



Expanded Polystyrene Recovery Feasibility Study Moonee Valley & Melton Transfer Stations

Final Report

24th November 2022



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FINAL REPORT

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This report has been prepared for Moonee Valley City Council (MVCC) and Melton City Council (MCC) in accordance with the terms and conditions of appointment on Monday 12th September 2022. The information contained in this report prepared by DJR Environmental Pty Ltd (ABN 48 853 513 446), is based on information gathered throughout the project in consultation with MVCC and MCC and available documentation provided by MVCC and MCC at the time of preparing this report. DJR Environmental Pty Ltd cannot accept any responsibility for the use of or reliance on information provided in this report.

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Background

In July 2022 DJR Environmental were invited by Moonee Valley City Council (MVCC) and Melton City Council (MCC) to respond to a Request For Quotation to provide a response for an EPS feasibility study.

Both MVCC and MCC operate transfer stations in Aberfeldie and Cobblebank respectively. Currently there is no diversion of EPS from landfill from either site.

While MVCC segregate EPS on site into a signed 30m³ EPS bin, this bin is then topped with heavy general waste and sent to the Cleanaway Melbourne Regional Landfill (MRL) as general waste.

At the Melton Transfer Station all EPS is thrown into the general waste pit and also disposed to MRL as general waste.

In September 2022 DJR Environmental in association with Circular Resources Australia were appointed by MVCC as the successful consultant to carry out this EPS feasibility study.

EPS is very problematic as it is light in weight, takes up large volumes and if broken can become a significant litter issue.

This feasibility study has assessed the current EPS recycling markets and options for both Councils to take the next step to implement an EPS recycling program at their respective transfer stations. It assesses on-site EPS compaction options (both hot and cold), EPS being collected loose from the transfer stations and also a drop-off model direct to the recycler. These options are presented in a detailed cost benefit analysis. The study also provides current information on EPS generation, recycling rates, tonnages still being sent to landfill and government policy on EPS.

The report also provides a recommendation on the best path forward for recycling EPS generated at each transfer station.

1 Assessment EPS Materials Flows

1.1 Moonee Valley Transfer Station

On Tuesday 13th September 2022 the DJR Environmental Project Team, David Rako and Allan Cummins visited both the Moonee Valley Transfer Station (MVTs) and Melton Transfer Station (MTS).

The Project Team met with Wesley Death, Waste Management Officer, City of Moonee Valley, at the MVTs located at 188 Holmes Road, Aberfeldie. Wesley provided a site tour of the MVTs and inspection of the expanded polystyrene (EPS) drop off service for residents and businesses.

While the drop off service is free for Moonee Valley residents for non- residents MVTs charge the following EPS drop off fees:

- Car Boot Load up to 0.25m³ = \$40.00;
- Station Wagon up to 0.5m³ = \$60.00; and
- Single Trailer/Ute/Van up to 0.7m³ = \$80.00.

MVTs have dedicated and signed EPS 30m³ hook bin, into which loose EPS is placed into the bin. See images below from MVTs:



All EPS collected at MVTs is sent to MRL landfill located at Ravenhall.

It is estimated that up to 90m³ of EPS is collected each week at MVTs.

1.2 Melton Transfer Station

The Project Team met with Sarah Taylor, Assistant Coordinator – Waste Graffiti and Cleaning, Melton City Council and Andrew Christie, Commercial Services Manager Victoria, Outlook at the Melton Transfer Station (MTS) located at 33 Ferris Road, Cobblebank.

The MTS does not provide a dedicated drop off area for expanded polystyrene (EPS).

All EPS is placed into the mixed general waste bins and disposed at landfill.

Anyone dropping off EPS at MTS are charged the following mixed waste fees:

- Car Boot Load: Resident \$18.000 & Non-Resident \$26.00;
- Station Wagon: Resident \$26.00 & Non-Resident \$43.00;
- 0.5m³: Resident \$37.50 & Non-Resident \$45.50; and

- 1m³: Resident \$75.00 & Non-Resident \$91.00.

It is estimated that approximately 10 m³ of EPS is collected each week, however this number is not able to be confirmed as receipt data is not maintained for EPS material.

While there is no recycling of the EPS, the MTS does segregate and collect EPS when segregating cardboard packaging, this EPS is then placed into the mixed waste bin. See image below of segregated EPS:



1.3 EPS Recycling and Consumption Trends

The following information sourced from *Expanded Polystyrene Working Group 2018 APCO* provides information on current EPS consumption and recycling rates across Australia.

There are major data gaps in the amounts of EPS that is consumed in Australia. Estimated consumption is 71,000 tonnes, growing at a rate of 5% per annum.

This consists of:

- 47,000 tonnes - domestic manufacture from imported resins, of which 70% is used in the built environment and 30% for packaging. Of the 30%, approximately half is exported as fresh food packaging.

This data, sourced from the industry association Expanded Polystyrene Australia (EPSA), is considered to be reasonably accurate.

- 24,000 tonnes – high level estimate of EPS imported as packaging with products.
- 3,000 tonnes – EPS reprocessed and used locally

The National Recycling and Recovery Survey for 2018-2019, March 2020 has estimated in Australia for EPS, 57,800 tonnes consumed and 6,600 tonnes recycled at a recovery rate of 11.5%.

Australian plastics reprocessing destination for EPS:

- Locally processed for local use: 1,500 tonnes
- Locally processed for export: 1,900 tonnes; and
- Direct to overseas: 3,200 tonnes.

In Victoria in 2018-2019 consumption of EPS was 15,100 tonnes.

In Victoria in 2018-2019 recycling of EPS was 2,400 tonnes.

In Victoria in 2018-2019 recovery rate of EPS was 16.3%.

- *Source: Envisage Works 2018-2019 National Recycling and Recovery Survey for Plastic Packaging: March 2020*

It is estimated that 12,000 tonnes of EPS is disposed to landfill each year, taking up 240,000 cubic metres of landfill space. In 2015-16, recycling rates for EPS in the ACT were less than 20%, with 500m3 going to landfill. This has an estimated cost of AUD\$3.5 million per year.

Source: Expanded Polystyrene Working Group 2018 APCO

There are still significant volumes of EPS being disposed into landfill, that could be recycled and diverted from landfill.

In discussions with Graeme Attwood, EPSA, he noted that during COVID there were record amounts of EPS generated due to the following reasons:

1. High demand in food delivery services;
2. Medical and supplies during COVID;
3. Construction Sector i.e. waffle pods; and
4. High demand for sales of white goods during COVID.

1.4 Current & Projected Recycled EPS Markets

The viability of any EPS recycling program will be reliant on both the current and projected EPS end markets. The following provides feedback from industry associations on the viability of the EPS recycled end markets.

The project team interviewed Graeme Attwood, EPS Consultant, Expanded Polystyrene Australia (EPSA). He noted that the Australian Federal Government export ban was a non-issue for the industry as long as EPS from Australia has been compacted, either hot or cold and is exported overseas to an accredited recycler.

There is a significant amount of hot compacted EPS being exported to overseas markets for recycling and the rebates associated are directly linked to the price of crude oil as this is the starting point for the development of plastics.

He also noted that there are a number of companies across Australia that have been compacting and exporting EPS overseas for over 10 years. These companies have developed strong export markets and are being provided with stable rebate prices for the compacted EPS.

In early 2023 EPSA will launch STYROCYCLE, a branded program that will be promoting recycling EPS by member companies including Foamex. This will include a collection and recycling program nationally and involves the recycling the EPS into new 'waffle pods' within Australia.

EPSA have also been working with the Consumer Electronics Suppliers Association (CESA) as they are keen to investigate a cost-effective EPS collection and recycling program for CESA members.

The project team also identified the FOAM MULCHER program, a truck with a hot EPS compactor that visits clients sites to compact EPS while on site. The program is run by Christian McClean, Managing

Director, Waste-Pro. Waste-Pro is keen to expand the Foam Mulcher program service to Victoria. He is looking for investors and funding options.

APCO is also reviewing an EPS Product Stewardship Program, EPSA members are already making a financial contribution on EPS production in Australia.

1.5 Current & Future Victorian EPS Supply

While there is some debate to the accuracy of the data provided for the EPS generation and recycling rates. One issue that is not under debate is that the volume of EPS being generated across Australia as per feedback provided by Graeme Atwood, EPSA, that EPS manufacturing across Australia has increased by approximately 5% each year.

During the recent COVID lockdown period there were record sales of home electrical items including computers, monitors, TV's and printers with many people working from home and setting up home offices and updating home entertainment systems.

1.6 Current plans to Phase Out EPS

Department of Agriculture, Water and Environment (DAWE) have released a discussion paper; *National Plastics Plan – Pathways to more sustainable use of expanded polystyrene (EPS) 2021* (see copy attached in Appendix A).

The paper highlights the Australian Government's National plastics plan and action to phase out problematic plastics that includes both imported and locally manufactured plastics.

Under the EPS umbrella, products that are in scope for the industry led phase out include:

- EPS loose fill consumer packaging – Used for consumer product protection in freight, for example peanut shaped loose foam packaging;
- EPS moulded consumer packaging – Use for consumer products. Protective packaging from white and brown goods and electronics including but not limited to computers, TV's, printers, fridges, toasters, furniture and homewares; and
- EPS food and beverage consumer containers – Single use hot and cold cups, tubs, bowls, plates and clamshells for food services.

Industry lead phase outs do not apply to the following EPS products:

- EPS used for business-to-business packaging such as fresh produce boxes;
- Specialist packaging used in medical applications for example organ transport or pharmaceuticals;
- EPS used in building and construction; and
- Business to consumer packaging where there is a demonstrated and effective reuse model in operation, for example bulk cold home delivered meal services.

In December 2022 the Australia Government will review industry progress in taking responsibility for the applicable packaging and container types. This will include phasing these items out where required. It will then consider any regulatory action that may include:

- Regulated ban;
- Co-regulatory product stewardship arrangement; and/or
- Mandatory product stewardship arrangement.

Before any regulation could come into effect it would first need to be considered through the Australian Government’s Regulatory Impact Analysis Framework. This approach would allow industry to demonstrate its leadership, potentially avoiding the need for any regulatory intervention.

There is currently no data on how any of these potential bans will impact on the overall volume of waste EPS generated across both the residential and commercial sectors.

1.7 Product Stewardship

There is currently no product stewardship for recycling EPS in Australia, however there is a plan to do so.

The Australian Packaging Covenant Organisation (APCO) report ‘Roadmap to implement the national phase out of business-to-consumer EPS packaging’, Version 1, 2022 outlines a key strategy to develop a product stewardship program by December 2025.

According to the report, there are four proposed actions:

Strategy and action	Lead agency	Partners	Timeline
3. Develop a product stewardship program by December 2025 to collect and recycle necessary EPS packaging.			
Establish an EPS Working Group to plan and oversee the development of options for a product stewardship scheme that will deliver clear objectives and targets.	Facilitated by APCO in collaboration with Government and Industry	EPSA, CESA, Ai Group, LFRA, CA, AIIA, AREMA Collectors and recyclers Federal, State and Local Government	Completed
Define the opportunity for a product stewardship scheme for EPS through data collection, stakeholder mapping and business modeling. Obtain appropriate commitment from Industry and Government to support a stewardship scheme for EPS.	Facilitated by APCO in collaboration with Government and Industry	As above	December 2023
Upon agreement and definition of an appropriate model, defined and agreed by key stakeholders, progress towards implementation of a scheme by 2025.	Facilitated by APCO in collaboration with Government and Industry	As above	December 2025
Include the EPS supply chain in Operation Cleansweep .	Chemistry Australia		June 2023

APCO states that it also aims to include the EPS supply chain in “Operation Clean Sweep”, an international plastics industry led initiative to ensure resin pellets (including EPS) are contained, reclaimed and/or disposed properly.

2 Current Market Availability & Sustainability For Recycled EPS

2.1 Local Markets For EPS

There are limited end markets for the recycling of EPS in Melbourne.

These markets include companies that manufacture new EPS products including waffle pods used in concrete slabs, cold storage insulation and cold store polystyrene boxes.

There are two key companies based in Melbourne that process loose EPS into new end products: Foamex, head office in Bayswater and UNIPOD based in Truganina.

Foamex are one of the largest EPS product manufacturing companies in Australia with sites across the country. They have three sites located in Melbourne being Bayswater, Somerton and Coolaroo. Foamex collect left over clean white EPS from customer sites. They also have established EPS recycle drop off bins out the front of their three factories located in Bayswater, Somerton and Coolaroo.

As part of this project we spoke to Justin Kelsey, General Manager. Foamex are also looking at the option to collect loose EPS from non-Foamex job sites across Melbourne. They are piloting a program on the Mornington Peninsula to collect loose, clean white EPS. If successful, they will look to use reverse transport logistics to collect loose clean white EPS from non-customer sites. Foamex will keep us updated on the progress of the pilot program directly.

UNIPOD, located in Truganina, manufacture waffle pods and have been accepting loose clean white EPS for recycling for over six years. They process the loose EPS into small particles that are mixed in with virgin EPS to manufacture new waffle pods. When contacted for this project, UNIPOD informed the project team that they are currently not accepting any loose EPS for recycling due to staff shortages and one of their process machines being off line. They said they would inform us when they will again be able to receive loose EPS for recycling.

Integrated Recycling, located in Mildura, also accept EPS for recycling. They source both loose and cold compacted EPS from customers across Victoria. They do not source hot compacted EPS as they cannot recycle the EPS in this form. The loose and cold compacted EPS is recycled into a number of end products including railway sleepers, noise barrier walls and bollards. The cold compacted EPS from Eaglehawk Transfer Station (near Bendigo) is sold to Integrated Recycling.

While there is currently no onshore recycling of hot melted EPS, there have been viable overseas export markets for the end product.

During the research for this study there was no indication of interest from local EPS recycling companies in recycling hot compacted EPS in Australia. Feedback included the high cost to purchase and operate the recycling equipment to reprocess the hot melted EPS into end products. The other key barrier is competing with the cost of recycled products imported from overseas such as picture frames and flooring.

2.2 Preferred Form Hot Or Cold Compacted EPS

See below table highlighting a number of key benefits and disadvantages with hot and cold EPS compaction.

Factor	Cold	Hot	Feedback
Airborne Litter	Particles of loose EPS can break off the EPS block generating airborne litter	No loose particles	Cold compaction can be very problematic in both open and closed processing areas
Compaction Ratio	40:1	90:1	More than double the compaction ratio than with cold compaction
Odour	No odour generated	If enclosed area may need to install air extraction fan	Slight odour with hot melt EPS coming out of machine
Rebate Value	Low - some limited local end markets but low export value	High – preference for export markets and high weight/m ³ ratio and lower storage space requirement	Cold compacted low rebate value as export markets looking for hot compacted EPS
Fire Risk	Low	Low	Perception of higher fire risk with hot compaction exists however modern machines have inbuilt fire safety controls

Based on the above findings hot EPS compaction provides a number of key benefits compared to cold EPS compaction.

These key benefits include compaction ratio greater weight per m³, higher rebate options and no litter generation (unlike loose EPS).

2.3 Australian Federal Government Export Ban Impact On EPS

In march 2020 the Australian, state and territory governments and the Australian Local Government Association, as the former Council of Australian Government, agreed that the export of waste glass, plastic, tyres and paper be regulated by the Australian Government.

The plastics phase out rules, that include EPS, have come into effect in two phases:

1. From 1st July 2021 you can only export waste plastics that have been:
 - a. Sorted into single resin or polymer type; or
 - b. Processed with other materials into processed engineered fuel.
2. From 1st July 2022 you can only export mixed waste plastics:
 - a. Sorted into single resin or polymer type and further processed for example into flake or pellet; or
 - b. Processed with other materials into processed engineered fuel.

To export waste plastic you need;

- A waste plastic export licence; and

- Declare each consignment to Department of Climate Change, Energy, the Environment and Water before you declare it to the Australian Border Force's Integrated cargo System.

The Australian Federal Government ban on the export of unprocessed plastics has had minimal impact on the export of hot compacted EPS overseas.

EPS for overseas export has been hot melt compacted format. The EPS has been processed and is able to be exported overseas.

The main countries for the end markets for Australia's hot compacted EPS include:

- China;
- India;
- South Korea; and
- Turkey.

3 Transfer Stations Currently Compacting EPS

DJR Environmental have spoken to a number of transfer stations that are collecting and compacting EPS and provided brief feedback reports, these sites included:

- City of Monash;
- Eaglehawk Recycle Shop;
- Campaspe Shire Council; and
- Moira Shire Council.

3.1 City of Monash

The project team spoke to Theo Kirizakis, Team leader of the Monash Transfer Station. The City of Monash site is located at 380 Ferntree Gully Road, Notting Hill, where EPS has been compacted for over the past four years. They initially installed a hot melt SH-90A model compactor that worked well but was considered slow for their requirements. However, as the unit is located in an area roofed but not enclosed, smaller EPS particles were picked up by the wind on windy days. Two years ago, they upgraded to the SH-150S model which has a larger processing capacity and included a feedstock collection bag reducing any smaller particles becoming airborne. They produce approx. 15-20 bulka bags of melted EPS each 1.5 to 2 months. This equates to approx. 200m³/week of loose EPS received at the site. They currently do not receive a rebate but are provided with free bulka bags and the compacted EPS gets taken away from their site for free. Staff need to remove labels from EPS and feed the EPS into the compaction machine, they process approx. 10m³/hour. They strongly suggest having some spare parts on site to ensure ongoing machine operation and also have a contractor that services the machine at least bi-annually.

3.2 Eaglehawk Recycle Shop

The Project team spoke to Annette Wiles, General Manager, Eaglehawk Recycle Shop. The Recycle Shop is located in the Eaglehawk Transfer Station at 189 Upper California Gully Road, Eaglehawk. The site accepts EPS for recycling, with a free drop off for residents where businesses are charged \$15.00/m³. The site uses an Intco Green Max cold EPS compactor. They generate approx. 14 pallets of cold compacted EPS or approx. 4 tonnes every two months. Integrated Recycling collect the compacted EPS and pay a per tonne

rebate. The site needs to have one person 4 days/week (approx. 28 hours/week) to handle and process the EPS, . The EPS recycling program is run at a financial loss to the Recycle Shop, with the program costing the Recycle Shop approx. \$40,000/annum to provide the service.

3.3 Campaspe Shire Council

The project team spoke to James Marsh at Campaspe Shire Council. In 2018 they had two cold compactor CF-CP 150 machines installed. One located at the Echuca and the other at the Mount Scobey Resource Recovery Centre. The machine compaction rates do not meet the Council's expectations and the machine regularly blocks up with EPS. The Shire is planning to upgrade compaction equipment from cold compaction to hot compaction units where they will improve their weight compaction rates from their current weight rate of approx. 20kg/m³ to hot compaction weight rate of approx. 600kg/m³. The Shire is also keen to develop an advertising and marketing campaign to increase the volume of EPS processed at the two sites and promote diversion from landfill.

3.4 Moira Shire

The project team spoke to Clinton Shand, Senior Project Lead Waste Management Services Sustainability, at Moira Shire and also attended a Teams meeting with Moira Shire. In March 2013, Moira developed the mobile EPS compaction trailer. The trailer includes a cold EPS compaction Mil-Tek EPS 900 machine and single-phase generator (for use if there is no power on site). The mobile unit is based at Cobram Transfer Station and services 9 sites in total across 4,000 km's. Processed EPS generates a rebate of approx. \$60.00/tonne. The cost for trailer transport has risen significantly over the past few years. The Shire also have a cold press unit permanently located at the Yarrawonga transfer station.

Moira plan to permanently relocate the mobile unit to the Numurkah transfer station and purchase a hot melt unit to be installed at Cobram. This will provide three (3) permanent EPS compaction units across the Moira Shire at the Yarrawonga, Numurkah and Cobram transfer stations.

4 Options Analysis

4.1 Existing & Emerging Local & Overseas Opportunities For EPS Collection, Handling, Storage, Transport & Recycling

Our research and feedback has identified that current practices in Australia with EPS compaction (hot & cold) and collection of loose EPS for local recycling is similar to overseas practices.

However, there are still significant amounts of EPS being disposed to landfill. The key challenges to increasing this diversion from landfill include the collection, transport, consolidation and compaction of EPS. For further information on disposal to landfill, refer to section 5.7 Disposing EPS to landfill.

This is where transfer stations play a pivotal role in providing a consolidated drop off point for EPS from both local residents and businesses.

4.2 Cost Effective Recycling Technologies For Local Markets

The only EPS recycling technology for local EPS is with the collection of loose EPS and cold compacted EPS.

The recycling program for loose EPS is successful as the companies that collect and recycle the EPS such as Foamex and UNIPOD use the clean white EPS as feedstock in the production of new end EPS products at their sites.

Similarly, Integrated Recycling based in Mildura collect and recycle cold compacted EPS into a range of innovative end products including railway sleepers, noise barrier walls and bollards.

Each of these companies are looking to expand both the volume of EPS they can recycle and to develop new end products using recycled EPS.

There are no companies in Australia that recycle hot compacted EPS. All hot compacted EPS is exported overseas for further recycling into end products including picture frames and flooring.

4.3 Price Point & Other Drivers That Will Influence Local On-Shore Re-Manufacturing

As noted above, there is limited recycling of loose and cold compacted EPS within Australia and no on-shore remanufacturing of hot melted EPS.

Loose EPS collection models investigated by the project team reflect a significantly higher cost to process when compared to hot compaction and overseas export options.

For example:

Based on an average throughput of 90m³ per week, the cost difference between loose collection and hot compaction (as calculated by the project team) are:

Supplier / Machine	Green Max Apollo C-200	IS Recycling SH-150S	Foamex
Compaction type	Cold compaction	Hot compaction	Loose bag collection
Cost per week (with rebate paid)	\$ 242.00 *	\$ 247.00 *	\$ 1,340.00
Cost per year (with rebate paid)	\$ 12,584.00 *	\$ 12,844.00 *	\$ 69,680.00
Variance (from cheapest option)	Cheapest weekly operating costs	+ \$ 5.00	+ \$ 1,098.00
Cost per week (if no rebate available)	\$ 531.80 *	\$ 536.80 *	\$ 1,340.00
Cost per year (if no rebate available)	\$ 27,653.60	\$ 27,913.60	\$ 69,680.00
Variance (from cheapest option – per week)	Cheapest weekly operating costs	+ \$ 5.00	+ \$ 803.20
Variance (from cheapest option – per year)	Cheapest weekly operating costs	+ \$ 260.00	+ \$ 42,026.40

* It is important to note that the machine purchase costs have not been incorporated into these calculations. However, there is a high likelihood for State (and possibly Federal Government) support in the form of grant contributions which have potential to significantly lower the financial impact to Council.

For loose bag collection methods to be comparable to compaction methods, the price per week would need to be reduced significantly, by a minimum of \$800 per week, or around \$9.00 per incoming metre of EPS. This is unlikely due to the costs associated with the transportation of large volumes of uncompacted (loose) EPS material.

Rebate value for EPS is not likely to offset the operational costs of processing the EPS material. This means the process will still be a cost to Council. Cost neutrality is not expected to be possible. However, there are options available to Councils to ensure these costs are covered such as increasing (or introducing) a gate rate fee for EPS drop-off. The reallocation of labour saved in driving the EPS material to landfill may be another option to reduce the impact of new labour requirements on site.

4.4 Machine purchase repayment periods

The purchase of machinery is a significant expense that must be considered when assessing the viability of EPS processing methods. However, while the expense is significant, the high likelihood of beneficial, supportive Government grants should be considered in when assessing the cost impact of this type of equipment.

For reference, the payback period for the above machine types, based on weekly savings against estimated current landfilling method are as follows:

Supplier / Machine	Green Max Apollo C-200	IS Recycling SH-150S
Full purchase price	\$ 81,900.00	\$ 72,000
Payback period (full purchase price)	9.1 months	8 months
Payback period (1:1 grant funding)	4.5 months	4 months
Payback period (1:2 grant funding)	3 months	2.7 months

The payback periods of the above machines using the savings compared to the cheapest loose bag collection system are as follows:

Supplier / Machine	Green Max Apollo C-200	IS Recycling SH-150S
Full purchase price	\$ 81,900.00	\$ 72,000
Payback period (full purchase price)	14.1 months	12.4 months
Payback period (1:1 grant funding)	7.1 months	6.2 months
Payback period (1:2 grant funding)	4.7 months	4.1 months

As has been identified in the above tables, the payback period when compared to the savings available to Council against current landfilling methods is quite short. The ongoing cost saving benefits of processing EPS via machine ownership will provide ongoing benefits to Council.

*Note: Approximate volumes at Melton are only 10m³ per week. Purchase of a hot or cold compaction for this system is unlikely to deliver a return on investment that would make the purchase worthwhile.

Companies collecting and hot compacting EPS are based on large volumes and rebates they are being paid by recycling companies based overseas. The rebate amounts can be volatile and fluctuate based on crude oil prices, quality of the compacted EPS and the cost to ship overseas end markets.

5 Compaction Equipment

5.1 Equipment Options

The Project team contacted and spoke to the key companies selling EPS compaction equipment in Australia, these included:

- Green Max;
- IS Recycling; and
- Mil-Tek.

The team also looked at other overseas websites promoting EPS compaction however on further investigation these companies had no representatives in Australia and did not provide ongoing after sales assistance. As a result, a decision was made to not pursue these technology providers.

5.2 Inflated Processing Volumes

Processing volumes supplied by some equipment suppliers appear to be inflated (metres processable per hour). Discussions with experienced operators of these machines have revealed processing volumes per hour are much less than described.

This is due to many variables such as:

- having to remove stickers and labels from EPS (required to maximise quality and gain best rebate);
- having to sort different coloured materials;
- feedstock material being of variable shapes and sizes (large, small, different shapes etc); and
- Available labour (this could be related to how many people are operating the machine).

The dataset includes information provided by equipment suppliers on processing volumes and also conservative assessments of throughput volumes. The Comparison Summary Table (as provided in Appendix B) is based on conservative calculations to provide a more realistic expectation of what volumes can be processed on site.

5.3 Rebate Values

Rebate values supplied by equipment suppliers vary greatly.

These are variable for a number of reasons, including:

- End-use of the material (value of the product manufactured from it).
- Supply deal negotiated. This may include frequency of collections (i.e. regular removal of material to save space costs more in transport and may potentially impact the rebate payable).
- Grade (or quality) of material. The purer the compacted material, the better. This relates to cleanliness, contamination and colour of the product.
- Form of the materials provided for recycling. For example, some recyclers prefer the material shaped into ingots, so it stacks better on a pallet (hot compacted material). Note: This will likely require an extra person to assist in moulding these ingots and the rebate yield Vs labour costs to do this may not be viable.
- Container shipping costs.

It is important to note that due to the lightweight nature of the material, rebate values are quite low when compared to the number of labour hours used to process the material.

For example, a weekly volume of 90m³ will take approximately 9 hours to process at a feed rate of 10m³ per hour. This volume of material will yield approximately 830kg of processed material if processed to an A-grade standard.

At a conservative rebate value of \$350.00 per tonne, this equates to a rebate of \$290.00 per week. This will be less if the material is not of the highest quality and may even be nothing if contaminated.

In the APCO Expanded Polystyrene Works Group 2018 Report, March 2019, it noted:

...EPS recycling is challenging due to volatile recycle market prices with pricing swings from \$250-\$800 per tonne over a 12-month period. The typical break-even position is \$400 per tonne.

A number of EPS compaction equipment suppliers have provided an estimated rebate value based on the quality of the end product. These companies include IS Recycling and WastePro (agents for Green Max), both are proactively seeking to supply compaction equipment and also to buy back the compacted EPS product. They will collect from the transfer station sites, pay a rebate and manage the export of the compacted EPS overseas.

5.4 Value of Compaction

Perhaps the largest benefit to a transfer station with limited space is the value of compaction, reducing incoming material volume at a rate of up to 90:1.

Hot compaction units provide the greatest reduction in volume (90:1). Typically, the EPS material is shredded, heated and extruded into a sausage like shape where it can be either placed into a bag or moulded into ingots for easy stacking. The value of this type of process is the storage space saved in storing the processed material. Hot melt EPS can be stored outside and this will have no impact on the rebate being paid (providing it is kept clean). Once the EPS has been hot melt processed, the EPS will not be blown around site.

Cold compaction also provides a significant reduction in volume but not to the same extent as hot compaction. At a stated 40:1 compaction ratio, cold compaction systems create a block of material that is wrapped and palletised for collection. This takes up more space than heat compacted EPS but still significantly less space than loose EPS material. The drawback with cold compaction is the potential for breakage and loose EPS granules escaping into the environment.

5.5 Funding Opportunities

The project team spoke to Kate Shaw, Program Support officer – Grants Regions & Partnership, Sustainability Victoria. Kate informed us that from the outcomes of the Feasibility 1 Round Projects, Sustainability Victoria will then plan to advertise a round of infrastructure funding in February 2023.

EPS will be a priority as it is light weight, large in volume and very problematic for landfills.

There will be \$2.1m total funding provided and co-contributions likely to be better than \$1 for \$1 with a generous in-kind Council contribution.

For both the Moonee Valley and Melton Councils the purchase of an EPS compaction unit will likely be eligible for grant funding via Sustainability Victoria for its planned funding round in February 2023.

Projects such as this that provide a significant reduction in waste to landfill (in addition to less trucks on the road) are likely to receive funding based on a detailed funding application. Funding opportunities such as this would provide an excellent incentive for Councils to invest in this type of technology.

Funding opportunities are often offered in the following formats:

- 1:1 contribution: This is a State Government dollar-for-dollar contribution
- 1:2 contribution: This is a format seen in the past 18 months where the Federal Government has contributed on a dollar-for-dollar basis alongside a State Government contribution of one dollar for every dollar contributed by the applicant. This equates to a joint Government contribution of \$2 for every \$1 contribution by the successful applicant.

5.6 Market Opportunities For EPS

There is a strong local demand for high quality recycled EPS material within Victoria.

Local recyclers exist, however depending on the final use of the material and the quality required, the type of material accepted (and how it is collected) varies.

Typically, local manufacturers such as Foamex and UNIPOD prefer to receive the material loose in bags. This allows them to process the material to their requirement, ensuring they understand the quality of the input materials (uncontaminated).

While other processors such as Integrated Recycling based in Mildura prefer to receive the EPS cold compacted.

For further information please refer to 2.1 Local Markets for EPS.

5.7 Disposing EPS To Landfill

The current structure of waste disposal contracts enables Moonee Valley and Melton Councils to dispose of EPS materials for \$164.25 per tonne in amongst general inert waste materials disposed to landfill.

It is a common practice for heavier inert wastes to be placed on top of EPS material to reduce the likelihood of the light EPS material escaping from the bin in transit.

While this method of disposal is not illegal, landfill operators do not like to accept EPS material on site for 3 main reasons. These are:

1. It is of large volume and low weight (landfills charge by weight);
2. It does not compact well (landfills like to maximise compaction to enable maximum use of airspace in the landfill – extending its useful life); and
3. It is messy as EPS creates a litter challenge on site due to its tendency to break apart and become airborne. This presents issues to a landfill as they are required to manage litter on site.

In anonymous discussions with a major Victorian landfill operator, they suggested a gate rate of \$900.00 per tonne with a minimum 2 tonne charge for EPS material if they are aware EPS was coming in. This is for the handling and compaction difficulties as outlined above.

While the above rate is not applied to Council at present, it may well be applied in future and should be considered as part of procuring a more effective, environmentally friendly EPS processing solution.

Further to this, the current cost of transport and disposal to landfill for EPS material outweighs the cost of processing the material on site and recycling it.

6 Cost Benefit Analysis

6.1 Assumptions

The following assumptions have been included for the cost benefit analysis:

- Labour cost (per hr – includes 30% on-costs – averaged over 7 days): \$ 59.07
- Days of operation per week: 7
- Driver cost (per hr – includes 30% on-costs – weekdays only): \$ 49.49
(assumption that transport to landfill and recycling sites only occurs on weekdays)
- Transport cost (estimate per hr for hook truck): \$ 70.00
- Round trip to landfill: 2 hours
- Estimated labour and transport cost to landfill (per trip): \$ 238.98
(assumption that transport to landfill and recycling sites only occurs on weekdays)
- Disposal charge to landfill (per tonne): \$ 164.25
(assumption that there is a minimum disposal charge of 2 tonnes)
- Estimated average disposal cost (per load) to landfill: \$ 567.48
- Existing EPS volume per week: 90m³
- Estimated loads of EPS per week (current): 3
- Average rebate (per tonne): \$ 350.00
- EPS density: 9.2kg per m³
(EPS weight is approx.. 11-13kg per m³. Density consideration of 30% air gaps considered)

6.2 Machine costs over 5 years (per m³)

Based on the estimated throughput of 90m³ per week, the following table indicates the cost of machine purchase over a five-year (60 month) period. Note: this does not account for servicing costs or operational costs, just machine purchase price. Further, potential funding opportunities have been considered in this table.

Supplier	Equipment Type	Model	Total Purchase Cost	Full purchase price (cost per m ³)	1:1 Funding (cost per m ³)	1:3 Funding (cost per m ³)
Mil-tek	Cold Compaction	EPS2000	\$43,955	\$1.88	\$0.94	\$0.63
Green Max	Cold Compaction	Apollo C-200	\$81,900	\$3.50	\$1.75	\$1.17
Green Max	Hot Compaction	Mars MC-200	\$92,900	\$3.97	\$1.99	\$1.32
IS Recycling	Hot Compaction	SH-40M	\$38,500	\$1.65	\$0.82	\$0.55
IS Recycling	Hot Compaction	SH-90A	\$53,500	\$2.29	\$1.14	\$0.76
IS Recycling	Hot Compaction	SH-150S	\$72,000	\$3.08	\$1.54	\$1.03

6.3 Machine Power Requirements

Data supplied by suppliers of the available equipment list power consumption data on their websites. This data is supplied in the table below:

Supplier	Equipment Type	Model	Power Requirement	Power Usage
Mil-tek	Cold Compaction	EPS2000	3 phase	Not available
Green Max	Cold Compaction	Apollo C-200	3 phase	19.55 kw/h
Green Max	Hot Compaction	Mars MC-200	3 phase	37.5 kw/h
IS Recycling	Hot Compaction	SH-40M	3 phase	9.9 kw/h
IS Recycling	Hot Compaction	SH-90A	3 phase	13.4 kw/h
IS Recycling	Hot Compaction	SH-150S	3 phase	19.6 kw/h

6.4 Cost comparison to other options

Hot compaction, even with the purchase price of the machine considered, presents an economical alternative when compared to other EPS collection (and disposal) options.

The table below provides an outline of findings through the analysis of available data. Note: These figures have been provided with consideration of all costs and with (and without) a rebate to highlight variables in the consideration. Machine purchase costs have been considered based on 1:1 funding being available (which is considered a highly likely scenario) and a 5-year repayment scenario (0% interest).

Supplier	Equipment Type	Model	Labour Requirement (hrs)	Estimated cost (per m3) – With Rebate	Estimated cost (per m3) – No Rebate
Mil-tek	Cold Compaction	EPS2000	12.0	\$5.60	\$8.82
Green Max	Cold Compaction	Apollo C-200	9.0	\$4.44	\$7.66
Green Max	Hot Compaction	Mars MC-200	9.0	\$4.67	\$7.89
IS Recycling	Hot Compaction	SH-40M	25.7	\$14.48	\$17.70
IS Recycling	Hot Compaction	SH-90A	15.0	\$7.77	\$10.99
IS Recycling	Hot Compaction	SH-150S	9.0	\$4.23	\$7.45
Foamex	Loose (in bag collection)	N/A	11.3	\$14.88	
Australian National Recyclers	Loose (in bag collection)	N/A	11.3	\$29.18	

Unipod	Loose (receival at depot only)**	N/A	17	\$15.35
Self-Managed	Landfill disposal	N/A	5.25	\$22.36

6.5 Loose (in bag) collections

Loose bag collection of EPS at transfer stations provides a low up-front cost option for receiving and recycling EPS. However, ongoing transport, collection, storage and disposal implications make this process a costly option.

The uncompressed nature of the material makes it difficult to handle and requires significant space to store up to 40 bags while a collection is arranged. Coupled with an estimated weekly volume of 90m³, around 2.25 collections would be required per week. When charged on a “per collection” or a “per bag” collection rate, this can become expensive, see attached Appendix B – *Loose Bag Systems*.

The availability of protected storage space should be considered when assessing this methodology for its effectiveness on site. The material should be kept clean and as dry as possible to maintain its value to the supplier (recycler). Invariably, covered space on site at metropolitan transfer stations is limited and if available, is reserved for higher value uses.

Loose bags and transport to recycling depot such as Foamex or UNIPOD options require a high degree of transport availability, similar to that of transporting to landfill. Given the volume of material to be transported per week (approximately 90m³), the availability of trucks and drivers in addition to high transport costs make this option appear expensive when compared to on-site compaction models.

7 Compliance considerations

Councils should ensure that the sites where EPS is received and processed hold the appropriate EPA Permissions for this activity.

Storing between 5m³ and 5,000m³ the site requires an EPA Registration.

Councils should also ensure that the facilities taking or receiving the materials are appropriately permissioned to receive the material.

Under EPA Waste Codes Publication IWRG822.4 June 2021 EPS falls under:

- Waste code - Z500;
- Description of waste: Plastics PIC #1 through #7; and
- Classification: Industrial Waste.

In storing EPS Council must also comply with *EPS Management and storage of combustible recyclable and waste materials – guideline Publication 1667.3 July 2021*.

8 Recommendations

Based on the data provided by Moonee Valley and Melton Councils, Councils currently collecting and compacting EPS, compaction equipment suppliers, EPS recycling companies and discussions with companies using of different types of equipment, the feedback and data points to EPS hot compaction as offering the most cost effective and sustainable process methodology.

The benefits of hot compaction to Council include:

- Greater compaction ratio (90:1). The direct effect of this is the reduction of incoming volumes of material from an estimated approx. 90m³ of loose EPS material down to approx. 1m³ footprint of compacted EPS;
- Reduced storage footprint of compacted EPS;
- Hot compacted material offers less risk of damage to quality of material or litter caused by weather;
- High possibility of government grant infrastructure funding success;
- Historically higher (and consistent) rebate values for hot compacted EPS material when compared to cold compaction or loose material;
- Reduction in transport costs (to landfill);
- Reduction in transport related emissions (less truck movements);
- Opportunity to divert labour previously required for driving trucks to landfill to assist with EPS handling and compaction activities; and
- Increased landfill avoidance.

Based on information provided by suppliers, Councils using EPS compaction equipment and Cost Benefit Analysis as provided in Appendix B, the IS Recycling SH-150S unit presents an attractive option based on the following key advantages:

- Hot compaction system;
- Throughput capability;
- Inclusion of an enclosed vacuum curtain system that aids in capturing loose EPS granules (reducing the likelihood of litter on site);
- Reasonably priced in comparison to other options (purchase price of \$72,000 including delivery and installation); and
- Reduced power requirement compared to similar performing machine analysed.

9 Area Required Hot Compaction Equipment Operation

Monash City Council operate an SH-150S unit at their transfer station located in Notting Hill.

See below image and specification for the SH-150S model:



Model	SH-150S
Materials	EPS
Processing	LUMP(INGOT)
Cooling	Air Cooling
Capacity(kg/h)	110~130 (abt. 20m³)
Feeder size(WxL)	724 x 500
Dimension(WxLxH)	1,925 x 1,372 x 3,000
Electrical Power(kW/h)	19.6 kW
Weight(kg)	1,120
Main Motor	15 kW
Bend Header	2.4 kW
Blower	2.2 kW

See below images of the Monash transfer station EPS drop off and SH-150S compaction area:



Undercover area enclosed EPS drop off cage approx 5m x 2m



Total footprint area SH-150S and EPA cage approx. 6m (L) x 2m (W) x 3m (H)



Outdoor storage of hot melted EPS in bulka bags approx. 12 bays per collection



10 Appendix A – DAWE National Plastics Plan



EPS phase outs

In March 2021 the Australian Government released the National Plastics Plan. The Plan includes an action for government to work with industry to phase out certain problematic plastics in line with the Australian Packaging Covenant Organisations' (APCO) work with industry to-date on problematic and unnecessary plastics.

Why are certain EPS packaging products identified as problematic and unnecessary single-use plastics?

- **EPS loose fill and EPS consumer food and beverage containers** are problematic because:
 - they are not recyclable
 - if littered, they have a high environmental impact.
- **Moulded EPS** is problematic because:
 - it is not recyclable using kerbside collection systems
 - for consumers, there are limited drop-off services to recycle moulded EPS
 - there is limited active uptake of EPS collection by retailers
 - if littered, it has a high environmental impact.

Which products are in scope for the industry-led phase outs?

Type of EPS	Description	Government review
EPS loose fill consumer packaging	Used for consumer product protection in freight, for example peanut shaped loose foam packaging,	July 2022
EPS moulded consumer packaging	Used for consumer products. Protective packaging for white/brown goods and electronics, including but not limited to computers, TVs, printers, fridges, toasters, furniture and homewares.	July 2022
EPS food and beverage consumer containers	Single-use hot and cold cups, tubs, bowls, plates, and clamshells for food service.	December 2022

Which products are not in scope?

The industry-led phase outs **do not** apply to:

- EPS used for business-to-business packaging, such as fresh produce boxes
- specialist packaging used in medical applications, for example, organ transport or pharmaceuticals
- EPS used in building and construction
- business-to-consumer packaging where there is a demonstrated and effective reuse model in operation, for example bulk cold home-delivered meal services.

Next steps

In July and December 2022, the Australian Government will review industry progress in taking responsibility for the applicable packaging and container types, including phasing them out where required. It will then consider if any regulatory action (for example, a regulated ban, or a co-regulatory or mandatory product stewardship arrangement) is warranted or not. Before any regulation could come into effect it would first need to be considered through the Australian Government's Regulatory Impact Analysis Framework.

This approach will allow industry to demonstrate its leadership, potentially avoiding the need for any regulatory intervention.

What packaging alternatives are available?

Many Australian businesses are already moving to EPS packaging alternatives, such as recycled cardboard, recyclable plastic mouldings and LDPE air pillow padding. APCO is able to provide further advice to businesses on the packaging alternatives available. For more information refer to APCO's [Action Plan for Problematic and Unnecessary Single-Use Plastics Packaging](#).

What if there are no suitable packaging alternatives to EPS?

APCO will work with industry associations to prepare a national roadmap that prioritises packaging applications for EPS phase out and identifies those packaging formats that may require alternative approaches, such as through product stewardship.

What support is available to help industry with this transition?

National Workshop

APCO will host a national virtual workshop on **Tuesday 8th of June 2021** bringing industry and government together to discuss how industry can transition away from loose fill EPS, unnecessary moulded EPS packaging and EPS

food and beverage containers. To register for the national EPS workshop please visit: <https://www.eventbrite.com.au/e/146702401833>

APCO will provide additional support to industry after the national workshop including **knowledge sharing sessions** to support industry associations and businesses to take practical action, and will also release the **Sustainable Packaging Program** in mid-2021. More information will be available on APCO's website and at the national workshop.

Australian Packaging Covenant SME Outreach Program

In 2021 APCO will expand its outreach program to include a comprehensive small to medium-enterprise (SME) engagement program. The program will support SMEs to work towards the 2025 National Packaging Targets. Support to SMEs will also address phase outs of problematic and unnecessary single use plastics, including EPS.

Resources

The following resources are free and available from the APCO website:

- [Action Plan for Problematic and Unnecessary Single-Use Plastic Packaging](#)
- [Single-Use Problematic and Unnecessary Plastic Packaging](#)
- [Sustainable Packaging Guidelines \(SPGs\)](#)
- [Quickstart Guide - Design for Recovery, Reuse, Recycling or Composting](#)
- [Packaging Manufacturers and Suppliers Toolkit](#)

Need more information?

Email wastepolicy@environment.gov.au or phone 02 6274 1801.

Officeworks EPS phase out

Officeworks has removed EPS from all packaging for its own brand furniture items, avoiding approximately 800,000 pieces of EPS every year.

Strong relationships with their international partners is also allowing Officeworks to encourage suppliers to remove or reduce the expanded polystyrene in packaging for technology products.



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11 Appendix B – Cost Benefit Analysis Calculations

Comparison Summary

Supplier	Mil-tek	Green Max	Green Max	IS Recycling	IS Recycling	IS Recycling	Foamex	Australian National Recyclers	Unipod	Existing Landfill Model
Model No.	EPS2000	Apollo C-200	Mars MC-200	SH-40M	SH-90A	SH-150S	N/A	N/A	N/A	N/A
Compaction Method	Cold	Cold	Hot	Hot	Hot	Hot	Loose (in bag collection)	Loose (in bag collection)	Loose (receiving at depot only)	N/A
Compaction Ratio (XX:1)	40	40	90	90	90	90	1	1	1	1
PRICING										
Total Purchase Cost Ex-GST	\$ 43,955	\$ 81,900	\$ 92,900	\$ 38,500	\$ 53,500	\$ 72,000	\$ -	\$ -		\$ -
Funding eligibility (likelihood)	Highly Likely	Highly Likely	Highly Likely	Highly Likely	Highly Likely	Highly Likely	Unlikely	Unlikely	Unlikely	Ineligible
Funding: 1:1 Purchase Value	\$ 21,978	\$ 40,950	\$ 46,450	\$ 19,250	\$ 26,750	\$ 36,000	N/A	N/A	N/A	N/A
Funding: 1:2 Purchase Value	\$ 14,652	\$ 27,300	\$ 30,967	\$ 12,833	\$ 17,833	\$ 24,000	N/A	N/A	N/A	N/A
THROUGHPUT CONSIDERATIONS										
Throughput - m3 per hr (Supplier stated)	15	40	40	7	12	20	N/A	N/A	N/A	N/A
Throughput - m3 per hr (Conservative)	7.5	10	10	3.5	6	10	8	8	8	13
LABOUR CONSIDERATIONS (hrs/week)										
Labour Requirement (conserv. estimate)	12	9	9	26	15	9	11.25	11.25	17	5.25
Labour Costs (week - conservative)	\$ 709	\$ 532	\$ 532	\$ 1,536	\$ 886	\$ 532	\$ 665	\$ 665	\$ 1,004	\$ 310
REBATES										
Rebate Value (conservative per tonne)	\$ 350	\$ 350	\$ 350	\$ 350	\$ 350	\$ 350	\$ -	\$ -	\$ -	\$ -
Estimated kg's per week	828	828	828	828	828	828	828	828	828	828
Estimated rebate value (per week)	\$ 289.80	\$ 289.80	\$ 289.80	\$ 289.80	\$ 289.80	\$ 289.80	\$ -	\$ -	\$ -	\$ -
OTHER OPERATIONAL COSTS (per week)										
Transport and disposal charges (per week)	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 675.00	\$ 1,674.00	\$ 716.94	\$ 2,013
Bags	0	0	5	5	5	5	0	\$ 288.00	0	
COSTS (per week)										
COST PER WEEK (not including purchase)	\$ 419	\$ 242	\$ 247	\$ 1,251	\$ 601	\$ 247	\$ 1,340	\$ 2,627	\$ 1,721	\$ 2,323
EXTRAPOLATED COSTS (per year)										
EXTRAPOLATED COSTS (per year)	\$ 21,790	\$ 12,575	\$ 12,835	\$ 65,053	\$ 31,265	\$ 12,835	\$ 69,656	\$ 136,580	\$ 89,499	\$ 120,779
Savings compared to current landfill	\$ 98,989	\$ 108,204	\$ 107,944	\$ 55,726	\$ 89,514	\$ 107,944	\$ 51,123	\$ (15,801)	\$ 31,280	\$ -
PAYBACK PERIOD IN MONTHS (using savings & assuming 0% interest)										
Payback Period (Full value)	5.3	9.1	10.3	8.3	7.2	8.0	N/A	N/A	N/A	N/A
Payback Period (1:1 funding)	2.7	4.5	5.2	4.1	3.6	4.0	N/A	N/A	N/A	N/A
Payback Period (1:2 funding)	1.8	3.0	3.4	2.8	2.4	2.7	N/A	N/A	N/A	N/A

Throughput Calculations

THROUGHPUT CALCULATIONS			Throughput, Labour & Cost Calculations					
Equipment Details			Supplier stated calculations			Conservative calculations		
Supplier	Equipment Type	Model	Throughput (m3 p/hr as provided by supplier)	Hours to process weekly EPS Volume (supplier throughput)	Estimated labour cost to process supplier stated throughput	Conservative assessment of throughput (m3 p/hr)	Hours to process weekly EPS Volume (conservative throughput)	Estimated labour cost to process conservative throughput
Mil-tek	Cold Compaction	EPS2000	15	6.0	\$ 354	7.5	12	\$ 709
Green Max	Cold Compaction	Apollo C-200	40	2.3	\$ 133	10	9	\$ 532
Green Max	Hot Compaction	Mars MC-200	40	2.3	\$ 133	10	9	\$ 532
IS Recycling	Hot Compaction	SH-40M	7	12.9	\$ 759	3.5	25.7	\$ 1,519
IS Recycling	Hot Compaction	SH-90A	12	7.5	\$ 443	6	15	\$ 886
IS Recycling	Hot Compaction	SH-150S	20	4.5	\$ 266	10	9	\$ 532

Material Volumes & Rebates

MATERIAL VOLUMES AND REBATES				Volumes and Rebates			
Equipment Details				Material Volume & Weight		Rebate Value*	
Supplier	Equipment Type	Model	Compaction Ratio (Number:1)	Resultant Weekly Volume (m3 after compaction)	Weekly weight of material (tonnes)	Rebate Value (conservative average - per tonne)	Estimated rebate value per week
Mil-tek	Cold Compaction	EPS2000	40	2.25	0.828	\$ 350.00	\$ 289.80
Green Max	Cold Compaction	Apollo C-200	40	2.25			
Green Max	Hot Compaction	Mars MC-200	90	1			
IS Recycling	Hot Compaction	SH-40M	90	1			
IS Recycling	Hot Compaction	SH-90A	90	1			
IS Recycling	Hot Compaction	SH-150S	90	1			

Equipment Details

EQUIPMENT DETAILS							
Equipment Details			Equipment Costs			Equipment Specifications	
Supplier	Equipment Type	Model	Purchase Cost	Delivery, Installation and Training	Ventilation System (optional)	Machine Footprint (m)	Power Requirement
Mil-tek	Cold Compaction	EPS2000	\$ 41,955.00	\$ 2,000.00	\$ -	2.4 x 4.0 x 1.2	3 Phase
Green Max	Cold Compaction	Apollo C-200	\$ 76,500.00	\$ 5,400.00	\$ -	1.0 x 4.9	
Green Max	Hot Compaction	Mars MC-200	\$ 87,500.00	\$ 5,400.00	\$ -	1.4 x 2.9	
IS Recycling	Hot Compaction	SH-40M	\$ 35,000.00	\$ 2,000.00	\$ 1,500.00	1.1 x 0.8 x 1.5	
IS Recycling	Hot Compaction	SH-90A	\$ 50,000.00	\$ 2,000.00	\$ 1,500.00	1.1 x 1.1 x 1.6	
IS Recycling	Hot Compaction	SH-150S	\$ 68,000.00	\$ 2,500.00	\$ 1,500.00	2.0 x 1.4 x 3.0	

Calculation With Rebate Available

CALCULATION WITH REBATE AVAILABLE			Throughput, Labour & Cost Calculations						Volumes and Rebates				Resulting Operating Costs (per week)	
Equipment Details			Supplier stated calculations			Conservative calculations			Material Volume & Weight		Rebate Value*		Supplier Stated Throughput	Conservative
Supplier	Equipment Type	Model	Throughput (m3 p/hr as provided by supplier)	Hours to process weekly EPS Volume (supplier throughput)	Estimated labour cost to process supplier stated throughput	Conservative assessment of throughput (m3 p/hr)	Hours to process weekly EPS Volume (conservative throughput)	Estimated labour cost to process conservative throughput	Resultant Weekly Volume (m3 after compaction)	Weekly weight of material (tonnes)	Rebate Value (conservative average - per tonne)	Estimated rebate value per week	Labour costs minus rebate value	Labour costs minus rebate value
Mil-tek	Cold Compaction	EPS2000	15	6.0	\$ 354	7.5	12	\$ 709	0.13	0.828	\$ 350.00	\$ 289.80	\$ 64.62	\$ 419.04
Green Max	Cold Compaction	Apollo C-200	40	2.3	\$ 133	10	9	\$ 532	0.17				\$ (156.89)	\$ 241.83
Green Max	Hot Compaction	Mars MC-200	40	2.3	\$ 133	10	9	\$ 532	0				\$ (156.89)	\$ 241.83
IS Recycling	Hot Compaction	SH-40M	7	12.9	\$ 759	3.5	25.7	\$ 1,519	0				\$ 469.67	\$ 1,229.14
IS Recycling	Hot Compaction	SH-90A	12	7.5	\$ 443	6	15	\$ 886	0				\$ 153.23	\$ 596.25
IS Recycling	Hot Compaction	SH-150S	20	4.5	\$ 266	10	9	\$ 532	0				\$ (23.99)	\$ 241.83

* Rebate calculation of \$350 is a conservative estimate based on clean, A-grade EPS with stickers and labels removed. Contaminated

Calculation With No Rebate Available

CALCULATION WITH NO REBATE AVAILABLE			Throughput, Labour & Cost Calculations						Volumes and Rebates				Resulting Operating Costs (per week)	
Equipment Details			Supplier stated calculations			Conservative calculations			Material Volume & Weight		Rebate Value*		Supplier Stated Throughput	Conservative
Supplier	Equipment Type	Model	Throughput (m3 p/hr as provided by supplier)	Hours to process weekly EPS Volume (supplier throughput)	Estimated labour cost to process supplier stated throughput	Conservative assessment of throughput (m3 p/hr)	Hours to process weekly EPS Volume (conservative throughput)	Estimated labour cost to process conservative throughput	Resultant Weekly Volume (m3 after compaction)	Weekly weight of material (tonnes)	Rebate Value (conservative average - per tonne)	Estimated rebate value per week	Labour costs minus rebate value	Labour costs minus rebate value
Mil-tek	Cold Compaction	EPS2000	15	6.0	\$ 354	7.5	12	\$ 709	0.13	0.828	\$ -	\$ -	\$ 354.42	\$ 708.84
Green Max	Cold Compaction	Apollo C-200	40	2.3	\$ 133	10	9	\$ 532	0.17				\$ 132.91	\$ 531.63
Green Max	Hot Compaction	Mars MC-200	40	2.3	\$ 133	10	9	\$ 532	0				\$ 132.91	\$ 531.63
IS Recycling	Hot Compaction	SH-40M	7	12.9	\$ 759	3.5	25.7	\$ 1,519	0				\$ 759.47	\$ 1,518.94
IS Recycling	Hot Compaction	SH-90A	12	7.5	\$ 443	6	15	\$ 886	0				\$ 443.03	\$ 886.05
IS Recycling	Hot Compaction	SH-150S	20	4.5	\$ 266	10	9	\$ 532	0				\$ 265.82	\$ 531.63

Loose Bag Systems

LOOSE BAG SYSTEMS		Estimated Labour Requirements			Collection Service Details			Service Costs				Material Volume & Weight		Costs
Supplier	Process Type	Throughput (m3 p/hr estimate)	Hours to process weekly EPS Volume (throughput)	Estimated labour cost to process supplier stated throughput	Minimum bags for collection	Number of bags required (per week)	Collections Required (per week)	Collection Fee (per load)	Collection Fee (per bag)	Cost of Bags (ea)	Frame Stand	Resultant Weekly Volume (m3 after compaction)	Weekly weight of material (tonnes)	Labour and Equipment Costs Per Week (No rebates offered)
Foamex	Loose (in bag collection)	8	11.3	\$ 665	35	90	2.5	\$ 300.00	\$ -	TBC	\$ 225.00	90.00	0.828	\$ 1,414.54
Australian National Recyclers	Loose (in bag collection)	8	11.3	\$ 665	4	90	TBC	\$ -	\$ 18.60	\$ 3.20	No Charge			\$ 2,626.54
Unipod	Loose (receival at depot only)*	8	17	\$ 962	0	0	3	\$ 716.94	\$ -	\$ -	\$ -			\$ 3,112.52

Note: No rebates were offered for loose bag collections

* Rebate calculation of \$350 is a conservative estimate based on clean, A-grade EPS with stickers and labels removed. Contaminated material may be of a lower grade.

** Calculations made using landfill calculations

Current Landfill Costs Moonee Valley

CURRENT (LANDFILL) COSTS - MOONEE VALLEY												
Estimated Labour Requirements			Collection Service Details		Service Costs						Total Costs	
Throughput (m3 p/hr estimate)	Hours to process weekly EPS Volume (throughput)	Estimated labour cost to process supplier stated throughput	Bin Size (m3)	Collections Required (per week)	Transport Cost (Per load - incl driver)	Disposal Cost (per tonne)	Average / Minimum Load (tonnes)	Loads per week	Disposal cost per load	Total Disposal Cost (Per Week)	Cost Per Incoming Cubic Metre (based on 90m3)	Labour Costs and Service Costs
13	5.25	\$ 310	30	3.0	\$ 238.98	\$ 164.25	2	3	567.48	\$ 1,702.44	\$ 22.36	\$ 2,012.56

Machine Purchase Data

MACHINE PURCHASE DATA			Equipment Costs				Funding Possibilities			Estimated Monthly Repayments (60 months - 0% interest)				Machine Costs Per m3				
Supplier	Equipment Type	Model	Purchase Cost	Delivery, Installation and Training	Ventilation System (optional)	TOTAL COST	Funding Eligibility	Funding effect on purchase price (1:1 Contribution)	Funding effect on purchase price (1:2 Contribution)	Repayment Term (months)	Full Purchase Price	1:1 Funding (Council Contribution)	1:2 Funding (Council Contribution)	Weekly Volume (m3)	Monthly Volume (m3)	Full Purchase Price (cost per m3)	1:1 Funding (Cost per m3)	1:2 Funding (Cost per m3)
Mil-tec	Cold Compaction	EPS2000	\$ 41,955.00	\$ 2,000.00	\$ -	\$ 43,955	Highly Likely	\$ 21,978	\$ 14,652	60	\$ 732.58	\$ 366.29	\$ 244.19	90	390	\$ 1.88	\$ 0.94	\$ 0.63
Green Max	Cold Compaction	Apollo C-200	\$ 76,500.00	\$ 5,400.00	\$ -	\$ 81,900	Highly Likely	\$ 40,950	\$ 27,300	60	\$ 1,365.00	\$ 682.50	\$ 455.00	90	390	\$ 3.50	\$ 1.75	\$ 1.17
Green Max	Hot Compaction	Mars MC-200	\$ 87,500.00	\$ 5,400.00	\$ -	\$ 92,900	Highly Likely	\$ 46,450	\$ 30,967	60	\$ 1,548.33	\$ 774.17	\$ 516.11	90	390	\$ 3.97	\$ 1.99	\$ 1.32
IS Recycling	Hot Compaction	SH-40M	\$ 35,000.00	\$ 2,000.00	\$ 1,500.00	\$ 38,500	Highly Likely	\$ 19,250	\$ 12,833	60	\$ 641.67	\$ 320.83	\$ 213.89	90	390	\$ 1.65	\$ 0.82	\$ 0.55
IS Recycling	Hot Compaction	SH-90A	\$ 50,000.00	\$ 2,000.00	\$ 1,500.00	\$ 53,500	Highly Likely	\$ 26,750	\$ 17,833	60	\$ 891.67	\$ 445.83	\$ 297.22	90	390	\$ 2.29	\$ 1.14	\$ 0.76
IS Recycling	Hot Compaction	SH-150S	\$ 68,000.00	\$ 2,500.00	\$ 1,500.00	\$ 72,000	Highly Likely	\$ 36,000	\$ 24,000	60	\$ 1,200.00	\$ 600.00	\$ 400.00	90	390	\$ 3.08	\$ 1.54	\$ 1.03