McGregor Environmental Services

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Waste Management Plan

Commercial Development and Serviced Apartments

Barber Avenue

Kingswood

for

Aesthete No.3 Pty Ltd

September 2010

Contents

Part A Demolition and Construction Waste

1. Introduction

This waste management plan has been prepared for Aesthete N0. 3 Pty Ltd by M^{c}Gregor Environmental Services. The Plan has been prepared to demonstrate that this project will satisfy a range of obligations and management priorities. These include:-

- Satisfying appropriate Local and State Government waste management requirements
- Satisfying Penrith City Council's and the builders occupational, health, safety and quality commitments
- Monitoring and controlling materials usage and waste disposal costs.

1.1 The Building Project

Stage 1.

The building project that this plan has been prepared for is the construction in two buildings of 8 and 9 Levels plus three basement levels. There are 20,164 m^2 of commercial office style space, 4,592 m^2 of serviced apartments and 4,275 m^2 of retail space.

Stage 2.

The second stage is envisaged to consist of one building being part 12 storeys and part 7 storeys. It shall contain 3,138 m^2 of retail space as well as 32 single bedroom apartments and 74 two bedroom apartments.

The construction essentially consists of the following:-

- Concrete footings, columns and structure frame
- Concrete floors and suspended floor slabs
- Pre cast panel walls externally
- Internal dividing brick walls
- Tiled and soft floor finishes
- Rendered walls
- Plasterboard tiled suspended ceilings in the commercial properties
- Heating and air conditioning ducting in the commercial properties
- Water and sprinkler system in the commercial properties

1.2 Objectives of the Waste Management Plan

Each building project requires a waste management plan. The objectives of the waste management plan are essentially the following:-

1. Satisfy the State and Local Government environmental obligations regarding waste management.

2. Document, and thus ensure that the waste generated by the building project is managed in a particular fashion. In particular, this refers to the manner it is collected on-site, stored on-site and removed from the site. It also details procedures of source separation of materials on site, as well as specified resource recovery off-site.

3. The establishment of a recording and documenting procedure that tracks the waste generation and management behaviour during the life of the building project.

4. Manage the cost of waste and wasteful procedures in the project, so that future developments will remain competitive in an industry, which is brutally cost driven.

5. Documents the manner in which the builder manages its sub-contractors and passes waste management responsibility to those responsible for generating the waste. Those that generate the waste have the ability to minimise the amount of waste generated.

6. Ensure procedures are in place to guarantee that sub-contractors are generally made aware of their waste generating behaviour. In addition, that the company will consider this behaviour as a factor in assessing their true cost to the company of undertaking their sub-contracted task.

1.3 The Evolution of Waste Minimisation

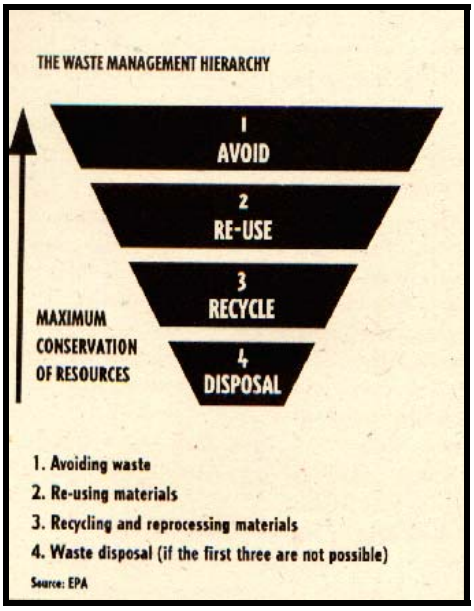
The building industry in Australia is cost competitive both locally and in the international arena. Waste minimisation initiatives need to be driven by economics, rather that policy. Government building projects that incorporate recycling requirements are in general more expensive if they require actions which are not driven by economics. The cost of waste disposal and the value of the potentially recyclable resource being disposed of essentially drive recycling and waste minimisation initiatives.

Waste disposal from building sites is, in general, charged for on a volume basis. This reflects, to some extent, that the cost of supplying and transporting the bin still, but only just, dominates the overall cost of disposal. Due to the introduction of weighbridges at landfills and stricter enforcement of waste reporting and the NSW Government's EPA collected levy being $70.00/tonne, the cost of waste disposal at landfills has tended to become more expensive and become weight based rather than volume based.

The price of tipping has essentially moved from $8/tonne in 1989 to $150/tonne in 2010, with the fundamental consequence that wherever possible, dense items such as concrete, bricks and spoil are removed.

The waste transporters are essentially trapped in a very competitive market place, that charges by volume for waste removal, yet pays by weight for disposal. They need to juggle their tipping costs to ensure that they are earning a profit from each project. The same criteria applies to the demolition and excavation stage of the building project.

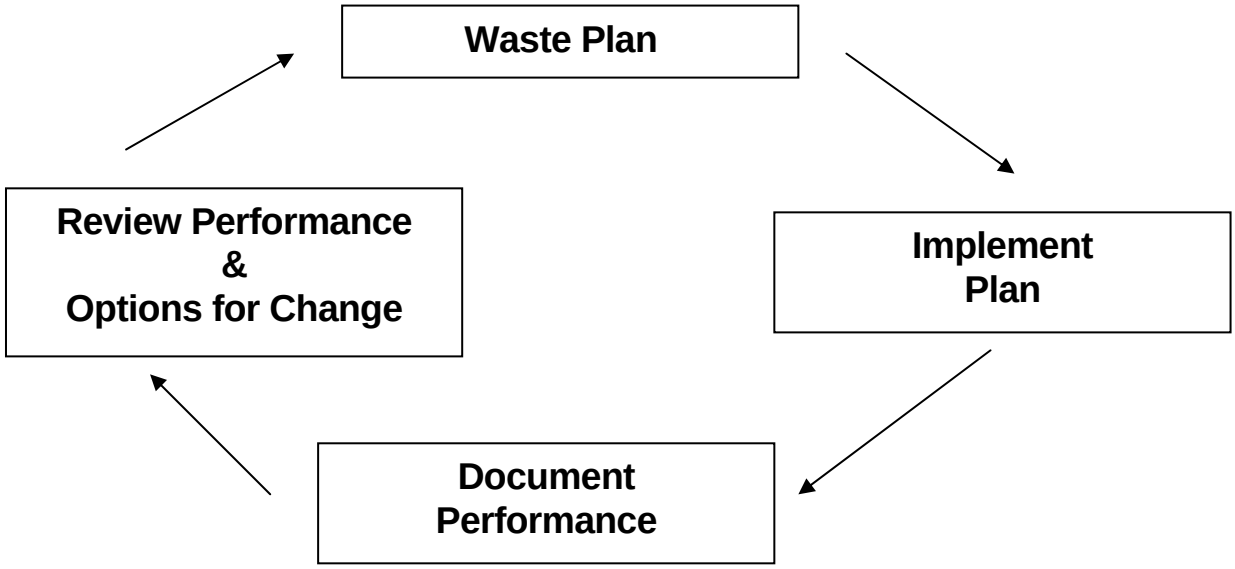
The Waste Management Hierarchy presents, in diagrammatic form, what are the environmental priorities for any action to reduce waste to landfill. This hierarchy of priorities was actually incorporated within the stated objectives of the Waste Minimisation and Management Act (1995) and its subsequent regulations. This has now been superseded by the Waste Avoidance and Resource Recovery Act (2002).



Waste Minimisation for economic efficiency is no different from total quality control and production optimisation. As a quality service provider, the builder is committed to the concepts of continuous improvement. Waste minimisation, like quality control, cannot be an end of pipe solution, where we fix everything that went wrong during the process, but must be an up-front process of improvement.

We do not expect that we need to inspect all our builders sub-contractors' work for a multitude of poor quality performances, then specify remedial action. We expect the quality control process to be at the front end of the process with the tradesman that does the work. In a similar fashion, we do not expect to scavenge through the waste bins to recover items that should never have been there in the first place. The rummaging through the waste bins or a waste audit (as it is called) is only a similar process to a quality audit that does a spot check on the performance of the tasks on site. The project manager on a continuous basis undertakes the latter.

The iterative process of quality control and waste minimisation is shown below:-



This Waste Plan document has incorporated these procedural considerations.

2. Environmental Obligations

2.1 Council Development Consent Requirements

A copy of the development consent will be attached as an appendix to this document when it is issued. The following are the expected requirements of the development consent that have waste implications:-

1. Waste bins are not to be placed on any public ground

2. The waste management procedures developed should be in accordance with those detailed in the preliminary waste plan submitted with the Development Application.

3. Site access is restricted to be in accordance with the traffic management plan submitted to Council.

4. Site work is restricted to the work hours 7.30am - 5.00pm Monday to Friday and 7.30am – 3.00pm Saturday.

2.2 Obligations under Environmental Legislation and the EMS

The general obligations under environmental legislation relate to requirements for separate disposal of various wastes of a hazardous nature. This includes:-

- Disposal of asbestos or asbestos cement in confined fashion for separate burial

- Disposal of hazardous or liquid wastes, such as paints, solvents and adhesives to suitable facilities. Empty containers may be disposed of amongst mixed waste.

- Where contaminated spoil is involved, all movement and management of the spoil must be in accordance with the contaminated site management plan approved by Council.

2.3 Occupational Health & Safety Requirements

Occupational health and safety legislation provides requirements regarding manual handling, personal safety equipment and procedures for safe use of chemicals and equipment. Included in the latter are cranes, lifts, waste chutes and earth moving equipment.

The lifting requirements restrict the weights that should be manually loaded. This requires that containers of waste, such as 240 litre mobile garbage bins (MGBs), must be loaded into bulk bins using mechanical lifting devices. Where this device is an electrically powered bin lifter, an approved safety cage to prevent access while the device is lifting must surround it. Larger or heavier bins must be lifted using front end loader or fork lift devices.

Where mixed waste is being dropped into a bin via a chute, the top of the bin must be covered to prevent excess escape of dust.

2.4 Requirements of the Quality Assurance System

The requirements of the builder's quality system that directly impact on waste management are:-

- Selection of sub-contractors according to quality criteria
- Contract review based on key performance
- Product (materials) traceability and assurance
- Corrective and preventive action regarding non conforming building work
- Maintenance of statistical records to demonstrate satisfactory quality control
- Internal and external audits of performance

In its entirety, the quality system ensures minimisation of waste in an economic fashion.

3. Building Project in Detail

3.1 Site Plan

Stage 1.

The building project that this plan has been prepared for is the construction in two buildings of 8 and 9 Levels plus three basement levels. There are 20,164 m^2 of commercial office style space, 4,592 m^2 of serviced apartments and 4,275 m^2 of retail space.

Stage 2.

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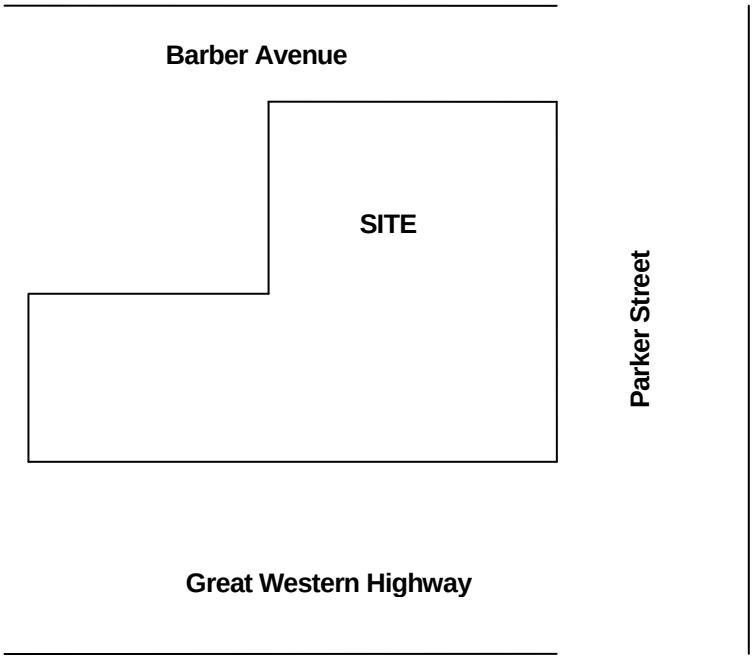
The general location of the site is shown in the following figure:-



3.2 Existing Buildings

The site is presently occupied by a church and three houses.

Photo 1. Two Fibro Houses facing Barber Avenue

Photo 2. View down Barber Avenue showing narrow width

Photo 3. Church Building facing Great Western Highway

Photo 4. Church Residence facing Great Western Highway

3.3 Site Excavation Requirements

The excavation of the site will be required to establish foundations and to create the underground car park. There are three floors of underground parking and ½ floor of retail . In order to establish the foundations for the building and excavate space for the car park gross excavation of approximately 60,000 m^3 of spoil for Stage 1 and 36,000 m^3 of spoil for Stage 2 will need to be undertaken. In all, approximately 150,000 tonnes of excavated spoil will need to be removed from site.

3.4 Design of the New Building

Stage 1.

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- Water and sprinkler system in the commercial properties

The building design attempts to maximise the utility of the buildings without impacting too greatly on the surrounding built environment.

4. Waste Avoidance at Design Stage

4.1 Options for Renovations of Existing Building

This is not applicable in this case.

4.2 Design of Building to Minimise Waste

The designers of buildings always endeavour to find the appropriate balance between complete standardisation, such as modular construction, and custom built dwellings. 'Standardised' is clearly lowest in cost, but in many cases, the community will not accept the lack of variety in these designs.

The design has endeavoured to have a large range of standard items. Ceiling lights, doors, and windows are all standardised. Shapes and pre cast panels have been designed to be aesthetically pleasing and blend into the civic environment, yet this has little impact on waste production.

4.3 Selection of Materials and Material Suppliers

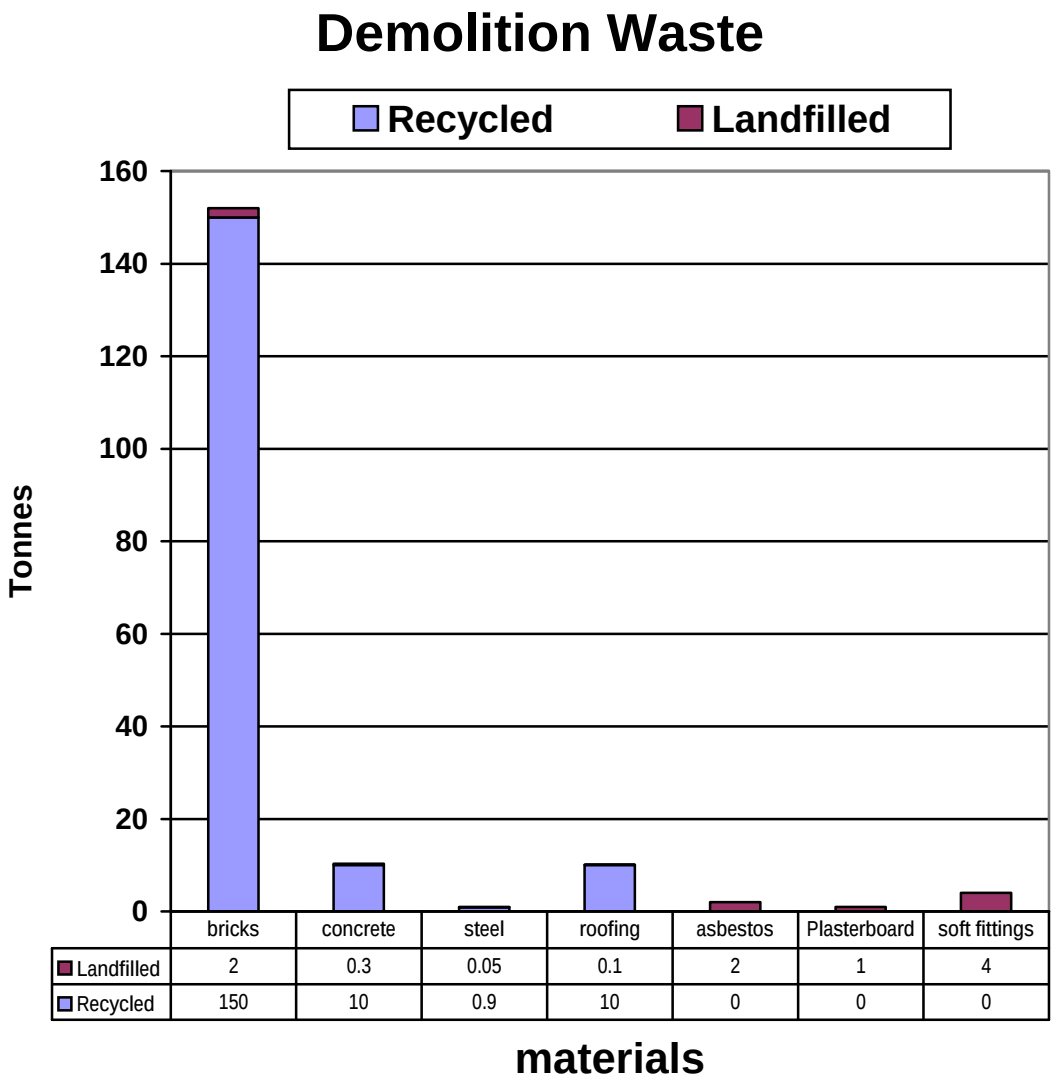
Materials and their suppliers have been chosen predominantly for the reliability and quality of supply. Gyprock and tiles have been supplied in standard sizes. The steel, bricks, roof sheeting, windows and doors, have all been supplied in standard form in sufficient quantity to optimise delivery. Wherever possible, packaging has been minimised, but the relatively high cost of having items damaged in transit has necessitated this decision resting with the supplier.

In most cases wherever possible building components have been formed into a suitable module in a factory. Examples include door and frames, window sections, modular wall panels etc.

5. Waste Minimisation during Demolition

5.1 Financial Considerations

The demolition quantities that are believed to be generated from the demolition of the existing buildings are shown in the graph below.



Mixed waste disposal costs approximately $150/tonne for tipping. Clearly, if all the material was landfilled as waste, the tip fees alone would be about $30,000. To minimise costs, the demolition contractor directs virtually all of the inert and dense material to reprocessing. This results in landfilling less than 1% of the weight of the demolished building excluding asbestos which must be landfilled.

Asbestos Sheeting Removal

In accordance with WorkCover requirements, the exterior cladding of asbestos cement and the corrugated asbestos cement sheeting needs to be removed in the following manner:

1. Placing plastic sheeting around the perimeter of house to collect all wet dust
2. Wet down the surface and the inside of the wall cavity
3. Removing the wooden joining strips and corner mouldings
4. Punching through or chiselling off the nail heads
5. Removing the sheet as intact as possible
6. Placing the sheet in a plastic-lined bin
7. Sealing the sheets up in the bin with the plastic liner
8. Transporting the sheeting to a suitably licensed facility

The following photograph shows an employee in full disposable body suit overalls, safety helmet, gloves and respirator. This shows him wetting down the surface of the fibro with the plastic sheeting in place around the perimeter:

Photo 5 : Asbestos sheeting removal – wetting down the surface

Photo 6 : Asbestos sheeting removal – preparing for sheet removal

This photograph shows the nails being punched through the sheeting to allow the removal of a full sheet:

The photographs below show the sheets being taken from the house to the lined bulk bin. The excess plastic is folded over the top and taped to provide a seal.

Photo 7 : Asbestos sheeting removal

Photo 8 : Asbestos sheeting for removal off site

5.2 Demolition Contractors

The stages of the demolition work is seen as fundamentally:-

- Removal of asbestos roofing and sheeting
- Stripping out any items of re-use value, in particular, doors and windows
- Manual removal of metal sheeting
- The retrieval of scrap metal items, such as copper pipe, tap fittings, hot water tanks and any suitable steel
- The collapsing of the brick walls of the office block in loads for recycling as crushed material
- Metal building frame sections may be suitable for recovery for reuse but most of the steel such as arch bars and structural steel are recovered for scrap, due to their age
- The ceilings and floors and any soft fittings are loaded as mixed waste
- The concrete floor and footings are pulled up and transported away for recycling
- The concrete pavements are pulled up and transported away for recycling

5.3 Re-Use of Building Materials

Where possible steel building frames or steel sections are recovered for reuse. The bricks and concrete will be recovered for crushing. Crushed bricks are sold as drainage media or as road base for low wheel load roads.

Any floors or road slabs which are made of concrete are recovered for reprocessing. The reprocessing produces a marketable crushed concrete product with the steel reinforcement recovered for recycling as scrap. If possible crushing may be undertaken on site to provide sub road base materials for use on site. This activity is compliant with Government initiatives for minimizing multiple handling and thus use of transport to off site processing.

5.4 Recycling of Materials

As detailed earlier, 99+% (excluding asbestos) of the buildings' weight will be recycled (scrap metal, bricks and concrete). The greater the level of use of inert materials in a building the greater the percentage that is recycled.

5.5 Disposal of Residual Waste

Fractured timber, soft fittings, hard fittings, plasterboard and other composite materials will be land filled. There is no market for the timber involved and only where there is sufficient wood to form a separate load is it feasible to dispose of the wood waste separately. It is hard to justify the separate disposal, because there are minimal tip savings and considerable additional cost of labour to form up the separate load. At this point in time, this activity is not viable, because there is simply no suitable material for removal.

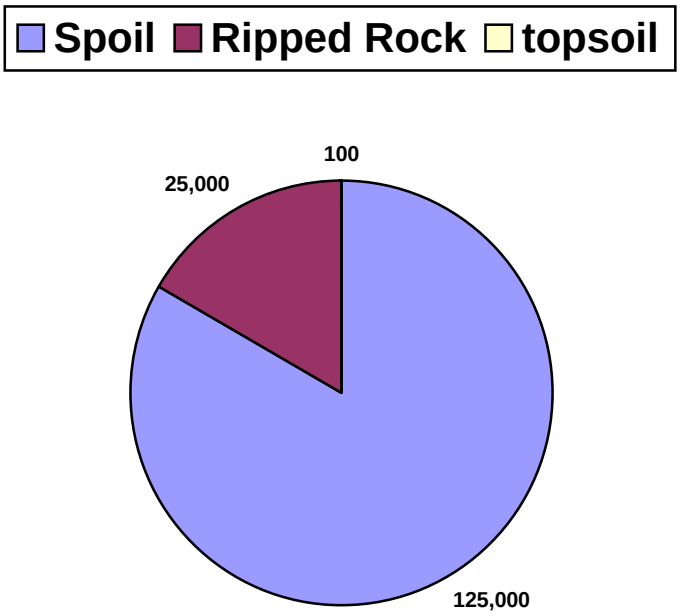
6. Waste Minimisation during Excavation

6.1 Financial Considerations

Due to the limited space on site, the excavation contractor tends to strip off the site and excavate the suitable void for establishment of the car park and the foundations. The excavation contractor will not remove more spoil than necessary, because it uses more machine time, costs him money and is a waste of money

No spoil from the excavation process will be directed to a waste landfill. The only exception to this is when the material is accepted at a landfill for use as engineering materials which are essential for the proper operation of the landfill.

The composition of the excavated spoil to be removed from the site is shown below.



Figures above are shown in tonnes

6.2 Excavation Contractors

The excavation contractor used will be required to have significant skill as any excess removal of spoil will incur additional costs for additional concrete to form the foundations.

6.3 Re-use of Topsoil and Spoil On-Site

It is not appropriate to reuse the topsoil or spoil on site. Overall there is a need to create void space for parking so there is an overall requirement to remove materials from site.

6.4 Re-use of Topsoil and Spoil Off-Site

The excavated spoil and ripped rock will be directed to an off-site facility that recovers and re-uses the material. The facility such as Benedicts on sells the material as product.

6.5 Recycling of Materials

The spoil will be screened and used elsewhere.

6.6 Disposal of Residual Spoil

No disposal of residual spoil to landfill will occur from this site.

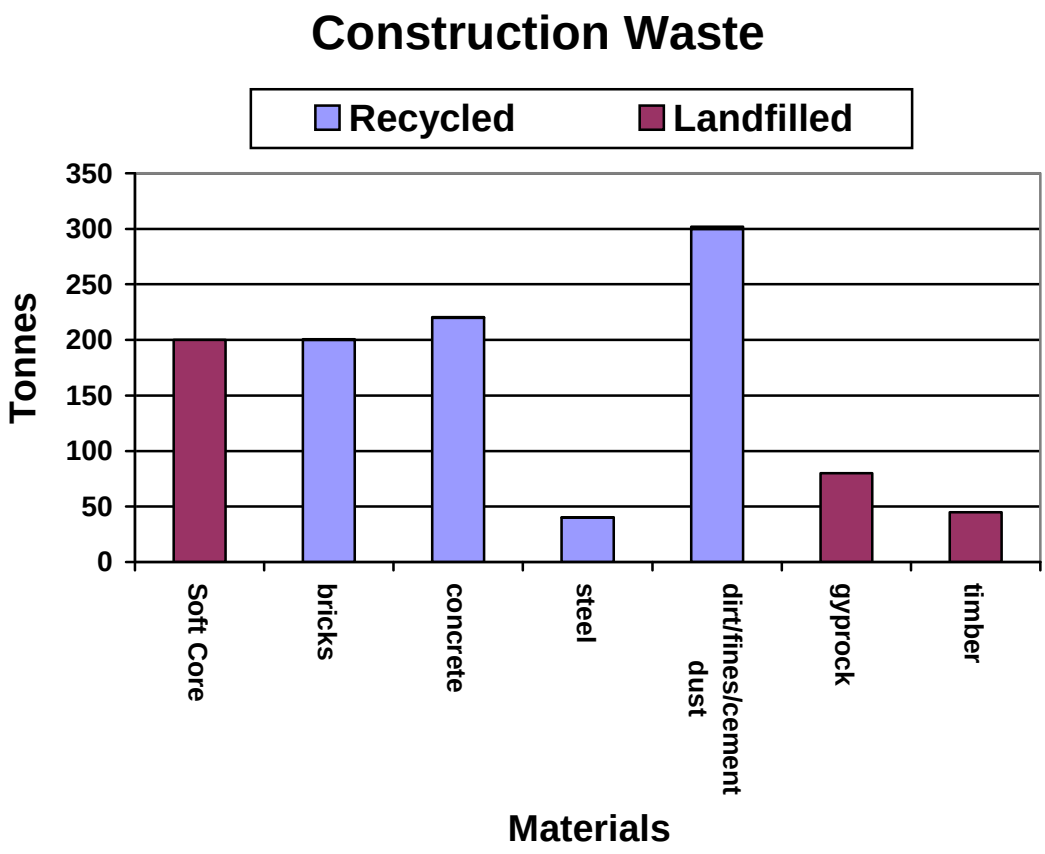
7. Waste Minimisation during Construction

7.1 Financial Considerations

As detailed earlier, the heavy fraction of construction and demolition waste is the most recyclable. This refers to the fraction consisting of concrete, bricks and soil.

The waste removal contractor charges per m^3 of bin space removed, whether it is heavy or not. High tip fees are a discouragement for dense materials being directed to the tip.

The following graph shows the composition of the wastes recycled and landfilled from the project. The total of the bar is the quantity generated.



7.2 Waste Contractors

The waste contractor for this project will direct the material to a resource recovery facility. The bin removal will be in 9m³ bins. The resource recovery process is shown in the photographs later in this document.

7.3 Building Sub-Contractors' Waste Obligations

The sub-contractors on site have an obligation to ensure all waste materials are placed in the waste disposal bin and that their work area is cleaned up. Where this is not satisfactorily undertaken the builder's site manager will instruct his personnel to do so and will on-charge the sub contractor.

7.4 Re-use of Building Materials

Preferably, excess materials are not ordered on-site and so minimal material is available for re-use. The concreters recover any viable pieces of steel for re-use, since it is at their cost. Left over copper pipe and wiring is used elsewhere. Residual bricks are re-used as commons at other jobs.

7.5 Recycling of Materials

Where concrete in excess of needs is delivered, it is disposed of into the mixed waste bin. The same is true for broken bricks and excess mortar. The waste contractor will transport the bins to the resource recovery facility, where the bins will be tipped in a stockpile. The mix is sorted using a grab attachment to an excavator. The dense fraction is fed into a trommell and sorted into various fractions of soil, aggregate and bulkier items. The soil, bricks, mortar and concrete are all retrieved from the mix at this site for reprocessing into products for marketing.

7.6 Disposal of Residual Waste

The residue of the recovery process is bulked up and transported to the landfill using transfer vehicles. These vehicles are either truck and dog combinations or semi trailers. In either case, they carry approximately 25-30 m³ of waste per load. This lighter fraction tends to have a density of approximately 400-500 kg/m³. This means the loads range from 10 to 15 tonnes each.

The materials disposed of are predominantly wood, plasterboard, plastic, composite materials and paper packaging materials.

Part B Future On - Site Waste Management

1. Introduction

McGregor Environmental Services have prepared this plan of the on-site waste management system for the Developers, Aesthete N0. 3 Pty Ltd, who engaged M^{c}Gregor Environmental Services to assist in preparing this plan.

Penrith City Council have made a commitment to ecologically sustainable development (ESD). The principles of ESD are incorporated into the Environmental Planning and Assessment Act and the Waste Minimisation and Management Act (now the Waste Avoidance and Resource Recovery Act). Council has incorporated the principles of ESD into both its planning, regulatory and operational roles. This includes incorporating in new buildings waste management systems that have the capacity to recover resources for recycling. By addressing solid waste management in the early design stages with other utilities the Developers have ensured that an efficient waste management system is in place in the buildings that form the development.

2. Existing Obligations

2.1 Council Development Requirements

The following are the waste collection system requirements specified in Council's code of waste handling in buildings:-

- Sufficient storage volume for garbage and recycling for the maximum period between collections.

- The waste storage area to be finished with impervious surfaces, drained to sewer, contain hot and cold water taps to allow bin washing, have an artificial light source and be vented.

2.2 Obligations under Environmental Legislation

The general obligations under environmental legislation relate to requirements for separate disposal of various wastes of a hazardous nature. This includes:-

- Disposal of hazardous or liquid wastes, such as paints, solvents and adhesives to suitable facilities. Empty containers may be disposed of amongst mixed waste.

- No disposal of leachate from waste into stormwater.

2.3 Occupational Health & Safety Requirements

Occupational health and safety legislation provides requirements regarding manual handling. The lifting requirements restrict the weights that should be manually loaded. This restricts manual lifting to a container of about 55 Litres. Mobile garbage bins (MGBs) must be loaded into bulk bins using mechanical lifting devices. Where this device is an electrically powered bin lifter, an approved safety cage to prevent access while the device is lifting must surround it.

3. Waste Collection System in Detail

3.1 Waste Volume Requirements

Stage 0ne

This is a commercial development only in Stage one and consequently although there are 84 serviced apartments it is not required by Council to specifically satisfy its residential requirements but instead the more flexible requirements of hotel style accommodation. The management of all wastes will be undertaken by employees of the businesses present.

Retail – 2,985 m^2

Commercial – 20,191 m^2

Hotel (Serviced Apartments) – 4,511 m^2

The rate of waste generation that is usually expected from this floor area of this type of usage is shown in the table below.

Activity	**Floor Area m^2**	**Waste Generation**	**Waste Volume /day**	**Recycling Generation**	**Recycling Volume /day**
Retail	2,985	50L/100m^2 floor area/day	1,500 Litres	25L/100m^2 floor area/day	750 Litres
Commercial Offices	20,191	30L/100m^2 floor area/day	6,000 Litres	15L/100m^2 floor area/day	3,000 Litres
Hotel	9,516 (96 beds)	40L/bed/week	500 Litres	20L/bed/week	250 Litres
TOTALS			**8,000**		**4,000**

The following is the storage and clearance requirement:-

waste – approximately 8,000 Litres per day.

Recycling – approximately 3,500 Litres per day of paper/cardboard recycling.

Recycling – approximately 500 Litres for glass, aluminium and plastic recycling per day.

The bins would be held in the garbage room and brought to the loading dock for collection.

Waste Storage Area

- Waste – One 3 m^3 steel storage bin for bulky waste located near the loading dock plus five 660 Litre MGBs plus twenty 240 Litre MGBs cleared daily = 11,100 Litres (exceeds requirement of 8,000 Litres per day) thus allowing for collections only six days per week.

Recycling Waste Storage Area

- Paper Recycling – Eight 660 Litre MGBs plus sixteen 240 Litre MGBs for paper/cardboard recycling cleared **twice** per week = 18,240 Litres.

- Containers mixed recycling – Ten 240 Litre MGBs for glass/plastic/aluminium cleared **once** per week = 2,400 Litres.

The bins would be serviced by waste and recycling contractors utilising a rear load vehicle which would reverse into the loading dock in Barber Avenue. Due to the frequency of clearance and the busy nature of Barber avenue it is likely that commercial waste and recycling would be collected at night.

Waste Storage Bin Sizes

The dimensions of the various commercial waste storage bins are shown below:-

Bulk Bins

The 3,000 Litre steel bulk bins are - 1,840 mm wide (plus 220mm for pick up sleeves), 1280 mm high (plus 250mm for castors) and 1420 mm deep.

The 1,500 Litre steel bulk bins are - 1,840 mm wide (plus 220mm for pick up sleeves), 940 mm high (plus 250mm for castors) and 965 mm deep.

These bins would be fitted with light weight plastic lids that seal well.

Mobile Garbage Bins

The dimensions of the 1100 Litre plastic MGB are - 1470 mm high, 1360 mm wide, 1115 mm deep.

The dimensions of the 660 Litre plastic MGB are - 1235 mm high, 1360 mm wide, 765 mm deep.

The 240 Litre plastic MGB are - 1100 mm high, 580 mm wide, 740 mm deep.

NOTE:- The term "***Commercial Waste***" is used here to reflect the common term for non residential waste used in the waste industry.

These bins would be used for garbage from the hotel retail and restaurants as well as recycling of bottles, aluminium and plastics. In each case a bin lid that seals entirely over a raised lip would be used to prevent the penetration of water and release of odours.

Stage Two

Stage two is envisaged as having the following composition of development.

Retail – 3,138 m^2

Residential Apartments – 74 two bedroom apartments and 32 single bedroom apartments

The rate of waste generation that is usually expected from this floor area of this type of commercial usage is shown in the table below.

Activity	**Floor Area m^2**	**Waste Generation**	**Waste Volume /day**	**Recycling Generation**	**Recycling Volume /day**
Retail	3,138	50L/100m^2 floor area/day	1,500 Litres	25L/100m^2 floor area/day	750 Litres
TOTALS			**1,500**		**750**

It is envisaged that for the additional retail waste produced by the stage two retail premises an additional three 660 Litre MGBs (two for waste and one for recycling) plus three 240 litre MGBs (two for waste and one for recycling) and collected via the loading dock.

For the proposed 106 residential apartments Council will be the waste and recycling collection service provider. Council require a floor space area in a separate residential waste storage room of 600mm x 800 mm for each of the 106 dwellings. They also require that the access doorway be at least 1m wide. It is expected that we will require 27 x 240 Litre MGBs cleared twice per week for garbage and 50 x 240 Litre MGBs cleared once per week. Space has been allowed for in the waste storage area for 106 bin areas in order to allow for reasonable access and ease of clearing and cleansing of the storage area. The bins would be serviced by Councils waste and recycling contractors utilising a rear load vehicle which would reverse into the loading dock in Barber Avenue.

Reprocessing Wastes

to

Form Products

Waste ⟹ Resource

Reprocessing of Materials

Comment: Inert materials (bricks, concrete, soil as in foreground) are fed into a crusher for downsizing and screening into products.

Feedstock for Concrete Crusher

Comment: The feedstock for all the products generated by crushing is a low-grade mixture of bricks, rubble and concrete. Note however, that it is completely free of wood and plastic thus ensuring a consistent quality of product that customers can rely on for their particular use.

Output from Crusher

Comment: This shows the output product. The fines have been removed and the gravel product is coming down the chute.

Waste to Resource – Screened Fines/Gravel

Comment: Here the crushed material drops through the screen. In this case, it contains a mix of fines and gravel that is marketed as a road base material.

Gravel-Sized Crushed Brick and Concrete

Comment: This gravel-sized material is predominantly sold as a drainage media.

Fines from the Crusher

Comment: This is the fines from the crushing of brick and concrete. These are relatively angular in structure and so make good filling sand. They are mainly used by the paving industry. This material could be used to form part of low-grade concrete.

Mixed Gravel and Fines

Comment: This blended material is sold as low-grade road base. The angular nature of both the gravel and fines makes it pack well.

Comment: Here skips are delivered to materials recovery site and the items removed in a similar fashion to those at demolition sites, i.e., bricks/concrete separated, items of value, scrap metal, soil/rubble and a mixed waste residue (as in background) for transfer to landfill.

Comment: Note sorting area with mixed residue in right background, brick/rubble for crushing in centre and scrap metal/items in left foreground.

Mixed Residue for Disposal from Materials Recovery Facility

Comment: The mixed residue contains large volumes of wood, cardboard, plastic, plasterboard and composite items formed of two or three types of material.