

City Strategy Committee Meeting 21 February 2011

11STRAT006 Lake Macquarie Waste Strategy Project - Adoption of Processing Technology

Council Ref: F2010/01055 - D02025729
Report By: Director - City Strategy - Tony Farrell

Précis:

Council commenced the Waste Strategy Project in November 2009 following adoption of a Project Management Plan by the Waste Advisory Committee.

The Waste Strategy Project has progressed through identification of viable technology options for the processing of waste to adoption and exhibition of a favoured draft processing solution.

The draft processing solution is particularly significant to the overall strategy as it determines collection arrangements and therefore the nature of the interface between the domestic waste management system and the households that are the users of the system. The exhibition of the draft processing solution presented a staged source separated organics (SSO) (three bin) collection system as the favoured option, and a mixed waste advanced waste treatment (two bin) system as the main alternative.

The exhibition was successful in generating over two hundred responses and when complemented by a randomly sampled questionnaire survey, should provide Council the confidence to make a decision on its favoured processing system.

As a SSO (three bin) system is the most favourable solution when compared to the criteria adopted for assessing waste management system options, and it is the option most favoured by the community of Lake Macquarie, this report recommends the adoption of a staged SSO waste management system for Lake Macquarie.

Adoption of a processing technology will facilitate the continued development and implementation of a Waste Strategy for the City that addresses our known existing, and emerging, waste management needs.

Recommendation:

A. Council adopt a waste processing strategy comprising;

1. A phased, three bin, source separated organics (SSO) system with phasing of;
 - a) Phase 1 – a source generated green (garden) (SSG), fortnightly collection commencing as soon as is practicable;
 - b) Phase 2 – a source separated organics (garden and kitchen) (SSO), weekly collection commencing as soon as practicable;
2. A weekly Mixed Solid Waste (MSW) collection during Phase 1 of the SSO system and a fortnightly MSW collection during Phase 2 of the SSO system.
3. Continuation of a fortnightly dry recyclables kerbside collection.

B. Prepare appropriate specifications and tender for the staged implementation of a

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- three bin SSO service. Allow for non-conforming AWT variants within that tender.
- C. Request a further report examining options for waste service delivery to multi-unit dwellings in the City.
 - D. Request a further report examining options for practical waste service user pay systems in the City.

Background:

Prior to the commencement of the current Waste Strategy Project, Council's previous long term waste strategy was to participate in a regional two bin solution where all Mixed Solid Waste (MSW) from Maitland, Cessnock, Newcastle and Lake Macquarie LGAs would be delivered to a central point for processing. The process was modelled to achieve 70% diversion of waste from landfill, generate energy, and in addition to processing 100% of collected domestic waste, would have had capacity to receive and process commercial waste streams. To deliver this solution, the four Councils formed a company, Hunter Integrated Resources (HIR), to manage procurement and administration of the service.

The delivery of the service was delayed by the complexity of the solution, which at the time of conception would have been unprecedented in Australia. There was also significant difficulty in obtaining assurances from relevant State agencies about regulations that would govern the operation of the plant and the products emanating from the facility. Finally, the advent of the Global Financial Crisis led to a dramatic and unaffordable increase in the cost of delivering the processing facility. These barriers led to the project being abandoned by mutual agreement of the parties.

With the demise of a regional solution to waste management, the other pressures on Council's existing waste management services were brought into stark relief. The most critical issues driving the need for an urgent response include;

Awaba Waste Management Facility Capacity: Council's only active landfill at Awaba has limited capacity to continue accepting waste. Under the terms of the existing approval for the site, it has a maximum estimated life of 4 years and 9 months as at February 2011. This capacity is based on the most recent volumetric survey of the facility undertaken (December 2010) and assuming the full approved air space can be utilised. It is likely that practical limitations associated with the operation of the site will act against 100% of the approved capacity being realised.

Waste Levy: In order to discourage land filling, the NSW Government charges a levy, on a per tonne basis, for all material that is disposed of in a landfill. The levy for Lake Macquarie is set at \$65.30 per tonne for FY 2010/11 and is scheduled to increase by \$11.50 (plus CPI) per tonne, per year until 2015/16. In total, Council forfeited \$6.1 million to the NSW Government in waste levies in the 2009/10 financial year. The cost of the levy to the Lake Macquarie waste service is likely to be about \$18.7 million by 2016 if no increase in diversion away from landfill is achieved and the long term growth trends in waste generation continue.

Carbon Tax: Landfill operations generate methane through the anaerobic decomposition of organic materials interred within them. Methane is considered a very harmful greenhouse gas and is targeted in discussions about greenhouse gas pollution reduction. There is a real possibility that a carbon tax will eventually be implemented in Australia and that methane producing activities such as landfilling will attract the tax.

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The previous Federal Government's proposal to introduce an Emissions Trading Scheme (ETS) for carbon pollution would have added an estimated \$600,000 to the cost of operating Awaba landfill in year 1 increasing to \$1.3 million by year 3. It is not possible to predict the timing, nature or quantum of new carbon pollution reduction schemes in Australia, but current indications are it will be a polluter pays scheme and that it will be on the agenda of the Federal Government in the current parliamentary term.

NSW Waste Diversion Policies: The NSW Government has adopted a policy of diverting a minimum of 66% of domestic waste from landfill by 2014. There are also diversion targets for Commercial and Industrial Waste (C&I, 63%) and Construction and Demolition Waste (C&D, 76%), also by 2014. These are known as the WARR Targets (Waste Avoidance and Resource Recovery). There is no legislative enforcement of these diversion targets as yet, however the Government has three measures in place to promote compliance.

The waste levy is the strongest incentive to achieve compliance. The other financial motivator is the Government's Waste and Sustainability Improvement Payment (WaSIP) scheme. WaSIP returns a small portion of the waste levy receipts to local government for sustainability activities, provided programs are in place to pursue compliance with the WARR targets. In the current financial year, Council can expect a WASIP payment of approximately \$990,000 growing to \$1.6 million in 2016. The third plank of its implementation scheme is the limitation on new landfill facility approvals, described in more detail below under *Landfilling Options (Options 5 & 6)*.

Community Expectations: The work undertaken to formulate the 10 Year Community Plan identified a community expectation that Council, in its operations and services, should become more sustainable over time. During consultation for the Community Plan, the environment ranked very highly (1st in importance) amongst Council's areas of responsibility. The current domestic waste management system does not maximise the City's contribution to environmental stewardship due to the large volumes of resources being discarded to landfilling. Though satisfaction with current waste management services ranks highly amongst residents, it would be reasonable to expect that satisfaction will fall away as costs rise (e.g. due to the waste levy) without a commensurate improvement in environmental performance.

Council surveyed its residents specifically on waste issues in November, 2009. The results of that survey are included as Appendix 1 to this report. Key relevant findings from that survey include;

- Limited support for the transfer of waste from Lake Macquarie to another LGA (38% 'would not' and 33% 'may' support).
- Concern about the volume of waste generated in the City (51% concerned and 25% very concerned).
- Significant support for the introduction of kerbside green waste collection service (82% 'would' support, 10% 'maybe would' support).

Background:

The Waste Strategy Project is being developed to respond to the pressures of

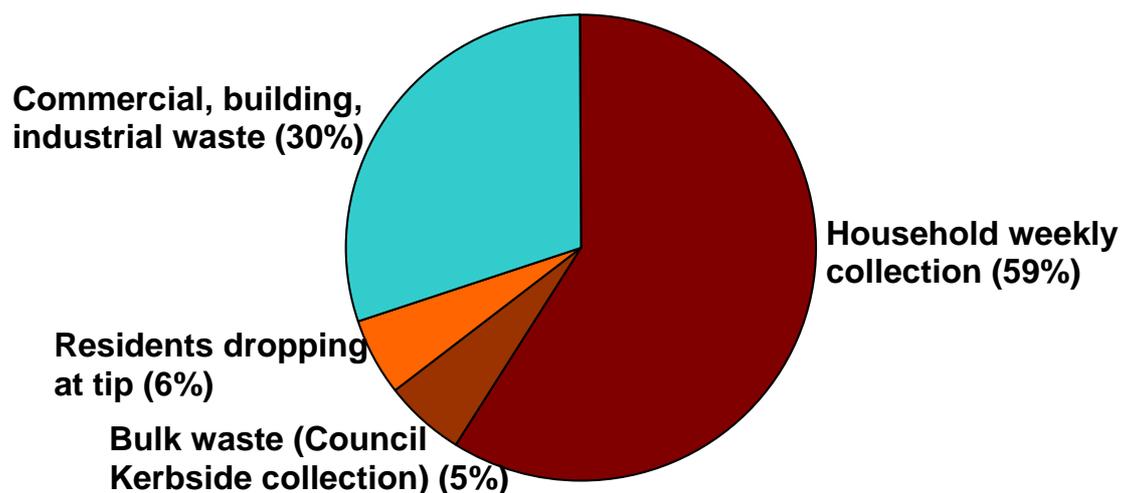
- Finite, limited landfill capacity;
- Increasing waste levies;

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- Potential carbon pollution taxes;
- NSW waste diversion policies; and
- Community Expectations.

It is doing so by formulating a new domestic waste service for the City. Initial efforts are being maximised to advance understanding and responses to the domestic waste stream but other waste streams will also need to be targeted in due course. Domestic waste is being targeted because it currently comprises 70% of all material presenting at Awaba for filling. Council maintains detailed records of the source of the waste that enters the Awaba site for landfilling and domestic waste streams are the largest. The following graph depicts the sources;

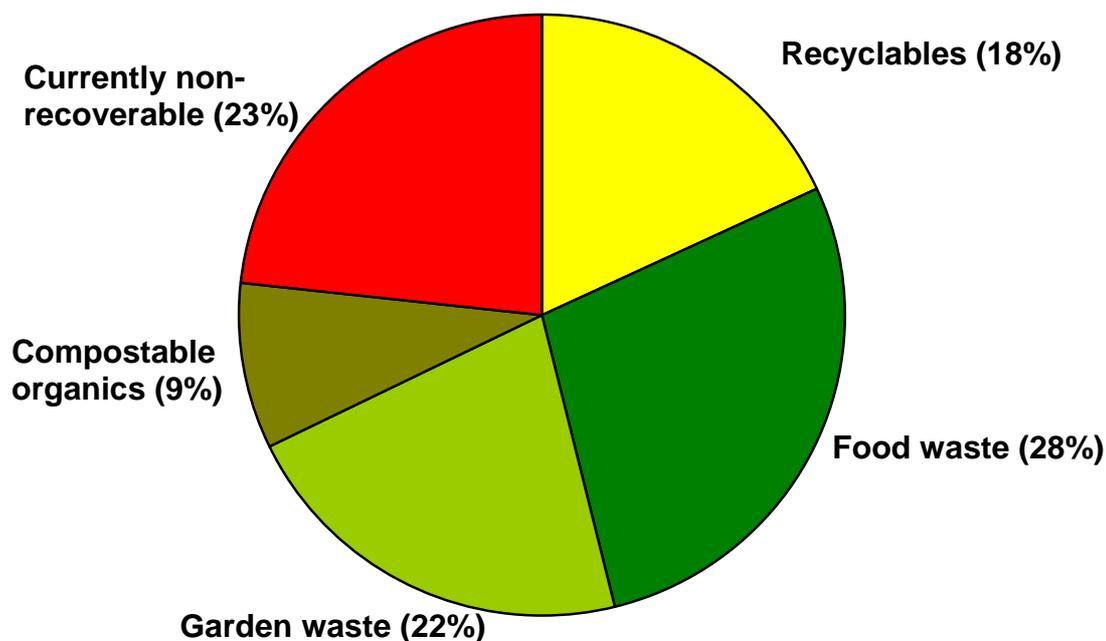
Graph 1: Waste Presented at Awaba from audit – Lake Macquarie, May 2010



It should be noted that in part the breakdown in source is skewed towards domestic waste because of pricing decisions taken by Council. C&I and C&D waste (shown as Commercial, building, industrial waste in Graph1), because it is self hauled, can be taken to the most cost effective receival point. Domestic waste, usually due to licensing limitations on waste facilities, but also because it is typically a local Council's responsibility to manage, flows to the relevant Council's facility. LMCC has been able to price away from Awaba a proportion of the C&I and C&D waste that may otherwise have presented there, to other sites that have capacity and whose business model requires higher volumes of discretionary waste to be attracted.

As well as the volume of domestic waste that needs to be dealt with, the makeup of that waste within the domestic stream indicates some immediate opportunities to divert significant proportions of the domestic waste stream. In particular, only about 23% of what is typically deposited in a Lake Macquarie residential mobile garbage bin (MGB) cannot be readily diverted away from landfilling. The proportions are;

Graph 2: Bin contents from audit – Lake Macquarie, July 2010



The above graph shows the average contents of MGB's audited in Lake Macquarie in July 2010. The section of the graph coloured red and labelled "Currently non-recoverable (23%)" depicts that portion of the MSW stream that can't be easily retrieved for reprocessing or reuse. The recyclables (18%) fraction of the waste stream can potentially be diverted through the existing kerbside recycling service offered by Council. The three green shaded sections of the graph, compostable organics (9%), garden waste (22%) and food waste (28%) could be processed through decomposition (composting or anaerobic digestion) and converted to composts and soil conditioners. They represent 59% in total.

Council has commissioned additional waste audits to improve its understanding of the domestic waste stream and support the development of the waste strategy. Additional completed surveys indicate the July 2010 results are typical and therefore form a reasonable basis developing the waste strategy. Specific results include;

- October audit: 67% organic
- MUD audit: 56.63% organic
- Home composting audit: 63% organic

Due to the extent of the MSW and the organic fractions within it, solutions that target those particular waste components are key to devising an effective waste strategy. Especially noteworthy in the above results is the experience with multi-unit dwellings. A key issue in the delivery of an SSO service is the community perception that MUD's do

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not generate volumes of organic waste comparable to single unit dwellings. The result of the audit is that in make-up, the composition of the waste stream is comparable.

A number of key elements of the Waste Strategy Project have been completed;

- Part 1 of the project is completed. It comprised a *Review of Waste Input Data and Forecasting Assumptions*. The stage one report informs the modelling of the options and is being used to benchmark negotiations for the temporary diversion of non-putrescible waste from the Awaba landfill site.
- Part 2 of the project is the *Strategic Waste Options and Triple Bottom Line Analysis Part 2; MSW and Organics*. That work evaluated and ranked the 10 most feasible processing solutions and led to the selection of the two most favoured options used in the exhibition of the draft processing strategy.
- Part 3 examines minor waste streams *Strategic Waste Options and Triple Bottom Line Analysis, Part 3: 'Minor' Waste Stream*.
- Part 4 examines the issues associated with implementing the favoured waste strategy and is titled *Strategic Waste Options and Triple Bottom Line Analysis Part 4; Implementation Considerations*. It was a key document supporting the recent exhibition of the draft Waste Strategy – Processing Technology.
- A waste auditing program is advanced with three stages complete, and two still to commence. Completed are the first MGB Audit (July) and Landfill Audit (May) while the second and third MGB Audits were undertaken concurrently with a Recycling Bin audit (October & January). One further MGB Audit is still to commence, to account for seasonality in the waste stream, in April and a follow up audit of premises participating in the home composting trial will occur in about September 2011.
- A stand alone report was also commissioned titled *Review of "Best Practice" Waste Management Alternatives*. That report examines world best practice, potentially relevant to Lake Macquarie, in various waste streams management.

Each of the reports described above has been loaded on Council's website and is available for public scrutiny. The Part 1 Report has been edited to remove commercial-in-confidence information provided to Council's consultant by third parties.

As part of the work to devise a waste strategy, a waste awareness campaign has been delivered. The community waste awareness campaign complements other activities that make up this project, including a home composting program, a community consultation program around the future of waste service delivery for the city, and an education campaign for the introduction of new or altered waste services for the city. The waste awareness campaign is described in greater detail in Appendix 2, however the objectives of the waste awareness campaign are to:

- Prime residents with the necessary information around waste management that will encourage them to accept and perform behavioural changes of their household waste management into the future.
- Reach the entire residential population of Lake Macquarie with the desired messages
- Raise community understanding of:

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- personal responsibilities around waste;
- current waste management practices and their impact, i.e. finite nature of landfill;
- different types of waste, e.g. e-waste, organic waste, hazardous waste etc.;
- increasing waste costs, i.e. State levies, and their impact at the local level;
- possible carbon pollution liabilities under Federal Government plans;
- need to reduce organic waste going to landfill, owing to the carbon emissions it produces and associated environmental and economic costs;
- Provide confidence to the Lake Macquarie community that Council is abreast of waste management issues; and
- Demonstrate that Council will consult with the community to develop safe, cost-effective, and convenient waste management solutions.

Following determination of a preferred waste processing technology, the campaign will continue at a low intensity up until about July 2011 concentrating on the 'call to action' message, "Avoid, Reduce, Reuse, Recycle". In the latter part of 2011, and if Council selects a three bin system, the awareness campaign will evolve into an education program preceding the introduction of Stage 1 of the SSO system.

No Regrets Activities

At the outset of the Waste Strategy Project, a number of no regrets activities were identified. These activities are considered *No Regrets* as they make a positive contribution to the City's waste management problem regardless of the eventual choices made by Council on a waste solution. Progress is being made on those no regrets activities as follows.

EOI, Provision of Waste Processing and/or Disposal Project (Awaba Waste Diversion): An Expression of Interest (EOI) was advertised for parties interested in taking a portion, or all, of any of the waste streams currently landfilled at Awaba. The intention is to identify any short term opportunities that exist to extend Awaba's life in a commercially sound manner. To accompany the EOI, a valuation of the approved airspace in the landfill was undertaken by Council's Business Analyst, Waste Environment and Rangers with advice from Council's consultant. The purpose of that analysis was to provide a basis of comparison between the airspace value and prices in the EOI responses. The air space value effectively representing a benchmark to determine whether any diversion options represent value for money. That analysis is included in the Part 1 Report and is commercial in confidence.

The EOI resulted in 11 tender responses and those were considered by Council at its meeting of 8 November 2010. Council resolved to dismiss all tenders and negotiate. Those negotiations have been delayed by staff vacancies though recent successful recruitments should now permit progress.

Proposed Capacity Extension – Awaba Waste Management Facility: The potential to expand the capacity of the current landfill at Awaba is desirable under any circumstances. Even though it is almost certain that Council's waste strategy will not be dominated by landfilling in the future, there will be a portion of the waste stream that is not recoverable for beneficial re-use. Council being able to control its

own destiny on the disposal of these fractions is very desirable. Additionally, the implementation of the strategy once adopted may take two to three years to implement, due to land acquisition, development approval, tendering and financing processes. Apart from leaving little space capacity in the landfill, it would not be desirable to go to the market, for any element of the implementation, in a vulnerable commercial position with no alternative waste management option. An increased capacity at Awaba represents a safety net to Lake Macquarie while the new waste strategy is being devised and implemented, and a solution for disposal of residual wastes that cannot be economically recovered from the waste stream.

An engineering analysis was undertaken to determine whether, in concept, an extension of the capacity of Awaba was feasible on the current footprint. That feasibility is documented in *Report for Awaba Waste Management Facility – Feasibility Analysis: GHD*, which has been loaded onto Council's website. The analysis returned a positive result and Council resolved in June 2010 to pursue a development application (project approval) for the extension. Since that time a Preliminary Environmental Assessment (PEA) has been completed by Council's Senior Development Planner and submitted to the Department of Planning (DoP) for consideration. The PEA has also been loaded onto Council's website.

The PEA is used to make a cursory analysis of the project and formulate Director General's Requirements (DGRs), effectively a specification, for the full Environmental Assessment (EA). The DGRs have been incorporated into a specification for a tender to undertake the EA. Consulting firm Cardno has been appointed to undertake the EA and commenced work at the beginning of January 2011. A project approval by the end of calendar year 2011 is feasible, though needs ideal circumstances to be achieved.

It is given that a requirement of the DGRs would be an assessment of the potential impact of the capacity extension on local flora and fauna. An important requirement of Council's own investigation guidelines is to ensure flora surveys are conducted in Spring. Many vulnerable native floral species are not detectable outside their flowering period, so spring surveys are important. Notwithstanding the DGRs for the project were received after Spring 2010, a specification and quotations for a flora and fauna assessment were prepared prior to their receipt. That resulted in Forest Fauna Surveys P/L being selected to undertake the assessment and they commenced the project on 13 September 2010. They are programmed to deliver a *Flora and Fauna Assessment of Awaba Landfill and Adjacent Land* in March 2011. That timing will allow incorporation of their results into the Project EA and the engineering design process for an extension that will be underway to coincide with the EA project.

Early indications from the flora assessment suggests offsets may be required for the threatened species *Tetratheca juncea*. The adjoining site to the east, which Council is examining as a potential site for the Waste Strategy processing technology may also provide suitable offset vegetation.

As part of the EA process Council officers have sought and received "owners consent" for the application from the Land and Property Management Authority (LPMA). Accompanying that consent the LPMA have flagged their desire to have Council acquire the landfill site. Currently the land is a reserve for waste management with Council as the Trust Manager. Council staff have commenced an

evaluation of the commercial and environmental risk implications of becoming the owner and a report on the LPMA's request will be provided in due course.

Awaba Site Extension: It is likely that Council's waste strategy, when adopted, will include the provision of new waste processing infrastructure. Both a two bin and three bin system require receipt, pre-treatment, composting vessel, maturation, post treatment and storage facilities. Most of these facilities will need to be within structures that are serviced by odour control plant.

All waste management facilities require weighbridges in order to comply with approval and licensing provisions and ideally are remote from sensitive land uses. The existing Awaba landfill is well placed and well accepted by the community. It is serviced by a weighbridge and adjacent land-users generate very few complaints about its operations (one complaint only in the memory of the current site manager).

Given the above, securing a site adjacent to the existing waste management facility at Awaba represents an almost ideal site for any future waste processing facility. To this end, a licence to occupy has been obtained from the LPMA for the property immediately to the east of the existing Awaba Landfill site. The licence will allow Council to evaluate the site for the purpose of a waste processing facility. The first component of the evaluation is a flora and fauna assessment. The second phase is the development of a concept design for the use of the site so that the relationship between the processing facility and the existing Landfill can be understood and design features incorporated into the project plan approval that is being sought for the landfill extension. The authors of the concept design for the landfill extension, GHD, have been engaged to prepare the concept design.

While the licence to occupy the adjoining land will permit Council's ongoing assessment of the site, there is a high level of risk associated with timely acquisition of Crown Land should Council decide to acquire the site for waste processing infrastructure. As the property is also now likely to be desirable as an offset site for the landfill extension proposal, Council has sought to minimise timing risks by compulsorily acquiring the property. Council at its meeting of 13 December 2010 resolved to commence the compulsory acquisition process. At this time the acquisition notice has been prepared by Council's Property staff and forwarded to the LPMA for consideration. The processing time for an acquisition notice is extremely variable, though having started the process early, the potential for it to be concluded prior to Council needing an offset or waste processing site has been maximised.

Home Composting Trial

Under any waste strategy scenario, home composting remains a highly desirable activity for City residents. Accordingly, a home composting program has been prepared with a view to maximising participation in home composting in the City. The aim of the home composting program is to empower LMCC residents with the resources and training to manage household organic waste at home, effectively diverting these organics from landfill. The Home Composting Program will;

- Empower the community to take direct action to contribute to waste diversion and minimisation/consumption;
- Raise awareness of waste issues more broadly within the community; and

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- Reduce exposure to carbon pollution reduction scheme liabilities from putrescibles wastes deposited in the Awaba landfill.

Specific targets of the LMCC Home Composting Program included a trial to engage and train 200 - 300 households on how to effectively manage organic waste at home by composting before November 2010.

The overall program is planned to build on the trial to;

- Engage and train 700 households across the LGA on how to effectively manage organic waste at home by composting before June 2011.
- Engage 7,000 households (10% Lake Macquarie population) on how to effectively manage organic waste at home by composting before June 2014.

The home composting trial has been completed and while considered successful for those that participated, a key weakness in the recruitment of participants has been identified. The original targets described above have no hope of being met unless alternative, more effective, recruitment methods are developed. A detailed review report is provided at Attachment 2. Key matters identified in the report include;

- 6,500 letterbox invitations to participate resulted in only 180 registrations and 135 participants;
- Council's audit contractor (EC Sustainable) audited 78 participant's garbage bins to determine pre-composting trial composition and found waste profiles reasonably typical for other audited properties in the City;
- Barriers to home composting primarily related to lack of expertise in home composting; and
- Participants were satisfied with the trial program and significantly increased their level of understanding of how to compost at home.

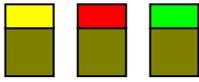
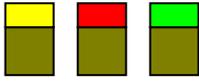
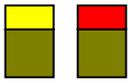
As a result of what was learnt from the trial, the following actions have been recommended;

- a) Defer roll out of the full Home Composting Program, which aims to facilitate home composting by 10% of city households, pending the outcome of a further trial of methods to improve home composting participation rates.
- b) Develop and implement a second household home composting trial that focuses on alternative methods to encourage residents to commence and maintain home composting.
- c) Review audit results of the first trial to determine whether participation has led to a decrease in amount of organic waste in participants' general waste bin.
- d) Design a communications plan for the Home Composting Program, should it proceed, that is consistent with Council's detailed City-wide waste strategy.

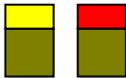
Analysis of Waste Processing Technology Options

The main purpose of the completed *Strategic Waste Options and Triple Bottom Line Analysis Part 2; MSW and Organics Report* (the Part 2 Report) was to describe and evaluate the most likely technology solutions for inclusion in the waste strategy.

The Report describes 10 potential technology solutions for the City's waste strategy. Those solutions being;

No.	Waste Treatment Option	Bin Configuration	Description
1	3 Bin Source Separated Green Waste – Windrow Composting		Green garden waste only (i.e. excluding food waste) collected in a third bin and composted in open windrows.
2	3 Bin Source Separated Organics - In-vessel Composting		Green and food waste collected in a third bin and composted in enclosed tunnels.
3	Phased 3 Bin Source Separated Organics – In-vessel Composting		Green and food waste collected in a third bin and composted in enclosed tunnels. Same end situation as option 2, but staged so that the third bin collection starts out with garden waste only, composted in open windrows (same as option 1). When Council chooses (+3 years used for analysis), food waste collection in the third bin commences and composting occurs in enclosed tunnels.
4	3 Bin Source Separated Organics – Anaerobic Digestion		Green and food waste collected in a third bin and composted without oxygen, anaerobic digestion. Methane produced, captured and burnt for energy.
5	2 Bin Landfill		Mixed waste collected (red lidded bin) and deposited directly in landfill. Same as current waste system.
6	2 Bin bioreactor		Mixed waste collected (red lidded bin) and deposited directly into a land fill specially designed to accelerate and maximise methane generation while maximising methane capture. Methane burnt for energy.

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7	2 Bin In-vessel composting		Mixed waste collected (red lidded bin) and composted in enclosed tunnels.
8	2 Bin In-vessel composting (Port Stephens)		Mixed waste collected (red lidded bin), transferred to the Port Stephens composter at Raymond Terrace for processing in a drum composter followed by enclosed windrow composting.
9	2 Bin In-vessel composting (Port Stephens) plus Energy from Waste		Mixed waste collected (red lidded bin), transferred to the Port Stephens composter at Raymond Terrace for processing in a drum composter followed by enclosed windrow composting. Additionally, energy is generated from Biogas and/or reject material at the facility, hence energy from waste. The energy component is a proposed future addition to the Port Stephens facility.
10	2 Bin Anaerobic Digestion		Mixed waste collected (red lidded bin) and composted without oxygen, anaerobic digestion. Methane produced, captured and burnt for energy.
Key	Yellow Bin		In all options, yellow lidded, recyclables bin continues to be serviced by Hunter Resource Recovery.
Key	Red Bin		In options with three bins, the red lidded bin collection is taken to land fill. In the two bin options, the red lidded bin collection is processed (options 7, 8, 9, and 10) or landfilled (options 5 and 6).
Key	Green Bin		The options shown with a green bin are all three bin options and incorporate source separation of part, or all, household waste. Each description above describes the role the green bin takes in each individual circumstance.

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These options were identified by examining Lake Macquarie's existing domestic waste stream to determine what fractions needed to be processed or recovered to achieve the NSW Domestic Waste Diversion target of 66%. Available technologies were then identified and their performance, particularly in Australia, determined. This list of available technologies was compared to the risk profile agreed by the Waste Advisory Committee (workshop of 19 November 2009). The most significant effect of analysing performance and risk was to remove options to burn waste (pyrolysis, mass burn, gasification and incineration), as a stand alone solution. These options are grouped as "thermal processing" options. One energy from waste (EfW) option was retained, option 9 above, but only as a longer term potential add-on to an existing proven facility, namely the Bedminster composter at Raymond Terrace.

The other key outcome of the risk and performance analysis was the identification of doubt around the performance of anaerobic digestion (AD) solutions for waste management. The consensus in Council's project team reflects the industry position that AD promises a very attractive waste management solution. It requires a small footprint, achieves very high diversion rates, maximises energy recovery, produces composts that are attractive for their carbon content, and produces virtually no amenity issues for adjoining land uses. The difficulty with the technology is that it is expensive, does not handle uncontrolled feedstock well, and until electricity prices warrant the investment, they are not commercially sound. In practice, AD promises a lot but under current conditions, delivers little.

Three large scale AD plants processing mixed waste have been commissioned in Australia and two have been mothballed (Atlas in Perth and UR3R in Sydney). A third plant (Arrowbio in Sydney) cost \$50 million to develop and is still operating but it has required ongoing modification and additional plant has been retrofitted, increasing the initial investment. It does not yet perform according to plan.

A plant specialising in food waste treatment in Sydney using AD technology (Earthpower, Sydney) continues to operate but has also had a very troubled past. Costing an estimated \$35 million to build, the plant has been continually modified, never performed as planned and was sold for \$1 in 2007. It is understood the plant continues to make significant operating losses though the operators advise they are confident of achieving 'break even' in the near future.

A pilot AD plant has been developed in Shenton Park, Perth that promises to address many issues with past experiences. Client approval to bring the pilot into full scale production (55,000 tonnes per annum capacity) has recently been given. Shenton Park combines aerobic with anaerobic stages of processing within the one vessel and marries advanced system control technology to the process. The provider's claims, if achieved, would make the approach extremely desirable, however in the absence of a full scale, stable working model and LMCC's risk averse profile, that technology scores poorly in the multi-variate analysis. As an aside, Barwon Regional Council in Victoria (Geelong and surrounds) had selected the same (AnaeCo DiCOM) solution as part of its waste strategy in 2009. It has recently been announced that Barwon has terminated its agreement for the provision of an AD Processing Facility due to "timing" issues. Barwon have advised they will return to the market with a new tender shortly and have publicly advised that AnaeCo are encouraged to tender again.

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With a list of 10 technologies described and with adequate information available for each to make a reasonable first pass analysis, the options were assessed against the triple bottom line weightings assigned by the Waste Advisory Committee. These weightings allowed Council's consultant to score each option against the values agreed by the Committee. The WAC weightings were;

Issue	Priority (out of 10)
Carbon footprint	9
Technology risk	9
Health and amenity	8
Service convenience	8
Empowered community	8
Local economic development	8
NSW waste targets	8
Market risk	8
Resource recovery	7
Financial cost	7
Local employment	7
Flexibility	7
Synergy with LMCC	6
Socially equitable	5
Pollution	5
Economic multiplier	5
Land contamination	4
Social cohesion & inter-action	2
Impact on tourism, mining	1

Using these weightings, the result was a set of scores for the options. The final scores are shown below;

Ranking	Option #	Option Description	Score
1	3	3 - Phased Source Separated G & Food Waste composted in Vessel	880
2	2	2 - Source Separated G & Food Waste composted in Vessel	824
3	7	7 - 2 Bin MSW enclosed composting (Awaba)	802
4	1	1 - Source Separated G/Waste - Open Windrow	796
5	9	9 - 2 Bin In Vessel Comp PS + EfW	792
6	8	8 - 2 Bin MSW enclosed composting (Pt Stephens AWT)	778
7	4	4 - 3 Bin Source Separated Green & Food to Anaerobic Digestion	763

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8	10	10 - 2 Bin MSW Sort + Anaerobic Digestion	755
9	6	6 - Two Bin + Bio-Reactor Landfill	663
10	5	5 - Two Bin + Landfill (BAU)	658

 Selected for more detailed analysis.

As previously reported to Council, the first ranked and third ranked options were selected for further, more detailed analysis. The second ranked option was considered a sub-set of the first ranked option, as discussed below. Within the Part 2 Report, each of the options has identified strengths and weaknesses, especially in relationship to each other.

Three Bin Phased Source Separated Garden & Food Waste Composted In-Vessel (Option 3)

The highest ranked and preferred option is the phased introduction of an organics processing service.

In Phase 1, garden (green) waste would be separated, at the home, and presented for kerbside collection in a third bin. The third bin would be collected fortnightly. The phasing would revolve around the introduction of food waste to the third bin. By only allowing green waste in the third bin in Phase 1, processing could occur through open (outdoors) windrow composting. Phase 1 has the advantages of;

- Being low capital intensive and low cost overall;
- Requiring limited infrastructure to undertake, it requires a relatively brief lead time for its commencement;
- Low risk in terms of the technology used and disposal of the outputs;
- Likely to enjoy a relatively brief approval process; and
- Relatively easy to communicate to users what can and cannot be presented for collection.

Green organic processing on its own has the disadvantage of not being able to achieve diversion targets, estimated to achieve only about 44%. Other organic streams need to be added if the 66% target is to be reached.

Phase 2 of the service would see the introduction of food waste to the third bin. At the time food is introduced, collection of the third bin would need to be done weekly to minimise amenity issues (odour, bin cleanliness) for users. Processing would also need to change to "in-vessel", rather than in open windrows so as to facilitate odour control. The addition of food waste also improves the quality of the compost by introducing additional nutrients to the mix. In most applications of the final compost, with the exception of native plants, the additional nutrients are beneficial.

The second highest scoring option, Option 2 was not selected for the next stage of analysis. The reason being that analysis of the higher ranking phased option (Option 3) provided intelligence on Option 2, Source Separated Green & Food Waste Composted In-Vessel. Option 2 provides the same end-point as option 3 but does not include phasing. That is, from the outset, Option 2 would permit food as well as garden organics to be placed in the third bin to be collected weekly for processing in-vessel.

In effect, analysis of the phased three bin SSO system Option 3, also gives an analysis of the un-phased three bin SSO system Option 2.

Two Bin MSW Enclosed Composting at Awaba (Option 7)

The third highest ranked option and the main alternative publicised in the exhibition of the draft strategy is the retention of a two bin system, which is the same as the current collection system, however with the separation of organics being managed at the processing stage. That is, the mixed waste is collected as it is now and delivered to a processing plant, rather than the tip face at Awaba (similar to that proposed under the previous regional solution). The location of a processing plant at Awaba is subject to other approvals and may not be achievable. The Awaba label is used in describing option 7 to distinguish it from the Port Stephens options (options 8 and 9) and to provide a basis for modelling the collection task.

The processing system could have a number of variations but in principle the likely key stages would comprise preliminary sorting to remove recyclables and oversized items, mechanical mulching, initial composting in controlled conditions (i.e. in-vessel to manage odours), maturation composting potentially outdoors, and final refinement to remove a proportion of contaminants.

The two bin system has the advantages of;

- Generating a smaller carbon (greenhouse gas) footprint than three bin options;
- Achieving higher diversion rates than three bin options;
- Facilitating dry recyclables recovery from the waste stream;
- Reducing the education 'burden' of introducing a third bin;
- Reducing the extent of change management required in Council's own operations;
- Providing greater flexibility in future waste options, including a pathway to an energy from waste facility; and
- Reducing the extent of service dissatisfaction opportunities amongst multi-unit dwelling occupants.

The relative disadvantages of the two bin system are that it will likely be more costly than a three bin solution. That is because the third bin provision and collection fleet cost would be more than offset by the higher capital and operating costs of the mixed waste processing plant. The other disadvantage is that the compost product emanating from the process has limited application, due to the existence of contaminants within it, and it is subject to a regulatory regime that may be altered in the future.

Landfilling Options (Options 5 & 6)

Two options that warrant particular comment are those relating to landfilling. The analysis indicates these options are attractive in the short term based on cost but they perform poorly against environmental criteria.

The keys to not pursuing landfill options include the great uncertainty about obtaining an approval for a landfill extension, or new landfill, in the absence of Council having diversion strategies in place. The Infrastructure SEPP has been amended to include the following provisions;

(1) In determining a development application for development for the purpose of the construction, operation or maintenance of a landfill for the disposal of waste, including putrescible waste, the consent authority must take the following matters into consideration:

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- (a) *whether there is a suitable level of recovery of waste, such as by using alternative waste treatment or the composting of food and garden waste, so that the amount of waste is minimised before it is placed in the landfill,*

(Underlining added)

The current capacity at Awaba means that delays to obtaining an approval for an extension, such as while an argument to set aside the quoted provisions noted above, place us at risk of not having a disposal option by the time Awaba's capacity is exhausted. On the other hand, the irony is by implementing a processing scheme, thereby reducing the need for landfill capacity, it increases our chances of getting an approval for an increase in capacity.

Proposal:

The proposal is that Council adopt a Phased Three Bin Source Separated Organics processing system as its preferred waste processing technology. The phasing to comprise;

1. Phase 1 - a fortnightly garden waste only collection coupled with processing by open windrow composting . Continue a weekly MSW collection.
2. Phase 2 – a weekly source separated organics (including food with the garden waste) coupled with in-vessel composting. Reduce to a fortnightly MSW collection.

The Phased Three Bin SSO system is the highest scoring option amongst the ten examined and assessed against Council's weighted evaluation criteria. The system has the following identified advantages (*Lloyd Consulting Part 4 Report*);

- *implementation can start sooner providing immediate rewards in the form of improved waste diversion (phased implementation);*
- *gate fees are lower therefore it is the cheapest solution;*
- *tunnel composting of SSO is well proven, tried and tested (lower risk);*
- *achieves the 66% WARR diversion target once fully operational;*
- *produced compost is clean and of high quality;*
- *unlimited market for clean compost (including in agriculture);*
- *very competitive market for tunnel composting;*
- *preferred by LMCC residents;*

The recommended option is considered the best available option. On balance the three Bin option is only slightly more favourable than the main two Bin option with the key determining features being;

- The avoidance of producing, and distributing into the wider environment, a compost material that presents potential legacy problems for future communities. While land treated with MSW composts in the future is likely to be severely degraded and will benefit from the application of the compost, in the very long term

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future users may be faced with difficulty in utilising that land due to the existence of glass fines and chemical contaminants.

- The standards applicable to the compost products of the three bin system are relatively stable, compared to the two bin standard which is only certain to 2013. Even accounting for a mooted removal of the 2013 expiry of the Alternative Waste Treatment Derived Organic Rich Fraction (AWTDORF) standard, there is also proposed a replacement trial program to quantify the impacts of physical contaminants in AWT composts. The response to a negative trial result remains a risk to such systems.
- The Three Bin system maximises the personal responsibility of householders to participate in the management of the waste they generate. This creates an education burden for Council but it is also an opportunity to engage and increase higher order waste management messages such as to avoid, reduce, and reuse waste.

There are however some weaknesses in the three Bin system relative to a two Bin system. I have concluded that while they are important, they do not on balance outweigh the other features of the three bin system. It is important for the sake of transparency and to ensure Council has a balanced analysis before it to recognise those weaknesses. The consultation undertaken on the draft emphasises these weaknesses;

- The three Bin SSO system potentially diverts less material overall (in the long term) from landfill than the two Bin alternative, though this is dependant on the maintenance of a low threshold AWTDORF standard.
- The overall increase in kerbside waste removal capacity (240 litres per fortnight) may facilitate increases in the total domestic waste stream.
- Premises that generate limited organic waste or have bin storage problems will not be willing participants in the service.
- The introduction of a third collection fleet operating within the City will have road asset and fuel consumption impacts and will be subject to peak oil vulnerability.

The 2 Bin AWT system also has strengths of its own. These are documented in the Part 4 Report and are summarised as;

- *higher diversion rate, enough to bring council well above the WARR 66% target;*
- *no need to change bins or collection system;*
- *lower GHG emissions profile;*
- *maximum resource recovery - allows the recovery of dry recyclables from the waste stream; and*
- *close proximity to Hunter region mine sites could improve marketability of AWT compost.*

The two bin option is inferior based on objective criteria used in the multi-variate analysis but remains close enough for it to remain a viable alternative to the preferred solution. It is also less preferred by the community as evidenced in the community feedback from the exhibition and the community survey. It would be likely to generate fewer community service problems during implementation (ie. due to the management of change around new services, bin delivery and collection) and therefore may generate relatively higher

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community satisfaction in the short term. On the basis of past community surveys, it is less likely to meet community expectations of environmental stewardship in the long term.

Consultation:

A detailed report outlining all consultation and feedback activities associated with the Waste Strategy Project has been provided as Appendix 3. Embedded within that report are the responses to the public exhibition of the preferred waste processing option and the results of a community survey undertaken in November 2010.

The clear message from the consultation is that the majority of the general community support a third bin. The key results being;

- 64% of submissions to the draft strategy exhibition prefer a third bin and 22% preferred two bins.
- 69% of survey respondents preferred three bins as the best option for their household, 18% preferred a two bin system and 9% would be satisfied with either.

The main reasons offered in exhibition submissions for preferring a third bin are;

- Satisfaction and support for Council in taking an environmentally sustainable direction with waste management.
- Preference for the high quality compost from the three bin system and the community involvement in taking responsibility for sorting their own waste.
- Additional space to dispose of green waste.
- Some residents are unable to home compost or had been unsuccessful in their attempts to home compost or could not use all the compost generated, and so the three bin system allowed them to participate in this practice.
- It is the cheaper of the two preferred options

The main reasons offered in the community survey for preferring a third bin are;

- Better for the environment
- Better management of green waste
- Better compost would be produced
- More cost effective/Cheaper
- We need the green bin as we have a lot of green waste
- Good/Great idea, would love it to go ahead
- Experienced with similar systems either at home or in other council areas
- Less waste going into landfill/Awaba tip
- More convenient way to recycle garden waste and food scraps
- Easier system, both for Council and residents

There were also reasons offered for not supporting a third bin system. From exhibition responses these included;

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- Residents have no use for a third bin as they do not generate enough waste.
- Residents home compost and see no need for an organics bin. Many suggested Council introduce a user pays system as an incentive and reward for people that home compost.
- Residents have no room to store the third bin (most of these submission were from residents identified as living in multi-unit dwellings).
- A small number of submissions suggested the general public are too apathetic and lazy to use a three bin system properly.

From the community survey, the following reasons for opposing a third bin service were offered;

- Compost/already use our green waste
- The current two bin system is sufficient/works well
- Do not have use/need for the third bin
- Lack of space for a third bin

In consultation with staff during assessment of the Draft Strategy options, there was a clear distinction between the preferences of operational staff and sustainability staff. The full content of those preferences is recorded in the previous report to Council on processing options (10STRAT037, 1 November 2010) but can be summarised as operations staff preferring a two bin solution as it most closely resembles the existing service thus reducing implementation risks and logistical change management. Sustainability staff preferred the three bin solution due to the superior environmental performance and greater community engagement it engenders.

Implications:

Policy Implications:

The recommendation to this report, that a phased three bin SSO processing system be adopted as Council's preferred waste processing technology, would represent a policy position of Council if adopted. The next stages of the waste strategy project include tendering for a waste processing service, and while non-conforming options may be submitted, the analysis to this point transparently describes the weaknesses of alternative options.

The determination of the processing solution is a fundamental element of the overall strategy and its determination affects each component of the waste service, from the household through to the final application of waste derived products. In the context of the current strategy formulation, and due to the capital costs involved, the processing technology decision is a long-term decision. It affects most significantly;

- collection systems
- the extent of work required by each individual or household to access the waste service
- the cost of the system
- the environmental performance of the system, and

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- the education effort required to support the system.

Due to the scale of the waste service and the fact its delivery touches almost every property in the City, the determination of a processing technology is one of the most significant policy determinations the Council will make.

Also relevant to Council's decision is the NSW Waste Avoidance and Resource Recovery Strategy. The Department of Environment, Climate Change and Water (DECCW) released for discussion a draft implementation plan for the period 2011-2015 in December 2010 (after Council adopted its draft processing technology). This implementation plan is especially important as it represents probably the last chance to adjust implementation activities ahead of the deadline for achieving the 66% diversion target (2014). Of particular relevance to LMCC is the proposition that DECCW will define a best practice model for household collection services. The best practice model being a three bin system. The full draft implementation plan is included as Appendix 4 to this report, and the reference to a best practice model is as follows;

- 1.1 Encouraging councils to adopt best practice models for household collection bins, with a minimum three-bin system with separate bins for (i) dry recyclables (glass, plastics, paper, and cardboard) to move towards a 75% best practice recovery rate; (ii) garden/food waste, where the waste does not go to alternative waste treatment plants; and (iii) residual waste.....*

The Minister for the Environment, the Hon. Frank Sartor MP has also flagged a preference to mandate a three bin collection system, taking the identification of a best practice model a step further. These forecast policy directions of DECCW further endorse the recommended three bin option for Lake Macquarie.

Environmental Implications:

Waste management is a major element of our environmental stewardship responsibilities with landfill operations being significant greenhouse pollution risk and waste management overall a major element of our City's environmental impact.

Council's decisions around waste management have the potential to greatly affect the environmental footprint of the City as a whole. Resources consumed and preserved, local environmental impact, the generation of greenhouse gases, and influencing community knowledge and behaviour will all be affected by the City's waste strategy.

The recommendation is to endorse a waste processing technology that rates best against multi-variate criteria and is most favoured by the community. A waste strategy is an important element of our environmental management program and the selection of a processing technology is fundamental to the strategy.

Social Implications:

The selection of a waste strategy will have social implications. The cost of Council services, the relative convenience of the services we offer, the flexibility of services to meet individual needs, the generation of new employment opportunities, and the extent of education and community interaction are all elements of the service that can be characterised as social parameters to the final decision.

While analysis of the options weighted social issues slightly behind environmental issues, they still received relatively high priority in the multi-variate analysis. Combined with a clear distinction in community feedback favouring a three bin system, the recommendation appears to be the most socially supportable waste processing option.

Financial Implications:

The implementation of a waste strategy will represent one of the largest cost decisions a Council is ever likely to make. Due to the scale of the service alone, any decision on the waste strategy will represent a large, long-term commitment to the expenditure of funds. As waste services are separately funded by direct charge to the community, the financial implications of any waste strategy decisions have a direct influence on charges borne by service users, though they isolate that impact from other financial constraints on Council services.

In summary, the key financial metrics of the recommendation are;

3 Bin Option (phased SSO)	
Total cost 10 years	\$329 million – aggregate
Total cost 30 years	\$1,769 million – aggregate
Cost per household +10 years	\$575 per year
Cost per household +30 years	\$1,491 per year

Financial implications also scored relatively highly in the values workshop, though lower than the key environmental and social elements. Community workshops placed financial considerations mid-range. The fact the three bin system was likely to be the cheapest practical option available was an important consideration for a significant minority of residents as evidenced in both submissions to the exhibition and the community survey.

Risk and Insurance Implications:

There was a significant influence of risk on the rationalisation of feasible options in the *Strategic Waste Options and Triple Bottom Line Analysis Part 2; MSW and Organics* report. Council's risk profile excludes thermal treatments from further consideration and even amongst the remaining options, risk was a key factor in scoring anaerobic digestion alternatives relatively lowly.

The recommended processing technology has a relatively low likelihood of failure and low consequence of failure characteristics, giving the technology an overall low risk profile.

Options:

The Waste Strategy Project has refined the available processing technology options to a point where a single processing technology emerges. At this time thermal treatment options have been excluded due to their inherent risk, landfill only options have been ruled out through government policy barriers and the anaerobic digestion options have been discounted due to their lack of a record of success.

What remains are in-vessel composting solutions of either source separated organics or mixed solid waste. An assessment of those two options has resulted in a phased introduction of a three bin source separated organics system being preferred.

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At this time all processing options remain open to Council to select. Ten different options have been examined in some detail in the Part 2 Report but there are also all the thermal options discarded early in the project that could be reconsidered. There is however a body of work now available that makes it clear that only in-vessel composting solutions have any real likelihood of addressing the key drivers of landfill capacity, rising landfill costs and environmental stewardship.

Between the two main variations of in-vessel composting, three bin SSO and two bin AWT, there is an advantage in the 3 bin system when compared against Council's weighted evaluation criteria and community consultation has led to a strong endorsement of a three bin system.

The strengths and weaknesses of all practical options have been extensively assessed. Endorsement of the recommended processing technology deliver a timely solution to the consumption of all available capacity at Council's only landfill site. Alternatives remain available to Council, however all represent more expensive alternatives and greater risks in achieving a solution within available time.

Conclusion:

The waste strategy project will continue to develop during 2011 potentially leading to the long term, most affordable and most environmentally responsible suite of services and facilities possible.

There has been extensive analysis and community consultation surrounding the processing technology that will be favoured within the strategy and a stage SSO (three bin) system has been preferred by both comparative assessment and community judgement.

Endorsement of the favoured technology will allow Council staff to continue to work towards a long term solution in time for the final consumption of Awaba's current, available capacity, in November 2015 at the very latest.

Director - City Strategy - Tony Farrell

Attachments:

- | | | |
|--|----------------------|-----------|
| 1. Final Report - LMCC Community Waste Research - 2009 | | D01655670 |
| 2. Home Composting Trial Report | Under separate cover | D02017112 |
| 3. Community Consultation Report - Waste Strategy Project - Waste Processing Technology 2010 | Under separate cover | D02027537 |
| 4. NSW Waste Avoidance and Resource Recovery Strategy. Discussion Draft: Strategic Directions and Implementation Plan 2011-2015. | | D02016982 |

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