives.

The WRR Act also contains exemptions for disaster management waste. This is defined as meaning waste generated by or because of a disaster that is or has been the subject of a declaration of a disaster situation under the *Disaster Management Act 2003*, but only within the limits, if any, declared by the chief executive by gazette notice for a particular disaster.

2.5 Queensland Waste and Recycling Strategy, 2010-2020 (repealed, to be replaced by the new industry led strategy)

The Queensland Waste and Recycling Strategy 2010-2020 (QWRS 2010-2020) contained strong anti-dumping and anti-littering enforcement measures. There was a special exemption for the landfill disposal of asbestos products waste to continue to encourage the safe disposal of these materials. However, contaminated soil is not exempt from the levy in order to encourage (via the pricing mechanism) the on-site remediation of contaminated soil where possible.

The details of the strategy revolved around:

- Best waste management practice services;
- Waste and resource recovery programs, infrastructure improvement (AWT's) and market development;
- Landfill levy;
- Strong Council advocacy;
- Educational and awareness material;
- Regional contracting and service delivery; and
- Green purchasing of goods and services.

2.6 Draft Queensland Waste Avoidance and Resource Productivity Strategy (2014 – 2024)

The Queensland Government has set targets that it intends to meet via the implementation of the new industry led Draft Queensland Waste Avoidance and Resource Productivity Strategy 2014-2024 (DQWARPS (2014-2024)). The Queensland Government issued the draft of this strategic plan for

comment in late 2012, to guide the next ten years of waste and resources management in Queensland. The strategy was scheduled to be finalised in late 2014 although due to a change of state government, this has not yet occurred. It is anticipated that the strategy will be retained by the new state government.

The broad goals are consistent with the National Waste Policy, and the objectives are:

1. Driving cultural change related to waste;
2. Avoidance and minimisation of waste;
3. Reuse, recovery and recycling of waste materials (including energy recovery) to optimise economic benefit; and
4. Management, treatment and disposal of waste to reduce the impact on human health and the environment.

The policy approach is based on five key principles:

- Protecting human health and the environment to secure our future prosperity;
- Sharing responsibility for avoiding unnecessary consumption and improving resource management;
- Recognising the economic, environmental and social costs of waste generation and disposal;
- Recognition of regional differences and opportunities; and
- Full lifecycle management of resources.

The 10 year plan is underpinned by the waste management hierarchy (re-defined since the Environmental Protection Plan was issued in 2000). Refer to Section 2, Figure 4 of the DQWARPS (2014-2024). Disposal of waste to landfill is the lowest priority and should only be carried out if there is no other viable alternative.

2.6.1 Targets

The priority targets listed include:

- Reduce waste to landfill by increasing recycling rates for both metropolitan and regional centres;
- Increase the recovery and recycling of materials from commercial and industrial waste and construction and demolition waste streams; and
- Reduce the per capita generation of waste.

The general targets nominated are more fully defined in Table 1 below.

Table 1. Draft Queensland State Targets (DQWARPS 2014-2024)

Waste Stream	Measure	2012-13 Recovery Baseline	2024 target
Municipal solid waste (domestic)	Improved recycling rate	37% metropolitan 30% regional centres 33% state	55% metropolitan 45% regional centre 50% state
Commercial and industrial waste	Improved recycling rate	42% state	55% state
Construction and demolition waste	Improved recycling rate	61% state	80% state
Reduce generation of waste	Reduction in per capita generation	1.9 tonnes general waste per person per year	Reduce by 5% to 1.8 tonnes per person per year

2.7 National Waste Policy Framework 2009

The Commonwealth has developed and adopted a framework for a National Waste Policy 2009 (NWP 2009). The policy was agreed and signed by all Australian Environment Ministers in November 2009. This policy is intended to re-structure the waste management sector and is a key driver for future planning. Therefore, its specific goals are reflected in this report. While recycling has advanced considerably

over the years, waste generation has increased by 31% to 43.8 million tonnes over the period from 2002-03 to 2006-07. Hazardous waste (as defined under the Basel Convention) has doubled from 0.64 million tonnes to 1.19 million tonnes over the period 2002-03 to 2006-07. Both now appear to have stabilised.

A key principle of the NWP 2009 is the promotion of partnerships between various stakeholders, with each taking responsibility for their own waste minimisation. A new Australian Packaging Covenant (2009) is also proposed to further strengthen packaging recycling. The NWP includes EPR proposed for end-of-life televisions and computers to contribute to e-waste management needs. Initiatives under the scheme are expected to be rolled out by industry in 2012, extending to regional areas by the end of 2013. MRC may seek to provide safe storage facilities to support this EPR initiative as it develops.

The aims of the NWP are to:

- Avoid the generation of waste; reduce the amount of waste (including hazardous waste) for disposal;
- Manage waste as a resource;
- Ensure that waste treatment, disposal, recovery and re-use is undertaken in a safe, scientific and environmentally sound manner; and
- Contribute to the reduction in greenhouse gas (GHG) emissions, energy conservation and production, water efficiency and the productivity of the land.

The NWP establishes a comprehensive work program for national coordinated action on waste across six key areas:

- Reducing hazard and risk;
- Tailoring solutions;
- Providing the evidence;
- Taking responsibility;
- Improving the market; and
- Pursuing sustainability.

2.8 Clean Energy Act 2011

The Clean Energy Act 2011 (CE Act 2011) was repealed on 17 July 2014 by the Carbon Tax Repeal Bill 2013, which is discussed below.

Under the original Clean Energy Act a carbon tax is to be levied on approximately 150 waste management facilities from the 1 July 2012. These facilities generate GHG emissions primarily in the form of methane gas measured as carbon dioxide equivalent (CO^2-e). For the purpose of calculating landfill gas liability, a designated large landfill facility is defined as having total covered emissions, legacy emissions and exempt emissions of 25,000 tonnes or more in a single year. In addition, emissions will be generated from fuel usage for transportation, operation of heavy equipment and energy usage. The financial year beginning on 1 July 2011 is an eligible financial year.

Annual reporting for GHG emissions for corporations that emit over the 25KT CO^2-e is already required under National Greenhouse and Energy Reporting System (NGERS) and will soon apply to municipalities. NGERS submittals are also subject to audits by the Department of Environment. In addition, organisations are required to undertake energy efficiency audits. Furthermore, proposed policies and legislation will increase the requirements pertaining to reducing GHG emissions, which will increase operating costs. The impact of the Government's plan on industry is expected to include:

- Increased investment in management of landfill gas including costs for infrastructure, measurement and administration;
- Costs payable on GHG emissions from landfill sites;
- Higher gate fees payable to third party disposal sites;
- Higher costs of fuel for off-road use; and
- Higher costs of energy due to the tax on power generators as well as the potential for subsidised investment in renewables.

Unresolved problems with the scheme include:

- There are still uncertainties around the current measurement of emissions;
- Uncertainty with the future price of carbon, and;
- Uncertainly associated the future emissions of methane from landfill sites as methane generation can continue for 30 or more years.

Some values for future scenarios are presented in Table 2 below.

Table 2. Various Future Cost Scenarios (CE Act 2011)

Example: For one tonne of MSW landfilled in a wet temperate zone in 2012/13

Year	Emissions (tonnes CO_2-e)	Carbon Price ($/tonne CO_2-e)	Carbon Permit Cost ($/tonne waste)
2012/13	0	23	0
2013/14	0.1376	24	3.28
2014/15	0.1187	25	2.98
Balance	0.9335	15 to 40	14.00-37.34
Total	1.190	17.02 to 36.63	20.26-43.60

2.9 *Clean Energy Act 2011* (Carbon Tax Repeal Bill 2013)

The Carbon Tax Repeal Bill 2013 (CTRB 2011) was part of a package of seven bills to remove the carbon pricing mechanism. The bill:

- repeals the six Acts which established the carbon pricing mechanism;
- amends 13 Acts to make amendments consequent on the repeals; and
- enables the payment and future enforcement of carbon tax liabilities for the 2012-13 and 2013-14 financial years;

It also amends the *Competition and Consumer Act 2010* to:

- prohibit carbon tax-related price exploitation and false or misleading representations about the carbon tax repeal, and provide the Australian Competition and Consumer Commission (ACCC)with additional price monitoring powers in relation to the repeal;
- remove the conservation tillage tax offset in the *Clean Energy (Consequential Amendments) Act 2011* and *Income Tax Assessment Act 1997*; and
- change the future funding for the Australian Renewable Energy Agency in the *Australian Renewable Energy Agency Act 2011*; and
- repeals the *Steel Transformation Plan Act 2011* completely to cease carbon tax-related assistance to steel industry businesses.

2.10 National Environmental Protection Measure (used packaging materials)

This federal legislation applies to used packaging material and has been rescinded in 2011 with relevant provisions included in the WRR (2011). Changes to the EP Act (1994) and sub-ordinate policies and regulations have been made to support this separate waste legislation.

2.11 Australian Packaging Covenant 2010

The Australian Packaging Covenant 2010 (APC 2010) builds on the lessons learned from the first National Packaging Covenant (NPC). The NPC contained mainly aspirational targets with little or no penalties or enforcement of its voluntary membership. Improvements made under the NPC were mainly centred on light-weighting of packaging materials, a process some argued that industry would have made in the course of normal operations. Reporting of waste diversion by some NPC members has been criticised for lacking accountability to verify the full extent achieved.

The NPC (now APC) has funded research into littering and waste avoidance programs. A current round of funding is open at the time of writing. These include public place recycling initiatives, school education kits and mobile education trailers / vehicles. The APC (2010) has made some funds available directly to Councils and other organisations for infrastructure projects e.g. public place recycling bin caps, signage and educational materials. These activities are seen to assist local governments in their efforts to create waste awareness among residents. The APC (2010) has strengthened the requirements of the participating members to meet the aims of the covenant.

2.12 Mandatory Renewable Energy Targets (currently under review)

Renewable energy generation in Australia is managed under several pieces of supporting legislation and regulations. These cover large scale and small scale renewable energy generation projects. The legislation has been amended several times to reflect the Federal Governments intentions to achieve greater renewable energy generation, most notably:

- The mandatory Renewable Energy Target Review (2006);
- Expansion of the Renewable Energy Target (2009); and
- Delivery of the enhanced Renewable Energy Target (2010).

The latest legislation amendment *Delivery of the enhanced Renewable Energy Target (2010)* has been passed to establish medium term Mandatory Renewable Energy Targets (MRETS) for Australia. This requires 20% of Australia's energy generation to come from green or renewable energy sources by 2020. As such, this provides some certainty to investors in renewable energy projects up to 2020. This is expected to impact the rate of technology implementation in the resource and energy recovery sectors. MRC could benefit from greater infrastructure choice in the future as a result of the availability of Renewable Energy Certificates (RECS) for certain Energy from Waste (EfW) projects.

Previously the Office of the Renewable Energy Regulator (ORER) administered the legislation and regulations pertaining to renewable energy. However in April 2011 the ORER became amalgamated into the Clean Energy Regulator and the responsibilities of the Renewable Energy Regulator transferred to the statutory role of the Clean Energy Regulator. The Clean Energy Regulator will also administer and enforce:

- The Carbon Pricing Mechanism (to be replaced by the Emissions Reduction Fund);
- The National Greenhouse and Energy Reporting System; and
- The Carbon Farming Initiative (to be replaced by the Emissions Reduction Fund).

Under the current Federal Government, the MRET scheme may be replaced by a 'Direct Action Plan' which uses an Emissions Reduction Fund for the reduction of carbon emissions. Legacy wastes (deposited prior to 2012) are not expected to be included under the ERF. The various programs and initiatives that the Emissions Reduction Fund would include:

- Bio-sequestration of carbon in soils;
- Forestry measures;
- Waste coal mine gas capture;
- Landfill gas mitigation measures (flaring, bio-filters, Phytocaps);
- Green buildings and energy efficiency;
- 1 million roofs solar energy rebate; and
- Green house friendly program.

3 CURRENT WASTE MANAGEMENT FACILITIES

3.1 Regional Overviews

The MRC is centred in Roma and includes waste management facilities located in the outlying towns of Injune to the north, Surat to the south, Wallumbilla, Yuleba and Jackson to the east and Mungallala, Mitchell, Amby, Muckadilla to the west, which comprise a significant number of waste management assets. The following breakdown is explored under the headings below.

Landfills:

- Roma landfill (major facility);
- Injune landfill;
- Surat landfill;
- Mitchell landfill;
- Yuleba landfill;
- Wallumbilla landfill; and
- Jackson Landfill.

Rural bin sites:

- Mungallala;
- Amby; and
- Muckadilla.

3.2 Landfills

There is one major landfill and six minor landfills within the Maranoa region. The Roma landfill is the major facility and Roma itself contains the majority of the region's population.

3.2.1 Roma Landfill

The Roma landfill facility is located on End Short Street, approximately 2.8 km to the north east of the central business district of Roma. This facility is manned by MRC staff for landfill operations and gatehouse and recycling services. The site is fenced and the gate is locked after hours. The site is fitted with a weighbridge. A deep groundwater bore has been installed at the site and the water is in the process of being connected to the facilities at the site. An organics recycling company, Nugrow, which has recently commenced composting operations at the northern end of the site is also using water from this supply. Most of the green waste delivered to the site is being processed by this composting facility as a trial. The composting operation will be advertised for tender in the future.

The landfill cells at the Roma facility do not appear to be fitted with leachate collection systems, although the latest cell developed for MSW has a compacted clay impermeable base. Falling head tests were conducted across the base by Pacific Environment to verify the effectiveness of the compaction treatment. Generally, the dry conditions in this region mitigate against the development of leachate.

The Roma landfill accepts municipal solid waste (household), C&D and commercial and industrial (C&I) waste materials from both commercial operators and the public. There is a dedicated asbestos cell and a dedicated arsenic and carbonated filters cell. Some waste material is delivered from the oil and gas industry camps in the near area. In addition, dead cattle are delivered to the landfill from the local cattle sale yards and there is a burial area reserved for dead animals. A large quantity of untreated timber pallets is delivered to the site; these are usually landfilled due to contamination by metal scrap making them unsuitable for shredding. The Roma landfill previously operated a limited range of recycling services, which included the bailing of waste cardboard, although this has been discontinued. The recycling area is located within the site, to the north of the gatehouse. Rejected material from recycling activities was disposed of in the landfill cells. In the recent past (2013), there was a fire in the builder's waste cell of the site.

There are a series of drop-off points past the entry to the landfill where regulated waste (oil and filters, tyres, lead acid batteries) and recyclable materials (including reusable items, green waste and bulk steel) may be deposited prior to accessing the landfill cell. The Roma landfill facility includes a large open shed, which will be used to house machinery and a fenced compound, both to the north of the gatehouse. There are some roofed structures and concrete slabs already present within the fenced compound. In the future this fenced area is intended to be converted to a tip shop for the sale of any reusable items dropped off at the landfill. A large drum muster cage is present next to the open shed. Recently, MRC's dog pound has been relocated to an area adjacent to the sealed car park to the south of the gatehouse and weighbridge.

After the floods in Roma in 2012, clayey soil was excavated from one area within the Roma landfill site and from a large reserved area immediately to the north of the landfill site for the construction of levy banks to protect the residential areas of the town. This has left several large voids which will be utilised as waste cells. A new putrescible waste landfill cell is currently being developed from one of these voids in the south west corner of the site. Land has also been reserved to the north of the present landfilling operations and the expected remaining life for landfilling activities is greater than 30 years, even if the site is developed as a regional facility.

Further general comments are:

- The site layout is considered adequate although at present, not ideal. MRC landfill operator Tony Dixon has indicated that plans are already being developed for the transfer of household waste to the tip face via skip bins to prevent public access to the tip face and a drive through circuit for the drop off of recyclables is also planned. Separate cells are present for various waste streams and hazardous materials are collected and processed separately to the regular waste;
- Landfilling methodology is via lifts with compaction and soil cover applied; however, MRC has only a single compactor unit and this has required maintenance at times. Optimal waste density may not be achieved as a measuring system to gauge compaction is not employed at the landfill, other than landform surveys;

- Groundwater monitoring is carried out at the site. However, during the majority of the scheduled monitoring events, the monitoring wells have been dry. This may be due to both dry climatic conditions and the clayey nature of the soil limiting moisture infiltration to the deeper sandy layers;
- The Bungil Creek is the nearest surface water body, located approximately 200 m down gradient to the west of the landfill. Any surface water runoff therefore has the potential to contaminate the creek and must be controlled within the site;
- Buffer distances – exist on most sides of the landfill, with the river to the west, a flood prone area to the south, land owned by MRC to the north and rural properties to the east. It may be prudent to ensure the rural residential zoning of the land to the east is maintained as this represents the greatest potential threat to the buffer zones;
- Encroachment – only likely from the east for the reasons stated above. Zoning controls should be sufficient to preserve the landfill site;
- The geological setting – unknown; and
- The local flora and fauna protection – unknown.

3.2.2 Injune Landfill

The Injune landfill facility is located on Womblebank Gap Road, approximately 2 km to the north west of the town of Injune. The site is fenced but has no gate or weighbridge and is unmanned. The site is usually attended by a MRC employee once per day with a backhoe to push the waste into the large trench type cell. The entry road leads past drop off points for scrap metal, tyres, concrete, oil and filters. There is also a drum collection cage on the site for drum muster collections. A green waste drop off area was not evident. At the northern end of the site there are two liquid waste pits both containing liquid, although one pit appears to be disused. A new large landfill trench has been excavated just to the north of, and parallel to the existing cell. Spoil from the trench has been built up between the old cell and the new cell and provides sufficient material for covering the waste.

The current cell has an open end at the lower side of the site (the south west end) where the floor of the cell is approximately level with the neighbouring land. Surface water runoff would be expected to flow from the site across this land as there is no interception device installed. A three strand barbed wire fence separates the site from this land. Minimal off site litter was observed, potentially due to the alignment of the trenches in an approximately south-west to north-east direction mitigating against the prevailing wind directions. This current cell has a limited life remaining; however the cell has taken more than seven years to fill to this point. The new cell was observed to be retaining water.

MRC maintains a fenced compound on this site where unused concrete pipe is stored and some waste concrete material originating from MRC footpath replacement works has been deposited. The compound has a locked gate. Domestic wheelie bin waste is collected by a local contractor and brought to this site for disposal. The loads are dumped on a levelled area near the tip face, and then pushed over the tip face into the large trench by the backhoe operator; minimal compaction is achieved by this method. The tip face is also accessed by residents and businesses for the disposal of self-haul waste items.

There is evidence of past fires at this site. It also appears that the waste oil collection hut has been fired upon from the evidence of holes in the side wall. Several empty 205L waste oil drums were left outside the waste oil collection hut. These are most likely from a commercial operation and the contents would have been emptied into the waste oil collection tank. Most drums dropped at the drum muster cage are not the correct type with many 20L engine oil drums deposited. Staining was observed on the ground within the cage. While there is a tyre drop off area, many tyres were observed to have been deposited in the waste cell, with a large number of these being from trucks or buses. Additionally, C&I waste, bailed cardboard and many beer cans and bottles were deposited at the landfill. One pile contained vehicle parts, most likely from a vehicle repair workshop. The concrete drop off point was poorly organised with some contamination by scrap metals and plastics and recyclable materials deposited haphazardly over a large area.

Further general comments are:

- Site layout is not ideal with a non-circular path for the drop off of regulated waste and recyclable materials. The full range of regulated waste is not catered for with informal drop-off of some items. There is a lack of signage;

- Landfilling methodology – large trench style with cover pushed from one end as the trench fills. Poor compaction, regulated items in the trench, poor litter control but minor litter off site;
- Groundwater – no groundwater monitoring was evident;
- Surface waters - minor creek approximately 300 m to the south west and down gradient from the site;
- Buffer distances – adequate, greater than 800 m to nearest rural residence;
- Encroachment – unlikely for the foreseeable life of the site;
- Geological setting – unknown; and
- Flora and fauna protection – unknown.

3.2.3 Surat Landfill

Surat landfill is a large trench style landfill located off Silver Springs Road, approximately 2.5 km to the south east of the town of Surat. The landfill facility is fenced but is not manned and has no weighbridge. At the time of the site visit, the current trench excavation was still smouldering due to a recent fire event and some combustible materials had been stockpiled away from the trench to mitigate against the fire flaring up again. The site has drop-off locations for metals, concrete, green waste, tyres and lead acid batteries. Some old telephone poles were also present and these are thought to have come from a commercial source. Although composed of timber, these poles are treated and are not suitable for recycling into mulch, even if the mulching machine was able to accept material of this size.

It was noted that the site drains naturally to the south east and this area of the site contained the scrap metals collection area. It has been proposed to relocate the scrap metals area and construct a surface water capture pond in this corner of the site as part of future works.

Further general comments are:

- Site layout is reasonable with a circular path for vehicle flow, some drop-off areas for a limited range of materials, poor signage;
- Landfilling methodology – large trench style pit, waste deposited directly into the trench and covered, regulated materials observed in the trench;
- Groundwater – no groundwater monitoring, site is on a slight incline;
- Surface waters – small creek approximately 575 m to the south west of the site;
- Buffer distances – adequate buffer distances exist for the foreseeable life of the site;
- Encroachment – unlikely for the life of the site;
- Geological setting – unknown; and
- Flora and fauna protection – unknown.

3.2.4 Mitchell Landfill

The Mitchell landfill site is located on a turn off from the Mitchell – St George Road, approximately 2 km to the south west of the town of Mitchell, with its northern boundary approximately 100 m south of the Maranoa River. This facility is manned part time and is not equipped with a weighbridge. The Mitchell site utilises a large trench style of waste disposal cells. There does not appear to be any form of leachate drainage from the cells; however, the dry climate limits the generation of leachate at this site. The current trench excavation partially intersected a former fill zone and waste materials are visible in the spoil stockpile adjacent to the trench and wall of the trench. A hook bin drop off point has been constructed within the site from an old steel shipping container; however, a hook bin collection and cartage contract is not in place and this facility is not currently used.

The local waste collection contractor deposits collected wheelie bin waste directly into the landfill trench and members of the public are also allowed to deposit waste materials directly into the disposal trench. There are a range of drop off points for recyclable and reusable materials (including bulk metals and green waste) and regulated waste items (waste oil, filters, batteries, tyres). Some compaction is applied to the deposited materials in the trench. C&I waste materials are usually placed into the landfill, however some C&D materials are deposited separately for recycling. Concrete is stockpiled separately to this C&D material to await sufficient volume for cost effective recycling.

There is room to extend the landfilling operations within the site with a proposed new cell to be located to the west of the current cell. However, there may be issues with a sub-surface sand layer, nearby

creek and potential for surface water flow/flooding. Expansion beyond the current site boundary has not been approved by the Department of Natural Resources and Mines.

Further general comments are:

- Site layout includes a circular path for vehicles that passes various drop-off areas for recyclable and regulated materials. Large trench style pit for waste materials, minor amount of regulated materials observed in trench;
- Landfilling methodology - large trench style pit, high proportion of plastic materials in waste, poor compaction of waste was evident;
- Groundwater – no groundwater monitoring evident;
- Surface waters – the Maranoa River is approximately 100 m to the north and down gradient of the site with a fall of approximately 10 m over this distance;
- Buffer distances – the nearest rural residence is approximately 250 m to the south of the site, little other development in the immediate area. This appears adequate for the foreseeable future;
- Encroachment – unlikely to occur due to rural and commercial/industrial nature of the surrounding area;
- Geological setting – unknown; and
- Flora and fauna protection – unknown.

3.2.5 Yuleba Landfill

The Yuleba landfill facility is located approximately 1.75 km to the south of the town of Yuleba. The site is unmanned and surrounded by a three strand barbed wire fence, but has no gate. This site utilises a trench style landfill for mainly self-haul locally sourced material. Some C&I and C&D waste is also delivered. A driveway allows for the drop-off of a limited range of recyclables, green waste, concrete, tyres, metals and a drum muster cage. Many of the drums left inside the drum muster cage appear to be for oil products, which are not collected by drum muster. There appears to be hydrocarbon staining on the ground in several locations within the cage.

Litter is a severe problem on this site with a significant amount of windblown litter beyond the fence on the adjoining property. Several drums of waste oil were deposited in an open area at the time of the site visit, and many loads of soil have been stockpiled. These stockpiles are said to have originated from recent highway maintenance works. Although there is a tyre stockpile area, there were several scrap tyres at the waste deposit face and pit, along with white goods that could have been left in the scrap metals stockpile and oil and paint drums (unknown volume of contents), which, if empty, could also have been recycled.

Water has pooled in the pit (there is no drainage system fitted) and appears not to readily infiltrate the base, although it is not desirable that water be present in a waste landfill cell due to accelerated decomposition of the waste taking place under wet conditions. This leads to the generation of landfill gas and odour issues. MRC intends to construct a bund wall along the edge of the site adjacent to the current pit for better surface water control.

Further general comments are:

- Site layout is poor with a non-circular road. Areas are present for the drop-off of some regulated waste and recyclable items. A drum muster cage is present but is not correctly used and is sited at the rear of the site. Litter issues were identified at this site;
- Landfilling methodology - a large open trench pit. Water was observed within the trench and regulated waste items were also present in the trench. Materials are pushed and covered at intervals;
- Groundwater – no groundwater monitoring evident;
- Surface waters - creeks are located approximately 550 m to the east and 500 m to the west of the site, the land is mainly flat with a slight fall to the east;
- Buffer distances - the nearest residential properties are approximately 750 m to the north of the site, this seems adequate for the foreseeable future of the site;

- Encroachment – unlikely owing to the rural nature of the surrounding land;
- Geological setting – unknown; and
- Flora and fauna protection – unknown.

3.2.6 Wallumbilla Landfill

The Wallumbilla landfill is located approximately 1.5 km to the north east of Wallumbilla. The site is surrounded by a three strand barbed wire fence but has no gate and is unmanned. The site has an excavated waste area that is being filled in lifts, with the current lift still having some way to go. The end of the pit contains water although some diversion bunds are in place on the site. There is a road system for accessing various drop-off points for scrap metals, tyres, green waste and concrete and a drum muster cage is present.

The drum muster cage was locked at the time of the site visit and many drums have been deposited on the ground in front of the cage. While the majority appear to be farm chemical drums, some are for machine oil products. In addition, several 1,000L Intermediate Bulk Containers (IBC) have been dropped off for recycling, however some of these containers were not cleaned beforehand. Contamination of the scrap metals stockpile was observed, mainly by plastics and timber, with some fibro sheeting present as well.

Windblown litter is a problem at this site with a large amount of mainly plastic litter in the adjoining property to the south. A plastic bag was observed hanging on the fence next to the highway over 500 m to the south of the site. There was also evidence a fire had been on the site.

Further general comments are:

- Site layout uses a non-circular path to several different drop-off areas, some recyclable materials and regulated wastes are collected. A large drum muster cage is present. The site uses a large trench type pit which contained pooled water and regulated waste items were identified in the waste face;
- Landfilling methodology – pushing waste into a large trench type pit and covering at intervals. Little compaction is achieved and only a couple of lifts would be able to be carried out;
- Groundwater – no groundwater monitoring evident;
- Surface waters - a creek passes approximately 35 m to the north of the site, the area is mainly flat;
- Buffer distances - the nearest rural residence is approximately 230 m to the north of the site. Due to the rural nature of the surrounding area, this should be sufficient;
- Encroachment – unlikely for the foreseeable future of the site;
- Geological setting – unknown; and
- Flora and fauna protection – unknown.

3.2.7 Jackson Landfill

Jackson landfill is located approximately 0.9 km to the south east of the town of Jackson off Pei Road. The site is fenced with a three strand barbed wire fence but has no gate and is unmanned. The site has a loop road for the drop off of recyclable items such as tyres, green waste, metals and concrete. It has a trench type waste deposit area accessible to the public. Recent information received by MRC indicated that the boundary with the adjacent cemetery may be inaccurate.

There was a high level of contamination observed within the green waste pile during the site visit, mainly plastics, metals and an old TV. The metals stockpile also contained some plastic contamination and a car battery had been deposited nearby although there was no signage to indicate that batteries were collected at this site. Many metal objects had been deposited in the waste trench. At least two areas contained concrete mixed with soil mounds, while additional soil mounds were located at either end of the trench ready for use as cover. In general the site was untidy with undefined deposit areas and mixed material deposited in various locations.

The trench seemed to contain a large amount of household waste, despite the wheelie bin collection service that deposits household waste at the Roma landfill.

Further general comments are:

- Site layout has a circular road that passes drop-off areas for a limited range of recyclable and regulated materials. Signage was poor and some materials were mixed. Some litter was observed;
- Landfilling methodology – large open trench type pit, material is deposited directly into the trench and covered at intervals;
- Groundwater – no groundwater monitoring evident;
- Surface waters – approximately 220 m to the south east of the site a gully runs from a dam, the land is almost flat around the site. A small dam is located approximately 120 m directly south of the site;
- Buffer distances - the nearest residential property is located approximately 650 m to the north west of the site, this distance is expected to be adequate;
- Encroachment - owning to the rural nature of the surrounding land, no encroachment is expected during the foreseeable future of the site;
- Geological setting – unknown; and
- Flora and fauna protection – unknown.

3.2.8 Rural Bin Sites

Within the MRC area there are three rural bin sites (RBS): Mungallala, Amby and Muckadilla

1. *Mungallala*

The Mungallala bin site has three front lift bins outside the fence; however bulky objects are deposited on the ground at a de-facto waste face inside the fence and beside the bins. This issue may be compounded by having a small opening on the top of the bin lid while the lid itself is locked down, making it impossible to place bulky objects in the front lift bins. Some regulated waste was observed, tyres, filters, oil containers and a large amount of fibro sheet fragments that may be composed of bonded asbestos. There was a clear area where waste concrete (with a large proportion of soil mixed in) was being deposited and another separate signed area for green waste. A load of old telephone poles had also been deposited in one area within the site.

The site generally lacked clear signage, is fenced with a 1.8 m chain wire fence topped with three strands of barbed wire but has no gate. It is open at all times and unmanned. Materials are being deposited across the site, mainly within the fenced area, but without good separation of the material types. The green waste had considerable contamination present at the time of the inspection visit.

When the site becomes too untidy, the waste is pushed up into a stockpile and when sufficient volume is present, the waste is removed to Roma landfill by MRC's infrastructure services department. These clean-up activities are carried out approximately three to four times per year. Otherwise the front lift bins are emptied weekly and the waste landfilled at Mitchell.

2. *Amby*

The Amby site has three front lift bins of approximately 3 m^3 each placed inside a fenced area. These bins were only ~20% full at the time of the inspection visit; however waste materials had been deposited on the edge of an earth embankment inside the fence. There was a lot of C&D waste present including regulated waste (tyres and a drum of grease) and some electronic components. Many air filters, metal parts and drive belts from heavy equipment were also present and were identified from their packaging as originating from a nearby quarry. Waste concrete was piled around the base of a tree and a separate green waste area was present. Both the concrete and green waste areas contained contamination. No scrap metals collection area was evident.

The site lacked clear signage and is fenced with a 1.8 m chain wire fence topped with three strands of barbed wire but has no gate. It is open at all times and unmanned. There was evidence of fires in the past.

3. *Muckadilla*

The Muckadilla site has four front lift bins of approximately 5 m^3 each placed inside a double fenced enclosure. The inner and outer fences cross over at the site entry point, so that the mesh fence is the outer at the entry and the inner for the remainder of the enclosure. The inner fence consists of a 1.8 m chain wire fence topped with three strands of barbed wire, while the outer fence is constructed of

colourbond sheet metal. There is a gate fitted to both the mesh fence and colourbond fence. From 1st December 2014, this has become a locked facility with keys being provided to residents within a 10 km radius of Muckadilla. The community requested this change.

Limited signage within the enclosure indicates where various types of materials should be deposited and in general this is the cleanest of the three RBS. This may be due to the local club taking ownership of managing the facility and the close knit nature of the small community, plus locking the gates at night. However, there was some evidence of materials being placed in the incorrect locations and tyres and concrete were observed in the metals pile. There are drop off points for green waste and scrap metals, however a timber drop off is also occurring (without signage) and some materials are left on the ground beside the front lift bins.

3.2.9 RBS Summary

The RBS are all unmanned sites. The sites have either three or four front lift skip bins of 3 to 5 m^3 capacity. All sites have fencing or an enclosure; however most do not have any method of securing the site. Although provided primarily for the use of rural residents for self-haul of domestic waste materials, there was evidence of some C&I and C&D waste materials being deposited at RBS. At these RBS, there is provision for only green waste, scrap metals, scrap tyres and concrete to be recycled. It is suspected that minor quantities of regulated waste may be deposited in the landfill via the unsupervised bins.

In general, there is contamination entering the green waste stockpiles, mainly through lack of proper separation of the materials due to the absence of a site supervisor to monitor the delivered material. The exception to this is the RBS located at Muckadilla, where a local community club manages the site.

MRC has been faced with increased clean-up costs to maintain these sites due to the nature of their use, with large items being deposited on the ground beside the bins or dumped at a de-facto waste face. This issue may be compounded by having (in some cases) a small opening on the top of the bin cover while the main large lid is locked down making impossible to place bulky objects in the front lift bins. Despite this, at most sites the bins seemed well utilised and therefore the material on the ground may indicate an under-capacity of the current bin volumes. Contamination of the recycling piles is also an issue.

4 CURRENT COLLECTION SERVICES

Currently the waste and recycling systems at the various population centres within MRC are still operating as independent services with different contracts, methods and levels of service. One of the goals of this WRRP is to propose the amalgamation of services for both waste and recycling collection (where viable) across all areas of MRC and in the process gain an improved level of service for all ratepayers. This should be achieved at the best possible economical rate for the community and businesses.

4.1 Roma

Municipal solid waste (MSW) is collected in Roma, Hodgeson and Muckadilla by a contractor using a 240L wheelie bin system and delivered to the Roma landfill located at End Short Street. The landfill site is bounded by Bungil Creek on the western side, a flood prone plain to the south, End Short Street to the east with some rural residential properties east of the road and undeveloped farmland uphill to the north. The collection contract also includes some C&I waste collected via the 240L wheelie bins provided to some businesses. Separate cells exist for MSW and C&D materials at the landfill; however, C&I materials are often landfilled with the MSW. The Roma landfill is manned, gated, opened for regular hours each day and is fitted with a weighbridge. There are drop-off areas for scrap metals, green waste, waste oil and filters, lead acid batteries, a drum muster cage and waste concrete.

A household recycling service in Roma was carried out using a crate collection system. Sorting of recyclable items collected in this manner was carried out at a small MRF located in buildings at the Roma landfill. This collection and sorting system was discontinued due to a lack of markets for recovered materials.

C&D waste materials are usually delivered by contractors and private companies to the Roma landfill and landfilled separate to the MSW. Currently there is no separation carried out, with the exception of drop-off areas for concrete, green waste, metals and regulated wastes. All remaining materials are placed into the landfill cells. There is an opportunity for MRC to impose waste minimisation conditions

on developers under the new waste regulation. Consultation with MRC's development assessment team would be warranted to determine how to implement such a policy.

4.2 Mitchell, Amby, Mungallala, Muckadilla (western area)

MSW is collected within the Mitchell, Amby, Mungallala and Muckadilla areas by a local contractor using a 240L wheelie bin system and is brought to the Mitchell waste management facility where it is landfilled. Private individuals and companies are also able to deposit waste materials at the Mitchell landfill facility. Drop off areas are provided for regulated waste materials (tyres, lead acid batteries, oil and filters) and salvageable/recyclable materials (concrete, metals, green waste). The site is manned on a part time basis but is also open at times when it is unattended. The site is nearing the end of its landfilling life, although there are areas of additional land nearby that may be utilised for landfilling in the future.

C&D and C&I materials are delivered to the landfill site at Mitchell. There is no sorting facility, other than the provided recycling/salvageable items areas and drop off areas for regulated waste materials, concrete and green waste stockpiling.

4.3 Injune

A local contractor collects household waste and some commercial waste in 240L wheelie bins within the Injune area and delivers the waste to the Injune landfill facility. The Injune site is not manned or gated and C&D, C&I and self-haul waste materials are delivered to the facility. The Injune facility has a significant amount of life remaining due to the excavation of a new cell in the recent past. The expected time required to fill this cell is between five and ten years, although the current cell is not yet completely filled at this time. There is no provision for leachate drainage from the cells; however, the dry climate limits the generation of leachate.

There are drop off areas for recyclable materials (concrete, scrap metal), regulated waste items (tyres, batteries, oil and filters) and other waste materials for landfilling. There is a separate pit for the disposal of liquid waste (grease trap and other oily water), with a second, disused pit for the same purpose sited nearby. The disused pit has not been decommissioned. A drum muster cage is present, however many of the drums within this enclosure did not comply with drum muster requirements at the time of inspection.

4.4 Surat

A local contractor collects the household waste and some commercial waste using a 240L wheelie bin system within the Surat area and delivers it to the Surat landfill facility. This is an uncontrolled site consisting of an entry circuit past areas for the drop-off of recyclable materials (concrete, scrap metals, soil and green waste) as well as regulated waste (tyres, batteries). Disposal of all other wastes is via a large pit type trench. The waste in the face of the pit was smouldering at the time of the site visit and some combustible materials were being stockpiled to the side of the trench in order to limit the potential for a flare up of the fire. It was unclear as to how often this site is serviced.

A large quantity of old timber telephone poles had been delivered to the site; these poles are treated timber and are not suitable for many reuses. There appeared to be an issue with wind-blown litter at this site at the time of the site inspection. Surface water was also ponding at the green waste collection area and this was due to be remedied in the near future by relocating the green waste collection area and installing a detention basin in this area of the site. The green waste pile was contaminated with scrap tyres, metals and plastics at the time of the site inspection.

4.5 Wallumbilla, Yuleba and Jackson (eastern area)

Household waste is collected by a local contractor and bought back to the Roma landfill. Each town retains a landfill facility for local use; the facilities are described below in more detail. None of these sites are manned or locked at any time.

The ***Wallumbilla landfill*** site is a large trench style landfill with drop-off areas for scrap metal, green waste, tyres, concrete and soil. There is a drum muster cage present which has a mesh top cover fitted and was closed and locked at the time of the site inspection. Since the drum muster cage was secured, drums have been deposited on the ground around the cage, including several 1,000L Intermediate Bulk Containers, not all containers appear to have been washed out; there was some

staining of the ground observed in the drum area. Items were generally well divided at this site with little regulated material observed in the waste face.

The ***Yuleba landfill*** site is a large trench type landfill with drop-off areas for the deposition of recyclable and regulated waste materials. Areas are available for green waste, metals, scrap tyres, concrete and soil. A drum muster cage is present, but most of the drums that were deposited within the cage area were of an inappropriate type, many contained waste oil. There was a lot of staining observed on the ground in this area. Despite the driveway requiring persons to pass the drop off points prior to arriving at the tip face, many items of regulated waste were still present in the trench.

The ***Jackson landfill*** site is adjacent to the cemetery to the south west of Jackson and utilises a medium size trench for landfilling waste material. The site has drop-off areas for green waste, scrap metals, soil and concrete. A tyre area is also present although this is not an official collection point. The waste trench was almost filled to capacity at the time of the site inspection, although there appeared to be very minor litter issues.

4.6 Rural Bin Sites

RBS are located at Mungallala, Amby and Muckadilla. These sites are for the use of local residents for the disposal of household waste materials, none are manned or locked and there is unrestricted entry at all times. The sites are equipped with front loading bins of 3 to 5 m^3 capacity; the numbers of bins at the sites varies. At all sites (3 of 3 bins at Mungallala, 2 of 3 bins at Amby and 2 of 4 bins at Muckadilla) the front load bins are fitted with a restricted opening using a locked down main lid allowing only small waste items to be inserted through the opening. Large waste items are being deposited at the sites, in some cases forming a de-facto waste face. The bin sites must be regularly cleaned up by MRC, with the waste transported to Roma's landfill for disposal.

5 WASTE FLOWS

5.1 Current Waste Flows

Along with waste stream data provided by MRC, a visual waste bin inspection was carried out by the consultants. This visual characterisation included the rural bin sites and the minor landfill sites. The results of the visual waste audit were tabulated; see *Table B1* in ***Appendix B***, and the findings compared to general municipal waste makeup data available to the consultants.

The waste stream makeup in the MRC region is generally consistent with that of a typical rural shire. Rural areas tend to recycle green waste and food scraps within the rural properties, while a lack of recycling services offered to the rural areas contributes to an increased rate of recyclable material in the domestic waste bins. The total potential volume of recoverable material is however; low due to the low population numbers in these regional areas. Rural residents are only provided with limited recycling available at drop off points at the RBS and minor landfills in the region.

The waste audit categories recorded were:

- Paper;
- Cardboard;
- Container glass;
- Plastic drink containers (recyclable);
- Steel cans/containers (excluding white goods);
- Aluminium drink containers;
- Other (mainly household putrescible waste).

5.2 Review of Current Waste Flow Data

Waste flow data supplied by MRC has been sourced from various inputs, only waste delivered to Roma landfill facility is weighed. The weight of waste delivered to all other landfills is estimated as there is no weighbridge currently located at these facilities. Some of the outlying facilities require frequent clean-up (approximately every three months) due to the deposition of excess materials at the sites. The clean-ups are conducted by infrastructure services and not the waste management division of MRC. Although the collected materials are brought to the Roma landfill for disposal, the exact weights of materials was not previously measured due to the lack of a weighbridge.

The data supplied is for the 2012-13 period as the weighbridge was not operational before this time. Table 3 below presents a summary of known waste flows.

Table 3. Waste Flow Data 2012/2013

Source	Weight Approx t/yr	Destination	Comments
Roma - Domestic	3,500	Landfill cell	New putrescible waste cell development, current landfill life projected as 20-30 plus years.
Roma – Commercial & Industrial	13,000	Landfill cell	Commercial waste landfilled in separate cells, several lifts remaining in current cell. Significant input from gas camps at present.
Roma – Construction & Demolition	12,476	Landfill cell	Some recycling of concrete where loads are separated.
Drum muster	--	Brisbane	Collections run every few years (3-5 years), irregular schedule. Several sites have drum muster cages.
Black metal	957	Sims Metal	Metal collected when sufficient volumes have been collected. Some monetary return to MRC.
Green waste	493	Composted by Nugrow on-site	Green waste is mulched and has been made available to the Nugrow operation on the northern end of the site for a composting trial. The composting operation will be tendered in the future.
Waste oil*	26,813L	Transpacific Industries	Collected from facilities where oil collection stations are installed, as required basis.
Scrap tyres	10	Brisbane	Tyres transported whole to Brisbane for recycling/disposal.
Lead acid batteries	37.6	Brisbane	Lead acid batteries transported to Brisbane for recycling, some monetary return to MRC.

Notes: *- These weight totals require further research by MRC, as only 7.5 months of weighbridge data was available and data was projected over the full year.*

*- * Waste oil in litres based on volume removed from the Roma landfill.*

5.3 Projected Population Growth

MSW volumes can be readily projected from a per capita basis as these rates are already known. Using population growth figures provided by both MRC and the Population Information Forecasting Unit (PIFU 2013), the number of residents within the MRC area is set to increase from approximately 13,437 persons in 2011 to 16,229 persons by 2031. The medium series population growth projections have been adopted for the purposes of modelling and are presented in Table 4 below.

Table 4. PIFU Maranoa Region Population Growth Projections

	2011 (Total persons)	2021 (Total persons)	2031 (Total persons)
Low Series	13,437	14,353	15,143
Medium Series	13,437	14,804	16,229
High Series	13,437	15,346	17,586

Notes: *- Boundaries are based on the 2011 edition of the Australian Statistical Geography Standard (ASGS 2011).*

- 2011 data are estimated resident population (ERP).

- All data are as at 30 June of the projected year.

For the purposes of this WRRP, the numbers of persons participating in Fly In, Fly Out (FIFO) and Drive In, Drive Out (DIDO) employment in the region were not included as they do not have residential address and are therefore not counted by the Australia Bureau of Statistics as living in the region. Furthermore, these persons are transitory and their numbers fluctuate with the construction/operation phase of the sites. Information supplied by MRC indicates that many of these camps are winding down as the

construction phase is completed and moving to reduced numbers for the operation phase of the projects.

5.4 Projected Waste Growth

The rate of waste generated per person was estimated at 2.1 tonnes per person per year in 2006/07 as an average for all of Australia's waste generation (National Waste Report 2010), however approximately 40% waste diversion was achieved resulting in an average of 1.26 tonnes per person being landfilled over that year. A total waste generation growth rate of 4.5% has been projected by the Australian Bureau of Statistics (ABS) which would make these figures even higher in 2014. For MRC the total domestic waste stream is projected as being approximately 4,687.7 tonnes or 0.365 tonnes per person in 2014 without any waste diversion being applied.

Taking household waste generation, C&D and C&I waste into account, the total waste projected to be landfilled in MRC in 2014 was approximately 33,981 tonnes, or 2.6 tonnes per person. These figures reflect the high rate of C&D and C&I waste currently generated in the region. The waste material growth figures included in Table 5 below do not include any diversion. This is to illustrate the projected total waste growth under the different population growth rates only. These figures also do not take into account any tailing off of business activity, as can be expected with the completion of many of the coal seam gas projects in the near future.

Table 5. Total Waste Material Growth Projections

	2014 (tonnes/yr)	2024 (tonnes/yr)	2034 (tonnes/yr)
Low Series (2.2%)	33,981	42,242	52,512
Medium Series (2.4%)	33,981	43,076	54,605
High Series (2.6%)	33,981	43,925	56,778

5.4.1 Waste Stream Makeup

The Queensland State of the Environment Report (2008) indicates that Queensland's waste stream makeup is divided into five general categories, these are:

- Domestic waste (MSW);
- Commercial and Industrial waste (C&I);
- Construction and Demolition waste (C&D);
- Green waste; and
- Biosolids.

The makeup of the typical regional domestic waste stream can be seen in Table 6 below.

Table 6. Typical Regional Domestic Waste Stream Makeup

Material	%	Composition
Paper and cardboard	20	Office paper, newspapers, magazines, wrapping, corrugated cardboard and flat cardboard
Glass	9	Beer and wine bottles, food jars
Metals	4	Non-ferrous 1% and ferrous 3%
Organics	42	Putrescible 37% and other (timber, dead animals) 5%
Plastics	13	Drink bottles, toys, goods and packaging
Liquid	1	Milk, soft drink and water
Hazardous	4	Oil, solvents, bleaches and pesticides
Other	6	All materials that could not be categorised, including soil and fines

The most recent waste audit data available from MRC indicated that overall, approximately 27.8% of the domestic waste stream is composed of readily recyclable materials including metals, plastics, glass, cardboard and paper products (MRC waste audits 2013) although these proportions vary across the region. On this basis, the target of 45% diversion of MSW from landfill by 2024 for regional centres as per the DQWARPS (2014-2024) is unlikely to be met regardless of the degree of effort expended by MRC and the target should be regarded as aspirational.

5.5 Regulated Wastes

Regulated wastes consist of a range of products and materials as defined in the *Environmental Protection Regulation 2008*, Schedule 7. For MRC, the most common regulated waste materials received at waste management facilities are:

- Tyres;
- Lead acid batteries;
- Oils and petroleum products;
- Oil filters;
- Acids and bases;
- Pesticides and other chemicals; and
- Asbestos products (bonded asbestos).

These regulated waste materials must be recycled or disposed of by licensed persons, companies or facilities. Systems are already in place throughout the MRC area for the collection and recycling/disposal of regulated waste materials, with the exception of bonded asbestos materials, and it is intended that these systems will be retained for the future waste management plan. Bonded asbestos materials are buried in a dedicated asbestos cell at the Roma landfill.

Minor volumes of clinical wastes may also be disposed of at landfill. The provision of home care has resulted in some medical related material finding its way into domestic waste bins. Medical facilities are required to manage their own waste materials and these should not be delivered to a landfill without the required pre-treatment.

The list of regulated/hazardous waste is long; most are generated by industry and should be managed by the generator through licensed waste treatment and disposal companies. The generators are required to report on the waste generated, transported and disposed of to the relevant local government. In a recent statement, the state government indicated that the definition of regulated waste would not be expanded to include materials listed under the dangerous goods code as the dangerous goods list numbers approximately 3,000 products.

6 WASTE COLLECTION CONTRACT REVIEW

At the time of the commencement of the RWMS several different waste collection contracts were in force owing to the local government amalgamations mandated by the state government. The existence of the different contracts is seen as inefficient as a lower price per unit / service may be gained for a larger allotment of work.

6.1 Current Contracts

The MRC WRRP will be supported by the rationalisation of existing contracts for waste collection and treatment and other existing waste management service arrangements. This will provide consistent waste management levels of service across the region, while considering the differing needs of urban and rural areas. Details of key existing waste contracts and agreements are shown below in Table 7.

Table 7. Existing Waste Management Contracts and Agreements

#	Contract Name	Contractor	Expiry Date
1	Roma & Hodgson MSW	BRACA Pty Ltd	30/06/2016
2	Mitchell, Amby and Mungallala MSW (& industrial bins at Muckadilla waste facility)	A L Cherry & M G Pearce	30/06/2016
3	Injune MSW	NJ & JA Gray	30/06/2016
4	Surat MSW	GE & JD Grams	30/06/2016
5	Wallumbilla, Yuleba and Jackson MSW	BRACA Pty Ltd	30/06/2016
6	Scrap tyre collection	No contractor	N/A
7	Green waste mulching (all sites)	No contractor but carried out by NuGrow Roma Pty Ltd	Trial stage
8	Lead acid batteries collection	No contractor	N/A
9	Waste oil collection	Transpacific Industries	Ongoing
10	Agricultural chemical drums	Drum muster	Ongoing
11	Composting (Roma only)	Nugrow	Trial stage

6.2 Contract Alignment

The development and implementation of the WRRP will take time. The lead time required for a new integrated waste collection contract is in the order of six to nine months (including allowance for truck delivery and mobilisation). Therefore it is estimated that a new consolidated waste collection contract would not be fully operational until 2016 at the earliest.

Considering these constraints MRC has extended existing contracts due for renewal from now until 30 June 2016. This approach will cover the interim period until the major new contracts are implemented and in the interim, provide certainty to the contractor and possible savings to MRC. The development of a new integrated waste collection contract should be initiated as soon as possible, with a view to calling for tenders by mid-2015. This tender would cover the selected collection option/s adopted by MRC after finalisation of the WRRP.

A preliminary review of the risk levels associated with various waste management activities undertaken by MRC and its contractors has also been undertaken. This review indicates several opportunities for improvement in MRC's risk profile that should be considered in the structure of future waste management contracts.

These opportunities for improvement are:

- Landfill operations are a future high risk activity for MRC that can expect more scrutiny and reporting obligations under the recent upgrade to the Queensland Department of Environment and Heritage Protection (EHP) DQWARPS (2014-2024)and associated legislation. This may include future facility upgrades to reflect the changing role of the site under the WRRP and landfill operations. MRC need to ensure control of the risk from landfill activities directly, whether contract or day labour is preferred for landfill management activities;
- In the future, MRC should review the potential costs and benefits of a landfill operations contract to better address emerging requirements. This may be best undertaken at the time of the WRRP review (every three years); and
- An integrated waste collection contract will allow the standardisation of service levels across the region, economies of scale and enhanced waste diversion from landfill. It is recommended that MRC tender for a single contract with separable portions to assess the widest combination of options and the discounts that may be applicable for awarding multiple portions to a single tenderer. This will also allow bin servicing contracts to be consolidated across MRC. The larger scale of the collection contract is intended to attract a greater number of bidders for the contract, ensuring that value for money is obtained for MRC.

New waste collection contracts should be designed with a view to achieving WRRP goals. Contracts should be rationalised and integrated across the MRC region. A suggested list of new contracts is as follows:

- MRC bulk waste haulage services (30 m^3 roll-on roll-off (RORO) bins);

- MRC resource recovery services to suit new MRF operations at Roma and coordination of specialist recyclers. Early contractor involvement type procurement involves direct negotiation with the preferred contractor on an open book basis, then locks in service fees apart from indexation;
- MRC green waste services, integrated green waste services including supervision, grinding, haulage and central processing by mulching and/or composting or equivalent process;
- MRC transfer stations (operations) specification for supervision of sites, compaction of loads, segregation of basic range of recyclable materials and collection of regulated waste items in a coordinated regional collection;
- Waste auditing (minimum every three years) component of waste collection contract to assist with the Queensland Government annual waste reporting requirement. MRC should have input into the scope of the auditing to ensure that the diversion rates of the recycling activities can be assessed from the waste audit data; and
- Waste education component of the waste collection contract for the continued delivery of the waste minimisation message.

And, if considering the contracting of landfill operations as a risk mitigation measure:

- Roma landfill (operations) specification for new landfill cell operations contract and a site based management plan for use by contract staff as determined by MRC. This contract may have KPI's built in for void space maximisation and recycling diversion rates.

7 RESOURCE RECOVERY AND WASTE MINIMISATION

7.1 Household Recycling

Household recycling is presently rated as poor across the region due to the lack of collection systems employed. A range of household recyclables was being collected within Roma using a crate system, however this has been discontinued. Cardboard was being bailed at the landfill in a dedicated recycling area but the market for recycling cardboard has shrunk recently with one of the two major south east Queensland recyclers (Amcor) closing down that part of their business. Previously bailed cardboard has been stored for the last couple of years in the open shed at the landfill. This cardboard has been disposed of by mulching with the green waste at the landfill and delivery to the composting operation at the Roma landfill.

While the entire market for recycled products is not likely to be viable for MRC, some recycling of high value only products such as aluminium cans, steel cans, polyethylene terephthalate (PET) and high density polyethylene (HDPE) plastics along with the diversion for local reuse of other high weight materials such as glass are considered a viable proposition. Such actions will create a MSW recycling rate and assist in working towards the waste diversion targets of the new DQWARPS (2014-2024). However, achieving the reduction of regional centre waste disposal to landfill target of 45% by the year 2024 for MSW is unlikely and this target should be considered aspirational.

7.2 Green Waste

Green waste is currently collected at RBS, minor landfill facilities and the main Roma landfill facility. The green waste is mulched on an as required basis by a contractor. The mulch generated is reused by the local community, with the exception of the recent establishment of a composting facility at the Roma landfill site. Green waste has been provided to this operator free of charge during the early stages of the facilities commencement. This arrangement should continue with the community encouraged to separate as much green waste as possible for recycling; however, it has been noted that the green waste collection stockpiles at most regional facilities is contaminated. In order to process this material for the best return, site supervision may be required to reduce this contamination. The recycling of this material is important for both the reduction of waste to landfill and the avoidance of the potential GHG emissions generated by organic matter decomposing in landfills, thus reducing the overall landfill management risk for MRC.

As such, the recycling of green waste meets many goals for MRC:

- Lowers waste to landfill tonnage;
- Reduction of leachate generation at landfill; and
- Reduction of GHG emissions from the landfill.

7.3 Construction and Demolition Waste

C&D waste is seen as an easy target for many local governments due to the high weight and readily recyclable materials usually present in this waste stream. The DQWARPS (2014-2024) sets high targets for this material, from the 2012/13 state wide diversion of 61% to a 2024 diversion of 80%. MRC may drive the recycling of C&D materials by requiring Waste Management Plans (WMP's) to be approved for large new developments within the region. MRC will have to determine the appropriate cut-in point for the instituting of WMP's. The WMP should be supported by the following methods.

7.3.1 'Dirty' C&D Materials Recovery Facility (MRF)

A 'dirty' MRF refers to a facility set up to sort and recover recyclable materials from a mixed waste stream as generated from a construction site where all materials are loaded into large bins for disposal to a waste management facility. The equipment used is of an industrial nature rather than for a household material recycling facility, but the facility itself is a basic design with a large concrete apron for a sorting floor and room set aside for stockpiling large volumes of separated materials. Separated materials would include concrete (slabs and blocks), bricks, glass, steel, aluminium and timber as a recommended minimum.

Processing of waste concrete, concrete blocks and bricks into aggregate and gravel products are carried out when sufficient materials are accumulated to make the hire / contracting of a crushing machine economic. In the case of the Roma waste management facility, it is also practicable to separate waste timber for stockpiling as fuel for a pit burner, should that option be adopted for the disposal of animal carcasses.

There are two important factors that need to be considered within this recommendation:

1. That a weighbridge be used for the correct application of landfill gate fees to all loads received; and
2. Full cost accounting is used to determine the appropriate gate fee for loads delivered to this facility. In the case of operating a dirty MRF, an additional charge for loads that are not source separated may be applied.

Where a load is delivered pre-sorted, a reduction in the charge for the MRF separation should be considered. This may assist in driving source separation by builders, which is a more efficient method for MRC.

7.3.2 Source Separation

Source separation at the construction site transfers part of the cost of recycling onto the developer. The theory behind this action is that the developer can implement material separation policies on the work site more cost effectively than trying to separate mixed materials at a later time. While this has some advantages for MRC there may be problems with space within building sites for the storage of separate waste containers and with the cost efficiency of transporting multiple waste containers that may not be full. This strategy may be more effective on larger building sites than individual residential sites where the higher costs have to be borne directly by a single owner, while larger multi-unit or commercial developments may spread the costs among multiple owners / tenants. MRC should consider a cut-in point for source separation based on building project size, but also allow for the granting of exemptions where site limitations make this impractical.

7.4 Regulated Waste Collection

Regulated wastes encountered in the MRC area consist of:

- Scrap tyres;
- Lead acid batteries;
- Oils and petroleum products;
- Oil filters;
- Acids and bases;
- Arsenic;
- Pesticides and other chemicals; and
- Asbestos products (bonded asbestos).

Appropriate collection areas for each of these regulated wastes should be available at each waste facility in the Maranoa region. Collection of the materials should follow a coordinated schedule to ensure that all sites are serviced regularly, prior to exceeding their storage capacity. Where there are established collection agencies, MRC should work with these agencies to minimise costs.

Asbestos containing materials present a special hazard to MRC. While there is a dedicated asbestos burial cell at the Roma landfill, asbestos materials are often delivered to outlying facilities and, at times may be poorly stored while awaiting burial. Where arrangements are made in advance, MRC creates a burial area and immediately covers and secures the waste asbestos materials; however this practice is incompatible with cost effective management of the facilities.

It is recommended that lined skip bins be provided at outlying facilities for the disposal of asbestos products. These may be on permanent standby or arranged in conjunction with demand by residents or companies requiring asbestos disposal. These skip bins will be sealed and transported to the Roma landfill for disposal in the dedicated asbestos disposal cell.

7.5 Alternative Waste Technologies (AWT's)

The waste management strategy team reviewed several AWT's that are currently commercially available in Australia:

- Gasification with energy recovery;
- Pyrolysis;
- Modular incineration;
- Mechanical / biological treatment;
- Windrow composting; and
- Anaerobic digestion.

At this time, the technologies reviewed did not meet the assessment criteria for MRC of being a proven and cost effective technology. Summaries of AWT's considered and reviewed can be found in ***Appendix F***. Furthermore, the evaluation of the suitability of AWT to MRC was curtailed given the limited waste stream characterisation data available to the waste management strategy team. If in the future, MRC considers that an AWT could be feasible then detailed waste auditing will be needed in order to accurately evaluate potential treatment systems.

Therefore, no AWT has been recommended for further investigation, however the WRRP is due for review every three years and the evaluation of AWT's should be carried out again during each strategy review. AWT's are still evolving and becoming more proven and cost effective. There is also a growing interest and demand in Australia for AWT's especially in jurisdictions with significant landfill levies in place. As they become established and more accurate information is gained on the cost and efficiency of each treatment, MRC will be in a better position to assess the potential for the use of an AWT and its applicability to their waste management operations.

It is recommended that MRC participate in appropriate study groups that may be formed in order to obtain accurate information concerning emerging AWT's that may meet some regional waste treatment needs in future. For a number of the AWT technologies, large scale plants are usually required for economic viability. MRC do not have the population and associated waste generation rates required to pursue such AWT options alone; therefore, MRC may in future wish to join a regional AWT initiative. Having accurate waste data will assist in carrying out feasibility studies for such facilities.

7.6 Waste Education and Awareness

Education about waste management and waste minimisation are regarded as key issues for the success of any waste management strategy. It is recommended that an education funding component be included in the regional waste collection contract, with either a lump sum returned to MRC each year for educational activities, or the contractor devising educational activities to be carried out using the funding component and gaining approval from MRC prior to actioning.

MRC may also make effective use of a range of tools available to them, having education material included with rates notices, information stands at local events, a schools information presentation and running community events such as 'waste to art' competitions in conjunction with community fairs or other events. The promotion of home composting and worm farms may also be beneficial in diverting some amount of putrescible and green waste materials from the household waste stream. This may be

carried out via educational materials and/or the provision of home systems to ratepayers at discounted rates.

In particular, for the effective transition from always open, unmanned sites to locked sites with limited opening hours and supervision, and the requirement of the correct depositing of recyclable and regulated waste materials, engagement of the local community is essential. This should be supplemented with an anti-dumping/littering campaign and enforcement of local laws applicable to those who are caught dumping waste.

The main education and engagement messages are:

- Minimise all types of waste generation;
- Manage potential wastes as resources, reuse where possible or seek persons/organisations that may be able to reuse waste materials;
- Promote the use of 'EcoBiz' by businesses to identify savings from waste minimisation and other efficiency measures;
- Opportunities for waste avoidance and resource recovery are available to ratepayers in all areas;
- Local markets need to be developed for recovered resources;
- Encourage product stewardship and EPR concepts;
- Businesses in manufacturing / supply chain minimise their ecological footprint; and
- MRC activities to facilitate waste avoidance and promote resource recovery.

7.7 Waste Auditing and Feedback

An effective waste management strategy requires knowledge of the waste stream and this stream may change over time with the establishment of new waste management facilities, new industry/businesses and additional residential housing development. The state government also requires annual reporting by local governments on the waste weights (or volumes) generated, recycled and disposed of within their area. For this reason the operation of a single, well managed landfill site equipped with a weighbridge is highly recommended.

The auditing of waste streams should be carried out on a regular basis to meet the reporting requirements and obtain data that is relevant to planning for the future waste management of the region. Accurate data may also assist in evaluating options for the viability of AWT's at a later date. Waste auditing should be a component of the waste collection contract, organised and carried out by the contractor to a standard set by MRC. The standard should be set in consideration of the Queensland Government requirements for annual waste reporting and for the purpose of evaluating potential AWT use in the region. It must capture the high value recyclable stream, putrescible waste component and materials that have the potential for energy recovery via AWT. A suggested list of categories is included below but may be expended to suit a particular AWT process being evaluated. Subsections may be derived for some of the below categories.

Recyclables:

- Aluminium cans;
- Steel cans;
- PET (#1) plastic drink containers;
- HDPE (#2) plastic drink containers; and
- Glass (container glass and flat glass).

Potential refuse derived fuel:

- Timber;
- Plastics – all other types;
- Green waste;
- Paper; and
- Cardboard.

Residuals:

- Putrescible waste;

- Liquids;
- Inert fraction; and
- Hazardous materials.

The WRRP has a built in review date every three years. It is recommended that a detailed waste audit be carried out prior to the strategy review to align the waste generation figures and allow for the evaluation of current waste diversion activities and potential waste management options. MRC has recently carried out a household waste and recycling audit (MRC 2013) and therefore has current data on their MSW stream that may be used as the benchmark for measuring the effectiveness of future initiatives under the WRRP.

The MRC waste audit found that there are up to 27.8% of recyclable materials going to landfill across the MRC area. This waste audit information will feed into the revised projections for capital works and future provisions, leading to a more accurate figure for full cost recovery. The waste audit data may also be used to help fulfil the MRC's annual waste reporting requirement.

8 LANDFILL MANAGEMENT

8.1 Current Facilities

Landfilling activities are carried out at multiple sites within the MRC area. These facilities are discussed in **Section 3.2** of this document. Most of these facilities are unmanned and open at all times. These facilities accept all types of waste materials; however the range of regulated waste materials and recycling materials varies across the region. Some sites are equipped with waste oil and oil filter recovery units and lead acid battery drop-off areas, but most are not and evidence of the need for these can be seen in the number of full waste oil containers deposited incorrectly at the sites and lead acid batteries either left for collection or deposited with the general waste. In general, these sites have compliance and safety issues that may be best resolved by implementing a series of measures:

- Fencing and gates locked outside of agreed opening hours;
- Site supervisors on site at all times the sites are open;
- Design that allows for users to drive past the various collection containers en-route to dropping off waste;
- Consistent transfer station layout across the region;
- Provision of collection bays and equipment for separated regulated waste materials;
- Provision of collection containers for separated recyclable items; and
- Provision of a large open skip bin for the depositing of waste materials.

8.2 Projected Life

Due to the various facilities having differing remaining lives, the WRRP calls for the conversion of landfill sites to transfer stations and retaining all of the current sites to service the region. Transfer stations have an indefinite life since waste only transitions via the transfer station; encroachment of residential dwellings is one of the few reasons that a transfer station may be closed in the future.

The projected lives of the current MRC landfill facilities are as listed below:

- Yuleba – 5+ years;
- Jackson – 1-2 years;
- Wallumbilla – 2+ years;
- Roma – 20-30 years;
- Mitchell – 2-5 years;
- Surat – 5-10 years; and
- Injune – 6+ years.

The WRRP recommends the progressive closure of the regional landfill sites and their conversion to transfer stations, with the retention of the Roma landfill for servicing the entire regions waste disposal. A recommended schedule of transfer station conversions is contained in Table 9 in Section 9.1.

8.3 Roma Landfill

The Roma landfill facility has a projected life of up to 30 years. This figure does not take into account the potential increase in the volume of waste to be received following the change of waste contracting arrangements in 2016 or the influx of C&I waste from the coal seam gas camps in the near area. With all the MSW from MRC being landfilled at Roma, the land reserved for future landfill cells may be developed earlier than currently expected unless recycling gains and other waste reduction measures are able to offset the increase.

A further consideration may be the increasing population expected to inhabit the region in the future and the locations where new housing will be established. While the area surrounding the Roma landfill facility is currently undeveloped, this may change. It is a known concept that if residential housing is allowed to encroach on a facility such as a landfill, pressure will be brought to bear for the relocation of the facility. This may bring about the abandonment of the site prior to the full use of the facilities potential. Any early abandonment will compromise the closure plan for the site, which will contain a desired final landform for the shedding of rainfall within the site. Long term prospects for the development of the neighbouring area should be considered by MRC and appropriate zoning enacted to protect the future viability of the landfill asset. A future potential landfill site should be selected and reserved via zoning laws to allow for the ongoing waste management of the region.

8.3.1 Landfill Cell Development

New landfill cells at Roma will be required to have some form of base lining with leachate collection systems installed. The cells will also require capping and, potentially, landfill gas capture. If the rate of landfill gas production is sufficient, energy recovery from the methane gas should be considered. However, a well capped cell will reduce rainwater percolation, leading to drier conditions within the cell which may lead to lower levels of landfill gas being produced, particularly in the generally dry, low rainfall climate of the region. At the present time potential landfill gas generation is unknown as generation modelling has not been undertaken. Several options exist for the use of captured methane gas depending on the generation rate (refer to Table 8 below). If there is insufficient gas volume produced for economical energy recovery, the gas could be captured and treated / flared, or alternative strategies such as installing a Phytocap could be used to reduce its environmental impact.

Table 8. Potential landfill gas treatment technologies for a range of gas generation rates (EPA Victoria, 2014)

Landfill gas generation rate	Potentially suitable landfill gas treatment technologies
> 1000 m^3/hr	Co-generation Substitute fuel Power generation Intermittent use and off-time flaring High-temperature flaring
> 250 m^3/hr - <1000 m^3/hr	Power generation Intermittent use and off-time flaring High-temperature flaring Low-calorific flaring
> 100 m^3/hr - < 250 m^3/hr	Power generation High-temperature flaring Low-calorific flaring Other oxidation and discharge (e.g. passive flares, biofilters, biocover)
< 100 m^3/hr	Other oxidation technology and discharge (e.g. passive flares, biofilters, biocover)

8.3.2 Closure Planning

All landfill facilities require a closure plan and in the case of putrescible waste landfills there is a significant post closure monitoring period. The landfill operator or owner may be required to post a bond with EHP and provide reports on routine monitoring rounds in order to prove that there are no adverse environmental effects occurring as a result of the presence of the landfill. The post closure monitoring period is typically 30 years. This expenditure should be provisioned for in the gate fees charged during the active life of the landfill.

Currently, on some landfills within Australia, trials have been completed for the use of plants to fulfil the capping requirements of closed landfills. This method of capping is called a Phytocap. Many conventional engineered compacted clay caps have been found to fail within three to five years of installation. This is mainly due to differential settlement of the waste material as it decomposes, although dry weather conditions may also adversely affect a conventional clay cap through desiccation and cracking. The Phytocap consists of a layer of soil cover over the waste, the thickness of which has sufficient field capacity to trap and hold the projected rainfall from even severe rainfall events. The surface of the soil cap is then planted with selected native plant species that both suit the local conditions and are known to transpire large volumes of water. Following rainfall events the soil holds the water while the plants pump the water into their leaves and release it to the atmosphere. This system is also known as an evapotranspiration (ET) cap.

Plant root zones are also known to break down low levels of methane emissions due to enzyme action and bacterial community support within the root zone and this process has been evaluated as a landfill gas emissions mitigation measure. Phytocaps are listed on the positive list (clay caps are not) of the Carbon Farming Initiative (CFI) (to be replaced by the Emissions Reduction Fund) and evaluation of the potential for methane abatement credits should be explored by MRC. Credits may be earned for the reduction of methane emissions, including for legacy waste (with the exception of waste placed during the Carbon Tax period, 1 July 2012 to 30 June 2014) and these earnings may assist in meeting future maintenance and monitoring requirements. Where small landfills exist, the levels of methane generated may not be sufficient for energy generation, therefore, flaring or Phytocapping are both viable options that earn methane mitigation credits. However, it is worth noting that Phytocaps may be maintained by MRC's own staff as the maintenance requirements are usually within the capability of Local Government departments.

8.4 Gate Fees

It is widely accepted that gate fees must be set for the recovery of the full cost of landfilling, including closure works and post closure monitoring. This is in accordance with the waste and resource management principles of the WRR Act:

1. the polluter pays principle; and
2. the user pays principle;

Since the Roma landfill is intended to be the sole landfill for the region and is equipped with a weighbridge, this will facilitate accurate charging for the disposal of waste materials. MRC should implement full cost accounting for their waste management business unit.

8.5 Environmental Controls

Environmental controls in regard to waste management activities are detailed in the EHP guidelines. For example *ERA 60 – Waste Disposal* is covered under the *Guideline: landfill siting, design, operation and rehabilitation V2* (2013).

The guideline includes:

- Air issues (odour management, GHG emissions, dust);
- Water issues (sediment control, leachate management);
- Noise issues (plant and equipment and traffic); and
- Waste management practices (litter control, waste handling and storage practices).

Other specific facility environmental controls are covered in state handbooks such as the NSW *Handbook for Design and Operation of Rural and Regional Transfer Stations* (DEC 2006). The available guidance should be reviewed prior to the acceptance of designs for the construction of new facilities and where current facilities are to be retained and upgraded.

8.5.1 Carbon Liabilities

Under the former carbon tax system, landfill facilities that generated more than 25,000 tonnes of emissions per year (CO^2-e), consisting of total covered emissions, legacy emissions and exempt emissions, were required to pay a carbon tax on those emissions. The carbon tax has now been repealed, as of the start of the financial year beginning 1 July 2014 the carbon tax no longer applies. However, with the change of state and federal governments over time, some form of emissions tax may be reinstated in the future. Minimising emissions where possible and at the lowest cost to MRC is a practical consideration and a direction consistent with good waste management practices. MRC

should carry out feasibility studies on low cost emissions abatement methodologies that may be applied to the closure of the outlying landfill sites. Any abatement considered should be consistent with the federal government's current strategy and may earn credits for the reduction of methane emissions if carried out correctly.

8.6 Future Facility Provision

This WRRP includes discussion of the provision of a future waste management facility. The waste management strategy team considers that there is currently no alternative to landfill, with no zero-waste schemes, no matter how well resourced, achieving zero waste to landfill at present. It is also considered that local government has always historically managed waste to landfill and this is a well understood part of ordinary business. While some private landfill facilities do exist, these are not practical alternatives for MRC due to the transport distances involved. Regardless of distance, exclusive use of private facilities while closing local facilities would expose MRC to a higher financial risk of rising gate fees and transportation costs.

The waste management strategy team recommends that MRC identify a future waste disposal site and apply zoning constraint's to this area in order to reserve it for the future development as a landfill facility. Purchase of the land has not been allowed for in the scenario 2 financial planning since there is considerable life remaining in the current facility at Roma. An effectively run waste minimisation and recycling program may extend the life of the current Roma facility and push back the start date for the establishment of a new site, however the reserving of a future site should be carried out as a near term objective.

8.7 Disaster Waste Management Options

In the past, Roma has been subjected to flooding events. Despite the recent building of levy banks to protect the town, flooding of land outside the levy bank area is likely to occur again in the future. Typically, flood events generate a large waste stream of mixed, contaminated, materials that requires immediate disposal for health and safety reasons. Minor waste transfer stations may act as emergency waste receiving sites. Waste materials can be rapidly stockpiled in vacant areas of each site close to impacted area where the waste material is generated. Most waste materials can then be compacted into hook bins and transported to a waste management facility for disposal as quickly as practicable. No effort to sort or recycle waste materials is able to be undertaken under these conditions.

It is the recommendation of the waste management strategy team that these emergency arrangements be formalised in an emergency response plan that is available to all persons in positions of authority throughout the MRC area and lodged with the state government's Department of Community Safety which uses the *Natural Disaster Relief and Recovery Arrangements 2013 (NDRRA 2013)* program to form the State Disaster Management Group.

Issues that the waste management strategy team identified regarding disaster waste are:

- The presence of asbestos materials mixed into the waste;
- There is limited space at some minor transfer stations requiring an immediate and high level of services to keep them operational over the term of the disaster event;
- Transfer stations should be above past flood levels so that they can remain operational, this includes entry roads;
- There is a need to identify standby facilities/sites in the event that access is cut-off to any of the designated waste receivable sites;
- The availability of heavy equipment can be limited due to unprecedented demand. MRC should compile and maintain a list of local contractors and their capabilities as part of the disaster management plan;
- Large materials are difficult to handle and heavy machinery is needed to break down and compact loads;
- There needs to be a specific method in place for dealing with dead animals and rotting food. If the Roma landfill installs a pit burner, then this may be used as a solution for the disposal of this waste stream;
- There is a potential for odour and health issues, exacerbated by the combination of rainfall, high humidity and high temperature in combination with the organic loading of the waste materials; and
- Funding assistance for the additional waste disposal costs may not be immediately available.

9 TRANSFER STATION MANAGEMENT

9.1 Current Facilities

The WRRP proposes that all of the current sites should be retained by MRC, with the outlying sites converted into transfer stations utilising 30 m^3 hook bins for the transfer of waste materials to the Roma landfill. A timetable for the conversion of the sites is included below in Table 9. The timetable takes into consideration the current status of each site (remaining life, environmental conditions and ratepayer base services by the facility) as well as the practical considerations of MRC's budgeting for the capital expenditure.

Table 9. Conversion of MRC Facilities Timetable

Site	Type of Site	Population - Bins/week	Transfer Station Type	Est Life Remaining (years)	Ranking	Year	Capital Cost	Rehabilitation Cost Estimate
Roma	Landfill	7097 - 3460	2 bin	20-30	1	2015/16	$236,100	$0
Jackson	Landfill	? - 15	1 bin	1-2	1	2015/16	$185,500	$28,125
Wallumbilla	Landfill	300 - 161	1 bin	2+	1	2015/16	$185,500	$108,750
Mitchell	Landfill	1312 - 644	4 bin	2-5	2	2016/17	$330,450	$38,500
Yuleba	Landfill	294 - 121	1 bin	5+	2	2016/17	$185,500	$58,950
Amby	Bin Station	62 - 40	1 bin	n/a	2	2016/17	$185,500	$11,450
Mungallala	Bin Station	70 - 33	1 bin	n/a	3	2017/18	$185,500	$13,750
Surat	Landfill	1091 - 286	2 bin	5-10	3	2017/18	$236,100	$60,250
Injune	Landfill	2230 - 251	2 bin	6+	4	2019/20	$236,100	$71,250
Muckadilla	Bin Station	? - 13	1 bin	n/a	4	2019/20	$185,500	$0

Notes: *- Despite the life remaining at the Roma landfill, capital expenditure is required to prevent residents accessing the waste face by installing transfer bins for self-haul domestic waste.*
- Muckadilla has no budget for site rehabilitation works as this site is well managed.
- Roma has no additional budget allocation for rehabilitation works as it will remain operational, assumed to be factored into the normal operating cost for closure/post-closure works.
- 4 bin transfer station at Mitchell only due to expected volume of waste.
- Conversion of Injune left to last but some site upgrades should be carried out in the short term.

9.2 Site Supervision

The use of site supervision is recommended under the WRRP. Where poor practices have existed over long periods of time, behavioural patterns may become entrenched in the residents using the facilities. It may prove difficult to alter these behavioural patterns without close support from persons on the site. A site supervisor must be fully trained in the expectations of MRC in the operation of the site and must have support available from MRC. This is seen as critical in the early stages of the implementation of the changes brought about by the WRRP.

9.3 Operational Considerations

Each site may be slightly different in its size due to the different population numbers being serviced by the site; however, the layout of the sites should be consistent across the region. This will assist where residents access a site other than their usual site. A consistent layout is expected to result in more effective separation of waste and recycling loads, thus minimising contamination and improving the net weight of materials diverted from the waste stream.

Applying compaction to the waste in the waste bins provided at each transfer station is seen as an important issue by the waste management strategy team. It is recommended that MRC investigate a cost effective method of applying compaction to the transfer station bin loads. In its simplest form, this may be achieved by using the bucket of a backhoe to compact the mixed loads into the hook bin several times per week or as required. At first, assessment for the compaction requirement may come from the site supervisor.

Compaction should be carried out frequently, although the frequency requirement may vary from site to site, three times per week may be a practical starting point. MRC should monitor the load density of the bins by using the weigh bridge at the Roma landfill to assess the compaction effectiveness, and then vary the rate of compaction application accordingly by providing feedback to the site supervisor. A greater load density in the hook bins will reduce the frequency of the need to transport the waste to the landfill and this in turn will offset the cost for the use of the compaction equipment.

10 WASTE MANAGEMENT STRATEGY OPTIONS

10.1 Stakeholder Feedback

Feedback was sought via a workshop with MRC members conducted on 21 October 2014. This WRRP is intended to be released to the public for additional comment following the presentation of the draft WRRP to MRC and prior to the formal adoption of the WRRP by MRC. A series of feedback consultations will be undertaken at that time leading to the finalisation of the WRRP.

10.2 MRC Endorsed Options

The MRC was presented with Pacific Environments Recycling Summary Options Report (2014). This report contained a matrix table of services and options for each of the three scenarios with a net present value (NPV) comparison to the BAU case. Following feedback from MRC gained via a workshop with elected members of the MRC, the waste management strategy team made a recommendation to MRC for the adoption of Scenario 2. Table 10 below shows the breakdown of the major risks and NPV costs associated with each scenario. The recycling summary options report may be viewed in ***Appendix G*** of this plan.

Table 10. Risk Profiles

Scenario	BAU	1	2	3
	Existing System with Minor Improvements	**New household collection contract plus limited local infrastructure upgrades, plus organics recycling**	**New household collection with second bin in Roma, centralised waste disposal to Roma plus regional facility infrastructure upgrades, targeted Resource Recovery and some AWT and organics recycling**	**All of the Scenario 2 options plus new household collection contract with region wide second bin for recyclables, Resource Recovery and AWT**
Risk Areas				
Environmental compliance	High risk of non-compliance due to multiple uncontrolled sites, regulated wastes incorrectly disposed	Moderate risk of non-compliance due to continued local landfilling but with improved practices	Low risk of non-compliance	Low risk of non-compliance
Collection Service	Inefficient, segregated contracts	Efficiency gains	Efficiency gains	Efficiency gains
Social	Poor service image/ratepayer dissatisfaction Uncontrolled disposal sites leading to litter issues and visual impacts	Improved service but some local amenity issues Caters for recovering resources from all areas	Improved services with some local amenity issues Full control over site operations leading to lower clean-up costs and litter issues	Improved services with some local amenity issues Full control over site operations leading to lower clean-up costs and litter issues Same level of service offered to all households across the region
Economic	Low capital cost but higher compliance costs and unit operating costs per service, potential for non-compliance penalties	Cheapest scenario with projected 20 year NPV less than BAU, due mainly to amalgamated regional waste service contract	Moderate capital costs Lower unit service cost Avoided transport cost and low exposure to price increases Minor resource price exposure	Higher capital costs due to expanded second bin service and expected low collection weight Lower unit service cost Avoided transport cost and some exposure to price increases Minor resource price exposure
Global	Higher carbon	Moderate carbon	Moderate carbon Flaring option	Low carbon from LFG recovery
Cost – 20 yr NPV	***$7.7 M***	***$7.1M***	***$9.098M***	***$13.64M***

Notes: BAU – Business as Usual,
NPV – Net Present Value

The summary in Table 10 indicates the following:

- BAU offers a relatively low level of service to ratepayers and exposes MRC to risk of non-compliance action;
- Of the scenarios offering service level improvements:
    - There is a $4.542M advantage to Scenario 2 versus Scenario 3 which is due to a focused recycling solution targeting only high value and locally reused materials.

- There is a $1.998M disadvantage to Scenario 2 versus Scenario 1 as a result of a greater resource recovery effort for Scenario 2 and more facility controls and upgrades for greater levels of compliance.

The recommended scenario (Scenario 2) has been amended slightly following the workshop with elected members on 21 October 2014 and now includes the following major items:

- New regional waste collection contract (regional kerbside collection for MSW, Roma only kerbside collection of recyclables) with all waste landfilled at Roma;
- Recyclables MRF re-established at Roma landfill, requires purchase/refurbishment of a bailer;
- Upgrade to drop-off bays at Roma landfill, self-haul waste deposited in a bin away from the tipping face, only waste vehicles to access the tipping face;
- Basic MRF for C&D materials at Roma landfill;
- Tip shop established at Roma landfill;
- Conversion of all other facilities to transfer stations with collection bays/facilities for the drop-off of recyclable and regulated materials;
- Conversion, closure and capping of former landfill sites to a schedule approved by MRC;
- Fencing and gating of all sites with staffing of all sites, limited days and hours of opening to be agreed with the local communities;
- New cells at Roma landfill developed as required and zoning to protect against future local encroachment, should Roma landfill be restricted for any reason, select a reserve site and preserve the site with appropriate land zoning;
- Investigation of the inclusion of a pit burner at Roma landfill, licence conditions variation;
- Glass processing at Roma landfill for suitable reuse by MRC works department;
- Investigation of scrap tyre shredding with local reuse in cover material and drainage media at the landfill; and
- Other resource recovery initiatives limited to proven technologies following life cycle assessment process to ensure cost effectiveness.

Scenario 2 offered the best combination of improved service delivery and value for money while achieving the lowest risk of non-compliance. MRC is also protected from the potential for external disposal cost rises due to the continued use of the Roma landfill facility and the provision of a future landfill site for use when required. With waste disposal centralised to Roma, accurate weighing of waste, C&I and C&D materials may be reported, assisting in gauging the effectiveness of meeting the WRRP objectives. The future adoption of suitable AWT facilities is also feasible due to MRC retaining operational control of the waste management facility.

11 FINANCIAL MODELLING OUTPUTS

Pacific Environment listed four scenarios (BAU plus Scenarios 1 - 3) for the consideration of MRC in the Pacific Environment (2014) Recycling Summary Options letter report. A workshop was held with MRC elected officials on 21 October to discuss the scenarios and implications for the MRC and residents of the region. MRC members supported Scenario 2, with some minor changes likely to be included. These changes were communicated to Pacific Environment and the detailed costing for the revised Scenario 2 was developed. The BAU case plus three scenarios modelled is as below in Table 11.

Once established the revised Scenario 2 indicative costs over the next 20 years are slightly higher than the BAU in NPV terms. While Scenario 1 costs are slightly lower, there is a greater risk of non-compliance and fewer services offered to residents using this scenario. Further to this, Scenario 2 has a significant financial advantage over Scenario 3. There is a minor reliance on mechanical technologies and hand processing of a limited range of high value recyclables via a MRF located at the Roma landfill facility, but a greater investment in local waste disposal sites being transformed into long term transfer station sites and managed by both fencing and staffing the facilities. The compliance levels expected from close site supervision and facility upgrades are significant for reducing the risk to MRC. This strategy also provides for local involvement in the staffing of the transfer station sites, applying compaction to the loads and haulage to the main landfill site at Roma.

Table 11. Capital Expenditure (20 Year)-$Million

Scenario	Total	Difference to BAU	Key Items
BAU	$7.7m	NA	Lack of compliance; high clean-up costs; litter, stormwater, fire and leachate issues
1	$7.1m	-$0.6M	Greater compliance and single regional collection contract for cost savings. Second bin in Roma only, recyclables MRF, C&D MRF and pit burner at Roma, regulated waste drop-off at all facilities, use of volunteer labour required.
2	$9.098m	+$1.398M	Greater compliance and single regional collection contract for cost savings. Second bin in Roma only, recyclables MRF, C&D MRF, glass crusher, tyre shredding and pit burner at Roma, regulated waste and recyclables drop-off at all facilities, outlying sites converted to transfer stations with all waste carted to Roma, all facilities manned with use of paid labour required.
3	$13.64m	+$5.94M	Greater compliance and single regional collection contract for cost savings. Second bin for entire region, recyclables to external MRF, C&D MRF, glass crusher, tyre shredding and pit burner at Roma, regulated waste drop-off at all facilities, outlying sites converted to transfer stations, all facilities manned with use of paid labour required. Provisioning for a future landfill site included.

The establishment of Scenario 2 will necessitate the expenditure of an additional $1.398M over the next 20 years compared with the BAU case. This is a modest annual increment to achieve a higher standard of waste collection service, recyclables diversion and consistent programs across the region.

11.1 Business as Usual Case

The BAU case is simply the existing collection system with some minor improvements. The BAU case has been modelled to give a cost comparison between the level of costs that MRC could expect to pay if no significant changes are made to the current waste management system and the three improved waste management system options.

The modelling does not take into account **all** the costs involved as it is intended to illustrate the differences between BAU and the options. Costs that are common to all four are not included, therefore the full cost of waste management services in the MRC region are not shown by the model. The BAU case does not take into account potential fines and compliance orders that may be imposed by the regulatory authority.

The NPV as determined by the model for the BAU case is **$7.7M** over the 20 year modelling horizon.

11.2 Scenario 1

Scenario 1 includes a new combined regional waste collection contract with minor improvements, including bin stations upgraded to transfer stations and using compaction of transfer station loads by a local contractor along with compliance upgrades to the small landfills located at the current sites. Waste collected at the transfer stations will be landfilled at the Roma landfill facility. The proposed new regional collection contract is for a single 240L bin collection system across the entire MRC area and a limited 240L recyclables collection within Roma only, requiring the establishment of a basic MRF for sorting and bailing of collected materials located at the Roma landfill. The second bin excludes glass, paper and cardboard, which will not be accepted for recycling.

C&D recycling is carried out via a basic MRF at the Roma landfill and drop off areas at all sites for concrete, timber and metals. Limited regulated waste collection areas are included at major centres for waste oil and filters, scrap tyres and lead acid batteries. The tip shop is reinstated at the Roma landfill and a pit burner is used for the disposal of dead animals and some of the scrap timber separated at the MRF or drop off points.

A range of staffing is considered, from part time volunteers at rural transfer stations, part time paid staff at rural landfills and full time MRC staff at the Roma landfill.

The NPV as determined by the model for Scenario 1 is **$7.1M** over the 20 year modelling horizon. While the NPV is less than the current operational costs, the level of service offered is greater and the risk to

MRC of non-compliance fines is better managed. However, issues such as reporting of accurate weights of waste materials deposited in rural landfills are not addressed. Scenario 1 therefore does not allow the opportunity for best practice waste diversion and accurate reporting of waste weight/volumes landfilled. Furthermore, the use of the minor landfill sites and transfer stations limits the ability to collect and fully control regulated wastes.

11.3 Scenario 2

Scenario 2 builds on the combined MRC waste and recycling collection contract with a single household waste bin service to the entire region and a second recyclables bin service in Roma only. The second bin excludes paper and cardboard, glass will be accepted for delivery to the Roma landfill for crushing and local reuse. All of the outlying facilities will be upgraded (RBS and landfills) to transfer stations, sized in accordance with the population serviced at each location. They will have drop off facilities for a limited range of regulated wastes, C&D and recyclables and use a local contractor for load compaction. The transfer stations will be staffed and only open for limited hours and days following consultation with the local communities.

At the Roma landfill, C&D recycling is carried out via a basic MRF sorting area with drop off areas at all sites for concrete, timber and metals. Regulated waste collection areas are included at all sites for waste oil and filters, scrap tyres and lead acid batteries. The tip shop is reinstated at the Roma landfill for the diversion of reusable items and a pit burner is used for the disposal of dead animals with fuel derived from the scrap timber separated at the C&D MRF or drop off points.

Roma landfill will be manned by full time paid MRC staff and upgraded to include a circular driveway where recyclable materials can be deposited prior to arriving at a RORO bin for the household waste materials. This RORO bin will be used for the delivery of waste materials to the landfill face for burial, public access to the landfill face will not be allowed. The recyclables MRF will be fitted with a bailer and supplemented by the installation of a glass crusher to produce suitable material for local reuse. Innovative green waste processing is continued. Tyre shredding will be carried out by a contractor and the shredded tyres reused for site drainage works and daily cover at the Roma landfill. This option retains all of the current sites in upgraded form and reserves a site for future development into a regional landfill. All waste for disposal will be transferred to the Roma landfill, which is equipped with a weighbridge for accurate weight recording.

The NPV as determined by the model for Scenario 2 is **$9.098M** over the 20 year modelling horizon. Scenario 2 provides numerous advantages over Scenario 1, chiefly, the conversion of all outlying current sites into transfer stations with load compaction for more cost effective load movements to the Roma landfill and the accurate recording of all waste weights via the weighbridge at Roma, closer supervision at all sites for source separated recycling and regulated/hazardous materials management, and greater recycling and local reuse of recycled materials.

11.4 Scenario 3

Scenario 3 builds on the upgrades discussed in Scenario 2 with the main difference being the provision for a two bin system for the collection of household recyclables across the entire region, but with recyclables transported to an external MRF. Glass will be treated as a separate stream using dedicated drop off bins located at all transfer and landfill sites in order to divert glass to a crusher located at the Roma landfill site and prevent glass fines from contaminating the general recyclables stream. Local reuse of crushed glass is sought to divert this material from landfill.

A C&D 'dirty' MRF is operated on the existing Roma landfill site, with scrap timber, soil, bricks, concrete and metals being separated from the C&D waste stream for recycling. Innovative green waste processing is continued. This scenario includes the opening of tip shops at all sites, as well as local shredding of scrap tyres for beneficial reuse within the landfill site (drainage media and daily cover supplement). This option retains all of the current sites.

This option also reserves a future land package to the north of the current Roma landfill for the establishment of the new landfill with appropriate zoning of the surrounding land to preserve the site but does not develop the site at this time. The reservation of a potential future site is seen as a risk management strategy to ensure that MRC may continue to provide services regardless of the changes to waste management practices that may arise in the future.

The NPV as determined by the model for Scenario 3 is **$13.64M** over the 20 year modelling horizon. In a comparison of scenario 3 with scenario 2, the primary difference in overall NPV cost is predominantly

due to the inclusion of the second bin system for recyclables collection and the use of an external MRF. Scenario 3 also includes paid site-supervisors at each transfer station. While expected to deliver the best possible recycling and diversion of waste materials from the landfill, as well as a higher level of risk management for MRC, this option does leave MRC exposed to market forces via the external recycling of collected materials. In addition, the expected total yields from the second bin within the rural towns are quite low and this adds to the inefficiency of the collection system. Further cost sensitivity analysis is required to determine the financial feasibility of a third bin recycling collection option including collection revenue and associated contractor kerbside collection costs.

11.5 Recommended Scenario

The waste management strategy team recommended that MRC adopt Scenario 2 as the preferred path of the WRRP. This recommendation was made in consideration of the costs and benefits delivered by Scenario 2 being superior to Scenario 1 and more practicable and affordable than Scenario 3. The NPV of Scenario 2 was greater than Scenario 1 and much less than Scenario 3 while still delivering significant increases in recycling and improved risk management at the existing waste management facilities.

Furthermore, the redevelopment of the RBS and outlying landfill sites into transfer stations, amalgamation of waste collection service contracts and supply of a two bin system to all rateable properties in Roma will assist in driving down landfilling rates towards the new DQWARPS (2014-2024) targets as is required. It should be noted that none of the scenarios presented are expected to meet the new Queensland waste strategy diversion targets for household, C&D and C&I waste. These targets should be regarded as aspirational only.

This recommendation has been discussed at MRC meetings and by MRC's own waste management group and was formally adopted for detailed modelling.

12 WASTE REDUCTION AND RECYCLING PLAN

12.1 Goals and Objectives for the WRRP

It is recommended that MRC set up a series of programs and goals under the WRRP for achieving the desired outcomes. The details of these programs are shown in Table 12 below. KPI's should be set to the local level for what is reasonably achievable with the current and proposed infrastructure and service levels. Waste minimisation activities should be assessed with regard to quadruple bottom line (governance, social, economic and environmental) sustainability criteria.

Table 12. Goals and Objectives of the WRRP

AREA	OBJECTIVES
Vision	The WRRP will facilitate sustainable growth for the MRC community by providing best practice in sustainable management of resources through effective waste minimisation, source separation and resource recovery, energy recovery (where possible) and residual waste disposal. It will enable individuals, businesses and the MRC to take responsibility for diverting their own resources through flexible user pays services with a mix of local treatment and transfer facilities and a local landfill supported externally by major regional infrastructure and technologies. Coupled with the changes will be a consultation and education process to engage the local communities and support the initiatives.
Programs: **Waste Minimisation**	Goals: Prioritise waste minimisation by reducing household waste generation per capita, focusing on high value recycling and high weight diversion, together with a concerted effort to minimise the landfilling of C&I and C&D waste from building activity as well as MRC generated waste.
Resource Recovery	To increase the amount of resource recovery in MRC to best practice within regional constraints over the next 20 years. All resource recovery programs should be coupled with continuous improvement initiatives and adoption of additional recycling from waste transfer stations, business and away from home public recycling where possible.
Energy Recovery	To consider maximum recovery of available energy resources and minimising fugitive GHG emissions from existing and former waste disposal sites and transportation operations.
Residual Disposal	Develop local waste disposal infrastructure with sites based on quadruple bottom line (governance, environmental, social and economic) performance indicators to current practices. Monitor and review future opportunities for the use of regional infrastructure.
Key Performance Indicators	MRC will establish specific measurable KPI's for each of these program areas and associated key action items.

To assist in monitoring the performance of the new waste collection and recycling contracts and WRRP aims, it is prudent to set KPI's on some of the measurable data. One KPI that will assist is measuring the rate of waste generation and waste to landfill (refer to Table 13 below). The data should be obtained from sources such as weighbridge receipts and regular waste audits carried out to a standardised format.

Table 13. WRRP Future Target 2014-2024

KPI TARGET	2014	2017	2020	2024
Per Capita Household Annual Waste to Landfill (t)	0.36	0.34	0.32	0.30
Per Capita Total Annual Waste Generation (t)	2.6	2.2	1.9	1.6

Table13 is based on a 5% reduction in household waste every 3 to 4 years and a 15% reduction in total waste generated for each of the same periods. To achieve such reductions in the long term requires a sustained effort. Although an overal reduction of 15% for houdehold waste and 45% for total waste generation are calculated, compliance with DQWARPS (2014-2024) targets is unlikely to be achieved due to funding constraints, regional location and lack of markets limiting MRC's ability to meet waste diversion targets.

12.2 Strategic Areas / Program Matrix

The overall structure of the WRRP can be seen broadly in Table 14.

Table 14. Simplified Overview of the WRRP

MRC WRRP	HOUSEHOLDS		BUSINESSES	
	Roma	Regional	C&D	C&I
Waste Minimisation	Organics separated and mulched, recycling bin, new MRF, user pays fees, tip shop. Glass processing for local reuse, pit burner for dead animal disposal, tyre shredding for local reuse.	Organics separated, mulched and re-used locally. Manning of rural sites, improved drop-off areas for C&D, regulated waste and recyclables.	DA conditions for Building - Waste Management Plans (see WRR Act)	EcoBiz and RRF
Resource Recovery	Tip shop implemented for reuse items, recycling drop-off points and regulated waste collections.	Recycling drop-off points and regulated waste collections.	'Dirty' MRF separation and recycling of C&D waste materials.	Future infrastructure/MRF upgrade to include storage areas for EPR items.
Energy Recovery	Potential for small scale EfW technology using combustible materials recovered from the waste, i.e. gasification.	Currently forming a regional cooperative with four other Councils, potential for future EfW scheme.	Potential for some source separated feedstock to be generated for EfW or recycling plant at Roma.	Potential for some source separated feedstock to be generated for EfW plant at Roma.
Residual Disposal	Future landfill upgrades and AWT/pit burner at Roma landfill.	Future transfer station upgrades and local landfill short term, then AWT/Roma landfill.	C&D waste residual to separate landfill cells, minimal environmental controls required	C&I waste residual to Roma landfill, environmental controls may be required

Note: RRF – Resource Recovery Forum

12.3 Action Plan

The Action Plan shown in Table 15 below outlines the actions by programs that are intended to give effect to the WRRP.

Table 15. Proposed WRRP Action Plan

Reference Section	Action Item	Timeframe
Administration/General		
2.6.1	Develop waste targets policy within MRC	1 – 3 years
2.4 - 2.5	Endorse EHP litter/dumping policy	1 – 3 years
2.4 - 2.6.1	Review strategy performance and targets	Annually
2.4 - 14.2	Review of WRRP	3 years
2.4	Provide EHP with annual reports	Annually
2.4	MRC to provide public feedback on performance via MRC annual reports	Annually
2.5	Investigation of future regional contract alignment for economy of scale in waste management activities	Ongoing
7.5	Investigation of future regional cooperation for sourcing contractor services in waste management activities	Ongoing
Waste Minimisation		
12.1	Set per capita waste reduction KPI's and reporting	1 – 3 years
7.6	Develop waste education material to focus on sustainability, based on the regional resource kit on waste avoidance from SEQ Council of Mayors (2011)	1 – 3 years
2.5	Develop MRC advocacy framework	1 – 3 years
7.3.1 – 12.2	Develop a plan for C&D recycling, dirty MRF at Roma	3 – 5 years
7.3	Require a Waste Management Plan with major development applications	3 – 5 years
12.1	Assess waste minimisation using quadruple bottom line (governance, social, economic and environmental sustainability) criteria	3 – 5 years
2.7 – 7.6	Promote national Extended Producer Responsibility schemes such as electronic waste and tyres with future drop off points	3 – 5 years
13.1	Develop sustainable procurement policy for MRC	3 – 5 years
5.5 – 7.4	Incorporate regulated waste drop-off areas in new infrastructure and monitor collections for improvements	1 – 3 years
Resource Recovery		
12.7	Conduct feedback campaign for performance and customer bin non-compliance (Roma recycling bin only)	3 years
2.4 – 7.6	Review local and regional markets for commodities including organics	1 – 3 years
2.4	Investigate options to increase diversion of resources from bins	Ongoing
2	Monitor state and regional policy on diversion	Ongoing
7.6 - 12.2	Review options for assisting business and industry to increase resource recovery	Ongoing
9 - 12	Deliver infrastructure for bulk transfer and resource recovery - review service levels	3 – 5 years
Energy Recovery		
7.5	Review available EfW technologies	Ongoing
2.12 - 2.7 – 2.8 – 8.5	Monitor national GHG emissions targets and carbon capture performance	Ongoing
2.4	Annual report on MRC waste quantities, GHG emissions and CPRS mitigation needs	Annual
Residuals Disposal		
8.4 - 15	Develop medium term operations plan for waste services, including full cost pricing, hours of operation and service standards for waste facilities, centralise landfilling to Roma	3 – 5 years

8.3.2	Maximise landfill life and develop landfill closure plans, as required	1 – 3 years
8.6	Life cycle assessment of waste disposal services contract to select reserve landfill site	1 – 3 years
2.4	Monitor and report landfill tonnage and diversion rate using new standard waste datasets	3 – 5 years
2.12 - 2.4 – 10.2	Monitor any government or private regional landfill/waste diversion initiatives	Ongoing

12.4 WRRP Implementation

Feedback from MRC has indicated their preference for strategic Scenario 2 as the scenario for future regional waste management planning. On this basis, a detailed assessment of issues related to WRRP implementation has been undertaken. One important dimension of this assessment is to consider whether particular services could be carried out on a day labour basis. The basic assumption of modelling undertaken to compare broad strategic options was that some services would be carried out using voluntary labour or community service groups and possibly contracted through appropriate tender processes. These issues are discussed further in the following sections.

12.5 Waste Collection

Existing services are contracted to the private sector. Due to historical circumstances, some towns are covered by separate contracts; however they all use the same 240L bin configurations. In addition, the combined service area does not extend to all rural properties. These services require a high level of availability and performance and benefit from the economy of scale available to contractors. The nature of contracts in this sector leads to a competitive market place and continuous innovation.

These factors could be expected to lead to competitive prices for an integrated waste collection tender for the entire MRC area. A single contract with separable portions leaves the widest opportunity for competitive tenders and could include an in-house bid for any portion MRC believed it could manage appropriately. Contracting out waste collection services is considered to lead to cost savings ranging from 10–30%.

12.6 Waste Transportation

The current situation for waste in the MRC area utilises many small landfill facilities within the region. The WRRP finds that the operation of these sites is inefficient in terms of cost due to the continued need for cleaning and clearing of the sites and that there is considerable risk to MRC through non-compliance issues arising from the uncontrolled nature of the facilities. The WRRP recommendation is to convert the sites to transfer stations and close the landfill areas of the sites. This will then require the appropriate capping of the landfill areas and the transportation of all waste materials to Roma for disposal to the single landfill in the region.

The upgrading of regional sites is to be carried out in a phased approach to suit annual budgets. MRC may consider that it could undertake such waste haulage services using its own resources following this transition. Alternatively, it could tender for such services to take advantage of recent bulk transport innovations.

12.7 Resource Recovery

Processing of resources recovered from recycling collections is not currently undertaken. The WRRP supports the use of a second bin for recyclables collection in the Roma area, with separate drop off collection bins at each of the regional transfer stations and the reestablishment of a MRF at the Roma landfill. The recyclables collected will be limited to a range of both high value and locally recyclable materials. This facility will provide sufficient capacity for recovery of select secondary resources from the whole MRC waste stream. Such services should be undertaken under an appropriate performance based contract to ensure MRC objectives are met through partnering.

A further initiative of the WRRP is to establish a basic MRF at the Roma landfill for the sorting of C&D waste materials, with recovery of some materials from this waste stream for recycling. It is anticipated that metals, concrete, soil and glass could be separated for recycling, and if a pit burner is installed for the disposal of animal carcases, then timber recovered from this waste stream may be used for the fuel source. MRC should also consider using its discretion in regard to building C&D permits for the source

separation of materials from larger building projects. Differential charging (source separated rate or mixed load rate) should be used to support the initiative. This will reduce the workload and staffing requirement of the sorting facility.

MRC should also carry out customer feedback surveys, particularly when recycling bin non-compliance is noted. The information gained from these surveys should be incorporated in the review of the WRRP at the three yearly intervals.

12.8 Waste Disposal

The level of environmental and compliance risk to MRC associated with the changed regulatory regime for landfills, suggests that MRC could better manage their own risk by the shift to a single manned, well managed landfill, equipped with a weighbridge and operated in full compliance with the licence conditions. If operational controls are not able to achieve compliance with licence conditions, then outsourcing landfill operations to a contractor, having regard to the recently upgraded EHP enforcement regime, should be considered.

Quotes received by Western Downs Regional Council within the past five years suggests that a contractor can offer plant and equipment at reduced hourly rates (up to 50% less) due to the differences in accounting rules (including amortisation periods and financing) for local government and the private sector. These factors suggest that should landfill operations be tendered for Roma landfill, strict pre-qualification requirements around management and compliance systems and technical competency would be incorporated in the tender conditions.

12.9 Minor Transfer Stations

The DQWARPS (2014-2024) requires a greater degree of control and supervision at waste facilities to minimise risk to MRC. There is an opportunity for MRC to provide supervision and staffing for operation of the facilities that will continue. Alternatively, a single contract or a series of individual contracts for these services across MRC's facilities could be awarded. MRC may also wish to engage a third party to handle all gatehouse functions involving cash receipts or move to automated accounts or voucher based systems for these sites. If site supervision is to be contracted out by MRC, this part of the tender should be made separable to provide the opportunity for local bidders to obtain supervision roles at their local sites.

Regardless of the system of operation of these sites, the approach must be consistent across the region and the site supervisors should be seen to apply the rules equally to all users. MRC must retain a close oversight role, at least for the initial commissioning phase and bedding in the new systems.

13 SUPPORTING POLICIES

13.1 Sustainable Procurement Plan

Several similar councils in the state have adopted or are in the process of developing a sustainable purchasing policy that includes provision for green purchasing and the use of recycled materials in its own purchasing of goods and services. Consideration could be given to the inclusion of a specific target for the percentage of purchase orders that include recycled product. A better indicator could be the quantity or value of recycled product utilised or the annual avoided greenhouse emissions arising from the substitution of recycled product. MRC could review this aspect in their contract management department. Amendment of the contracting documents is required to include provision for recycled materials in MRC's construction projects.

Some examples include the:

- Inclusion of recycled crushed concrete in site civil works (specifications are dependent on the proposed infrastructure); and
- Recycling of glass fines in works programs as aggregate, bedding sand or fill.

14 WRRP ADMINISTRATION

14.1 Amendment

MRC may choose to initiate a review of this WRRP before the date nominated in the legislation (WRR Act) under any of the following circumstances:

- Changing local collaborative waste management opportunities;
- Changing waste industry or technologies;
- Matters arising from any MRC review of compliance issues; and/or
- Any other matter MRC considers relevant to waste management.

14.2 Review Date

Each WRRP is required to be reviewed periodically (every three years). Therefore, it is proposed to take this date from the end of the current financial year, giving a planned review date of 30 June, 2018. At this time the review process may consider the provisioning for a new local landfill site and/or the adoption of a suitable alternative waste technology for processing waste materials. The review process should also conduct a feedback campaign to determine the current WRRP performance and assess the reasons for any non-compliance issues (if there are any non-compliance issues). Where legislative changes have taken effect, the WRRP may require updating to reflect these changes.

15 CONCLUSIONS AND RECOMMENDATIONS

This WRRP concludes that Scenario 2, as modelled for the MRC represents the best value in overall service delivery to ratepayers and risk minimisation for MRC. The combined contracting process has the potential to deliver savings on the current separate contracts and institute a two bin household waste and recycling bin for properties within Roma. This would feed recyclables into a local MRF at the Roma landfill, processing only a high value and locally recyclable stream. Recyclables collected from the outlying sites should be separated at the source, assisting in making that operation more efficient in the process and reducing risk in that work environment. It is also possible that MRC may tender on a fully priced basis for some or all separable parts of the new waste contracts.

It is recommended that:

- MRC considers the use of gate fees as one of their appropriate price signals to the community and the business supply chain concerning sustainable outcomes through waste minimisation, and to encourage source separation and local resource utilisation;
- MRC introduce a DA requirement for source separation of C&D waste materials for large demolition or construction projects. Differential charging for non-separated and separated C&D loads may also be used to encourage source separation. This could also be applied to C&I waste in some circumstances;
- A full cost recovery model for waste services be implemented using a combination of gate fees, rates and a local government levy;
- A regional waste collection contract be tendered, with second bin recyclables collection within Roma only and formal drop-off facilities for recyclable materials collection at all transfer stations;
- MRC adopts a program for the conversion of former bin sites and regional landfills to planned transfer stations;
- MRC to maintain a watching brief on potential future AWT's suitable for the region and participate in a regional group seeking collaborative waste reduction projects;
- MRC to actively seek funding programs from both state and federal governments for waste management infrastructure for the region;
- A waste education campaign be included in the MRC's waste reduction measures for homes (including recycling education) and that MRC encourages the business sector to adopt 'EcoBiz' or similar programs for the reduction of commercial and industrial waste streams;
- MRC commissions a study into the closure of regional landfills that looks for cost effective post-closure rehabilitation, including control of water ingress and landfill gas emissions and maintenance of the sites in a sustainable manner; and
- MRC carry out public consultation on the future of the regions waste and recycling collection facilities to agree days and hours of operation prior to converting the sites to transfer stations.

16 SIGNATORIES

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Appendix A STRATEGY DELIVERY PATH – SCENARIO 2

Appendix B PACIFIC ENVIRONMENT WASTE AUDIT RESULTS

Appendix C SCENARIO 2 MODELLING OUTPUTS

Appendix D INFORMATION SUPPLIED BY MRC

Appendix E STAKEHOLDER FEEDBACK SUMMARIES

Appendix F ALTERNATIVE WASTE TECHNOLOGIES ASSESSMENT

Appendix G RECYCLING SUMMARY OPTIONS REPORT