

D4 Recycling/Resource Recovery Capacity

Mike Ritchie & Associates



This page has intentionally been left blank



Dellara Pty Ltd

Orchard Hills waste and resource management facility

Recycling/Resource recovery capacity

30 July 2010

MIKE RITCHIE & ASSOCIATES

TABLE OF CONTENTS

Introduction	1
Requirements for Waste Recovery	1
Infrastructure SEPP requirements	1
WARR Act and WARR Strategy Targets.....	3
Orchard Hills Waste Inputs	4
C&D Waste (including soils)	4
C&I Waste.....	5
Sydney C&D and C&I Waste Management	6
Future Recycling Requirements.....	6
Composition of Incoming Waste	9
<i>C&D Waste</i>	9
<i>C&I Waste</i>	11
Recovery at Orchards Hills	13
Sorting Processes	13
<i>C&D resource recovery</i>	13
<i>C&I resource recovery</i>	15
Landfill diversion and markets for resources	15
<i>C&D Stream</i>	16
<i>C&I Stream</i>	17
Innovation to increase diversion	18
Conclusion	19
References.....	21

INTRODUCTION

The former Erskine Park Quarry (Lot 40, DP 738126 in Patons Lane, Orchard Hills, Sydney) is proposed by Dellara Pty Ltd ("the Proponent") as a suitable site to establish and operate a waste and resource management facility (Figure 1). The proposed Orchard Hills waste and resource management facility would be accepting general (non-putrescible) waste predominantly comprised of construction and demolition (C&D) and commercial and industrial (C&I) waste. Restricted, liquid or dangerous waste would not be accepted in the facility. The facility would primarily focus on maximising resource recovery. Any non recoverable residual waste would be emplaced in the site's proposed Class 2 solid waste landfill.

Recycling and reprocessing, clay/shale extraction and residual waste emplacement would be the main activities on the site, rendering the facility financially viable and providing a holistic waste management solution. Upon project completion, the land would be returned to rural grazing fully rehabilitated.

Mike Ritchie and Associates were engaged by the Proponent to ensure that the proposed Orchard Hills waste and resource management facility complies with the Infrastructure SEPP requirement for adequate levels of resource recovery and maximum diversion from landfill. This report examines the effectiveness of the proposed waste management methods in achieving maximum diversion of target waste streams.

REQUIREMENTS FOR WASTE RECOVERY

Infrastructure SEPP requirements

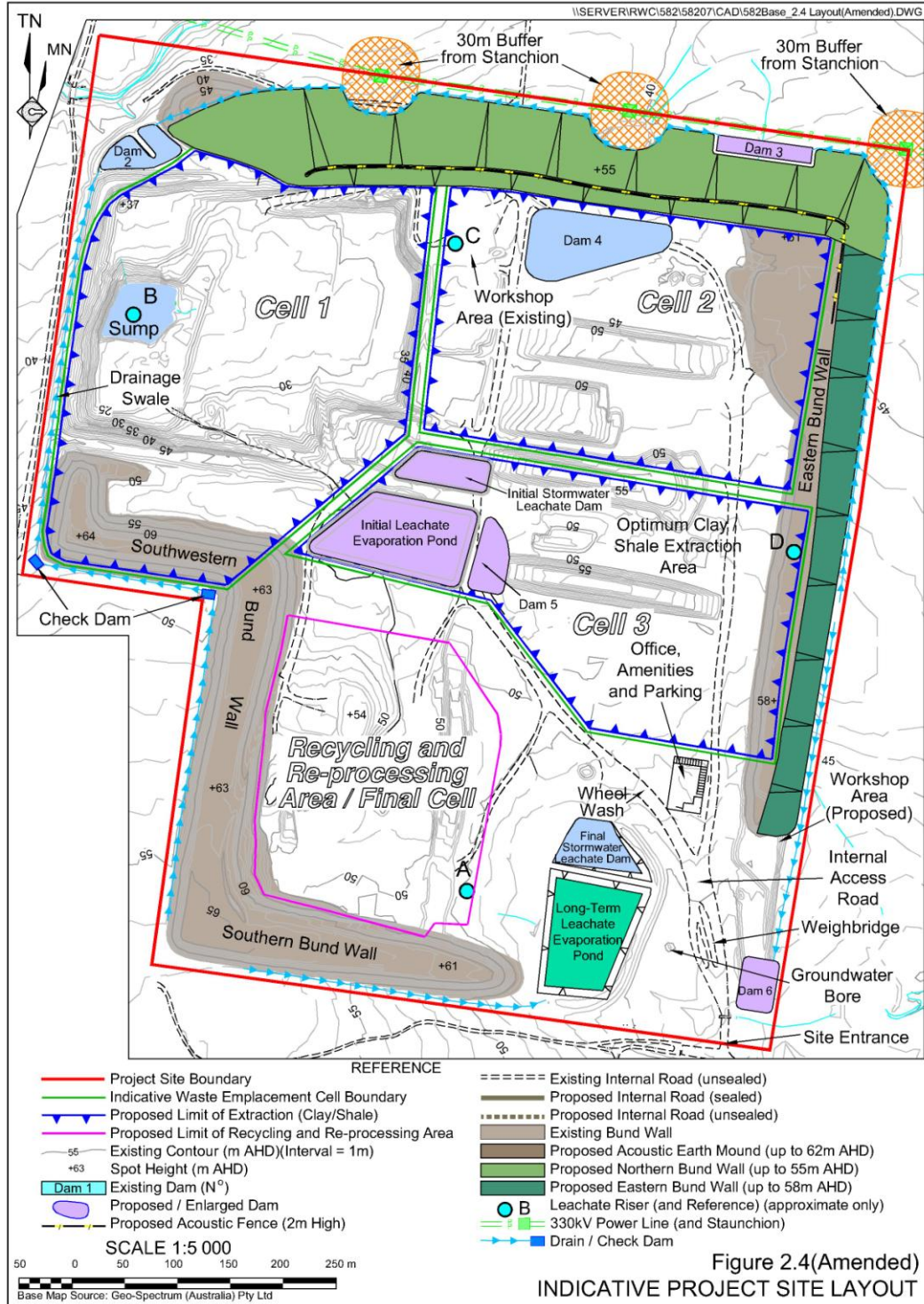
On 7th July 2010 the Government amended the Infrastructure State Environmental Planning Policy (SEPP) for Landfill Applications (2007) relating to mandatory considerations for determining applications for landfill facilities under Part 3A and Part 4 of the Environmental Planning and Assessment Act 1979. In particular, clause 123 of the SEPP was amended to reflect changes in market conditions for landfill disposal¹. Therefore, although the principle of Justifiable Demand is retained, issues such waste minimisation, best practice design and site location will be taken into account by consent authorities considering development applications for landfill facilities.

Figure 1 Site map.

DELLARA PTY LTD
Orchard Hills Waste and
Resource Management Facility

2 - 12

ENVIRONMENTAL ASSESSMENT
Section 2: Description of the Project
Report No. 582/03



The criteria relating to resource recovery require operators to provide evidence to demonstrate that the facility incorporates adequate recycling and resource recovery capabilities:

Whether there is a suitable level of recovery of waste, such as by using AWT or the composting of food and garden waste, so that the amount of that waste is minimised before it is placed in the landfill.

In a New South Wales context, a suitable level of recovery should be in accordance with current State waste policies and related waste management and resource recovery targets.

WARR Act and WARR Strategy Targets

In NSW, waste management and resource recovery strategies are set by the Department of Environment, Climate Change and Water (DECCW). The Waste Avoidance and Resource Recovery Act 2001ⁱⁱ (WARR Act) provides the strategic direction and aims to:

1. Encourage the most efficient use of resources and to reduce environmental harm in accordance with the principles of ecologically sustainable development,
2. Ensure that resource management options are considered in accordance with the following hierarchical order:
 - a. Avoidance of unnecessary resource consumption,
 - b. Resource recovery (including reuse, reprocessing, recycling and energy recovery), or
 - c. Disposal
3. Provide for the continual reduction in waste generation,
4. Minimise the consumption of natural resources and the final disposal of waste by encouraging the avoidance of waste and the reuse and recycling of waste,
5. Ensure that industry shares the responsibility for reducing and dealing with waste
6. Ensure the efficient funding of waste and resource management planning, programs and service delivery,
7. Achieve integrated waste and resource management planning, programs and service delivery on State-wide basis,
8. Assist in the achievement of the objectives of the Protection of the Environment Operations Act 1997

Based on the 2001 Act, Resource NSW (now part of DECCW) released the WARR Strategy (Waste Avoidance and Resource Recovery Strategy) in 2003ⁱⁱⁱ (updated

in 2007^{iv}). The WARR Strategy set the following 2014 targets for increasing the collection and recycling of materials:

- Municipal waste – increase from a 2000 baseline of 26% recycled to 66% in 2014;
- Commercial and industrial (C&I) waste – increase from a 2000 baseline of 28% recycled to 63% in 2014; and
- Construction and demolition (C&D) waste – increase from a 2000 baseline of 65% recycled to 76% in 2014.

It is expected that all new waste management facilities in NSW need, as a minimum, to demonstrate adherence to these diversion targets to be eligible for development approval.

ORCHARD HILLS WASTE INPUTS

The Orchard Hills Waste and Resource Management Facility would at maximum capacity receive up to 450,000 tonnes of C&D and C&I waste. The proponent plans to predominantly receive and reprocess C&D waste. The proponent plans to construct a modern C&I MRF (Materials Recycling Facility) in due course.

No putrescible, liquid, hazardous or restricted waste or dangerous materials would be accepted on site. The site would not be open for waste receipts from the general public thereby providing considerable control over wastes received. All incoming loads would be inspected both while on the weighbridge and at the tipping floor. Any wastes not permitted to be received at the facility would be refused entry.

C&D Waste (including soils)

At maximum capacity, incoming C&D waste would amount to a total of 250,000 tonnes per year. Principal C&D waste targeted for receipt and reprocessing include bitumen, concrete, bricks and roofing tiles. Mixed C&D waste that is harder to reprocess would also be accepted on site in smaller quantities in order to facilitate efficient resource recovery.

A major proportion of the C&D waste (up to 100,000 tonnes per year) is expected to be low-level contaminated soil. Potential sources include remediation sites such as old petrol stations and ex-commercial and industrial sites. Annual incoming quantities of low-level contaminated soil would be dependent on construction activity and remediation projects in and around Sydney.

The type of soil contaminants anticipated are a range of contaminants such as low-level metals, hydrocarbons, polycyclic aromatic hydrocarbons (PAHs) and, potentially, chlorinated hydrocarbons that have undergone prior thermal treatment. Contamination levels would always be below the hazardous waste threshold and thus the material is permissible on the site.

Any soils classified as hazardous waste would not be accepted on site. To ensure that soil contamination is low-level and below the hazardous waste threshold, the Proponent would require chemical analyses of all received soils.

C&I Waste

Following the completion of the C&I MRF, the proponent would seek to attract a sustainable quantity of C&I waste. It is expected that the excellent recovery rates offered by the modern MRF would attract enough C&I waste to utilise the facility's planned 200,000 tonnes (maximum) annual capacity.

Targeted C&I waste would predominantly consist of wood, plastic, paper, cardboard, ferrous and non-ferrous metals. It is acknowledged that general C&I waste contain varying quantities of organics. The proponent would aim to minimise receipt of C&I waste containing significant quantities of organics at the stage of contract negotiation. Loads not conforming to contractual agreements, such as those including high levels of organics, would not be accepted.

SYDNEY C&D AND C&I WASTE MANAGEMENT

According to the NSW DECCW Waste Avoidance and Resource Recovery Progress Report 2008 Sydney generated 7.9 million tonnes of C&D and C&I waste in 2006-07. Of this waste, 57% was recovered while the remaining 3.4 million tonnes were landfilled (Table 1).

Table 1: C&D and C&I waste management in Sydney.

	Disposed (t)	Recycled (t)	Generated (t)	% Recycled
C&D				
2002-2003	1,177,000	2,505,000	3,682,000	68%
2004-2005	1,306,500	2,508,000	3,814,500	66%
2006-2007	1,286,000	2,978,500	4,264,500	70%
C&I				
2002-2003	2,029,500	1,022,000	3,051,500	33%
2004-2005	2,246,500	1,214,500	3,461,000	35%
2006-2007	2,086,876	1,527,958	3,614,834	42%
2007-2008	2,223,856*	n/a	n/a	n/a
Total				
2002-2003	3,206,500	3,527,000	6,733,500	52%
2004-2005	3,553,000	3,722,500	7,275,500	51%
2006-2007	3,372,876	4,506,458	7,879,334	57%

Source: NSW DECCW, 2009^v

*NSW DECCW, 2010^{vi}

The table reveals a pattern of annual increases in C&I and C&D waste generation in Sydney. However, the increase in recycling efficiency results to annual landfill disposal increasing at a relatively steady rate in absolute tonnages.

Nevertheless, the dry fraction of waste disposed of in landfills is growing. The nationwide rate of increase is believed to be twice that of CPI and is projected in the National Waste Report (2010) to be growing at between 4.5 and 7% per year.

Moreover, waste diversion rates differ significantly between these two streams. While 70% of the C&D waste was recycled in 2006-07 (an improvement of 4% on 2004-05 performance), only 42% of C&I waste was diverted. Compared to 2004-05 performance this is a 7% improvement. Despite this, current performance still falls short of the WARR target for 63% C&I diversion by 2014.

Future Recycling Requirements

Although the target of recycling 76% of C&D waste by 2014 seems achievable, projecting current waste trends into the future reveals that it could be missed by a narrow margin (Figure 2). Tightening government policies regarding the management of waste in NSW (including the recent SEPP amendments) could provide the necessary stimulus for achieving the C&D target. One of the major

contributing factors to this success rate is the ability of C&D recyclers to produce recycled concrete and road base, together with the fact that there is a market for the product. Over 1 million tonnes of recycled material has been re-used as road base since 2005-06^v.

On the other hand, diverting an additional 21% of C&I waste by 2014 is a much more difficult undertaking. Under current waste trends C&I recycling would need to increase by 2 million tonnes on today's figures (Figure 3). The recycling of such huge quantities of waste cannot be achieved by the existing recycling facilities that largely operate on their capacity limits (Table 2).

Table 2: Existing C&I recycling in Sydney.

Facility	Location	Operator	Approx. Processing	System
Earthpower	Camellia	TPI/Veolia	80,000	MRF
Macarthur Resource Recovery Park	Jacks Gully	WSN	90,000	MRF
SITA Facilities	Camellia Wetherill Pk	SITA	30,000	AWT
Galloway	Seven Hills	Galloway Waste Management	30,000	MRF

Figure 2: C&D landfill trend in Sydney Metropolitan Area (utilizing data presented in Table 1).

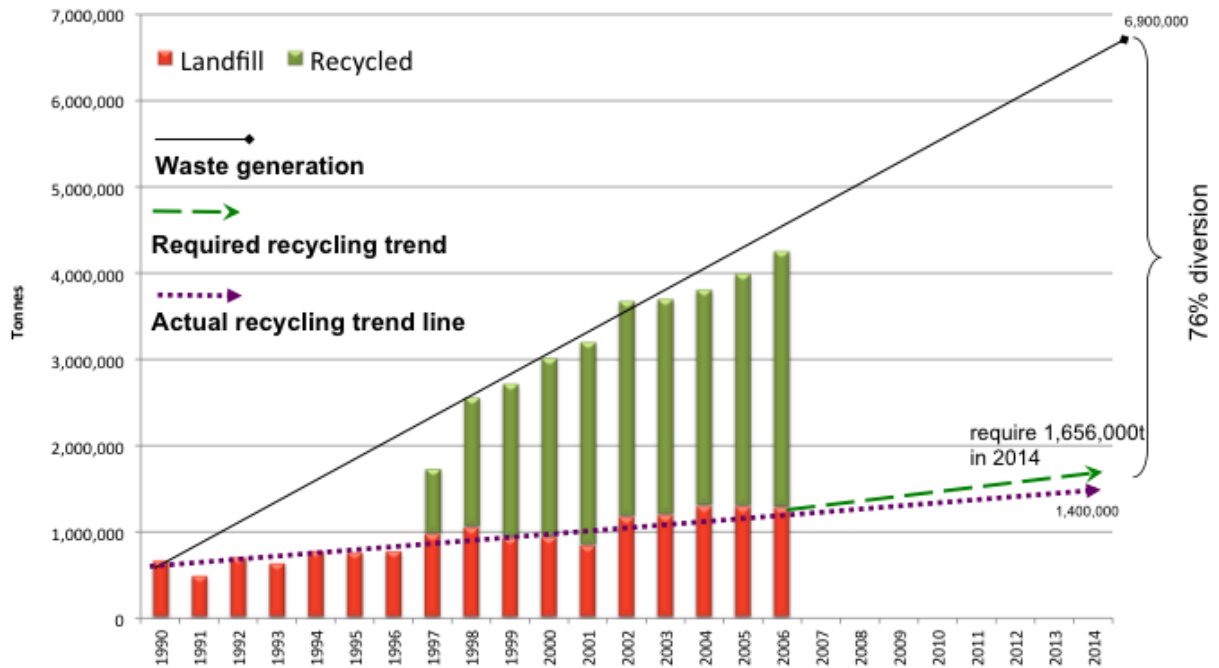
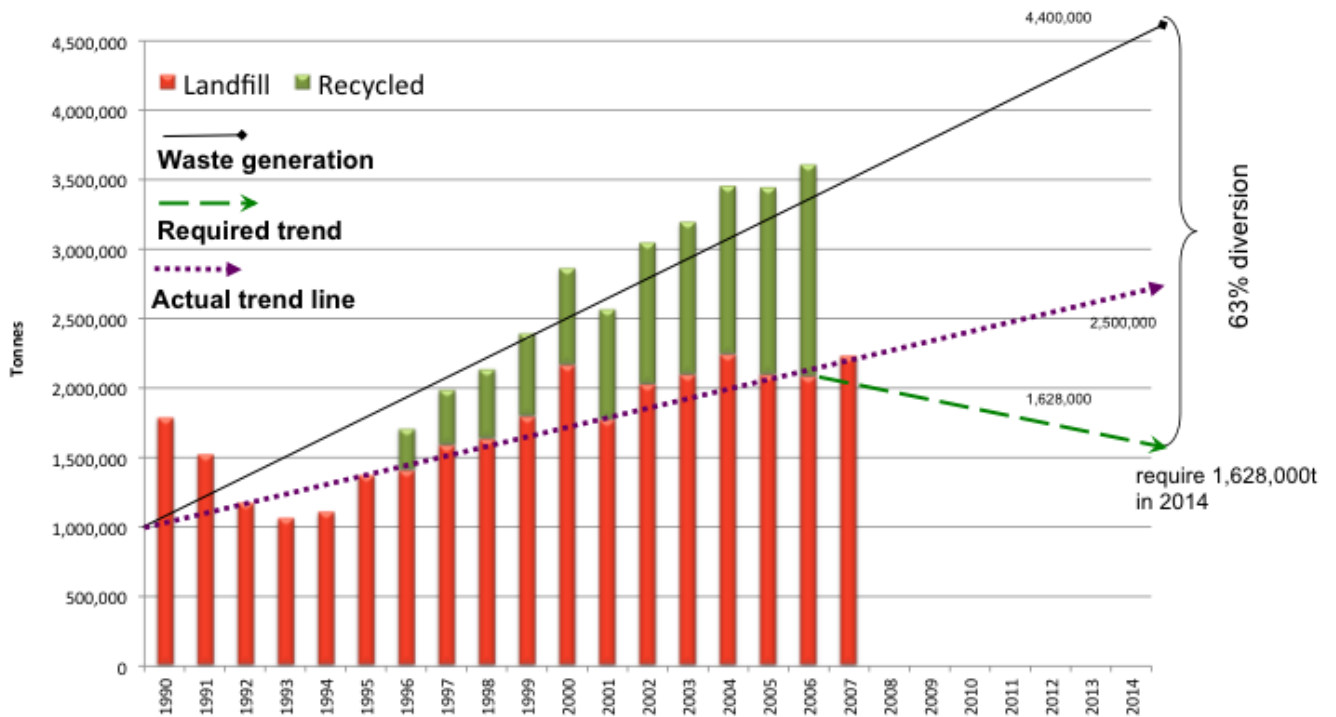


Figure 3: C&I landfill trend in Sydney Metropolitan Area (utilizing data presented in Table 1).



COMPOSITION OF INCOMING WASTE

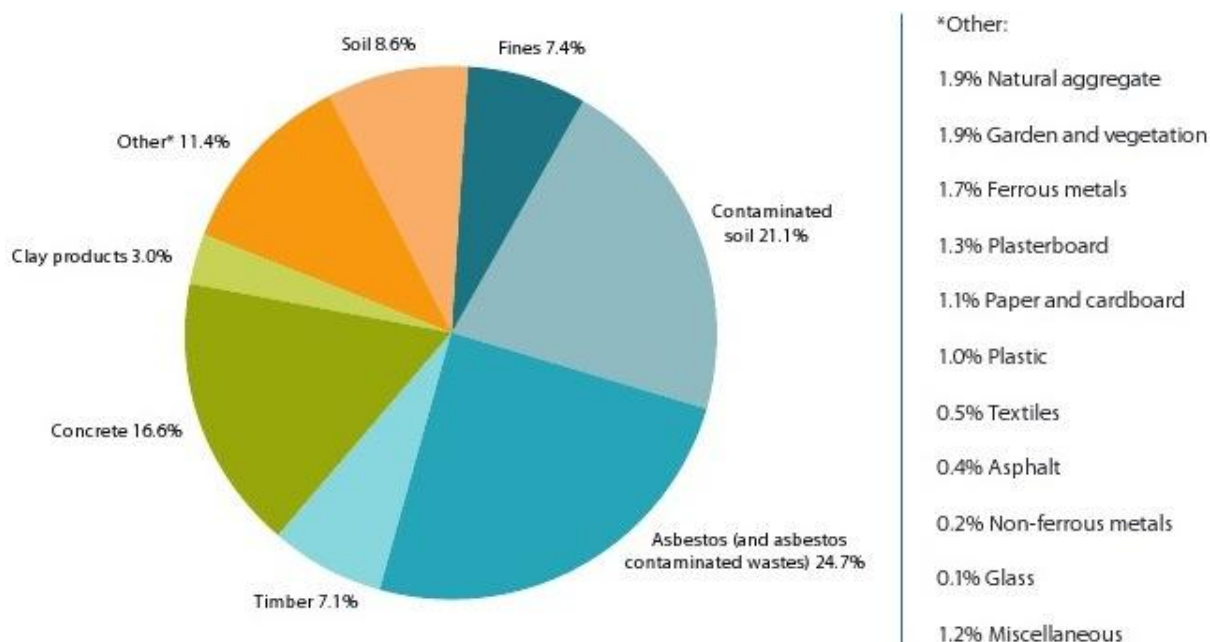
C&D Waste

NSW DECCW performed a compositional study of C&D waste that was disposed to landfill during the period January 2000 to June 2005^{vii}. The study concluded that there are opportunities for recovery of up to 40% of the C&D waste that was lost to landfill at the time.

Figure 4 presents the composition by weight of C&D waste disposed to landfill for the period 2005-05. Recoverable materials in significant quantities include concrete, clay products, timber and soil.

However, given collection, transport and sorting methodologies at the time of the study, over 50% of the C&D waste disposed of within the SMA was potentially non-recoverable due to contamination with asbestos and chemical contaminants. To reduce the proportion of non-recoverable wastes the report suggested greater segregation and removal of contaminants at the source.

Figure 4: Composition of C&D waste disposed to landfill by weight, 2004-05.



Source: NSW DECCW, 2007^{vii}.

Since 2005, diversion rates for C&D waste have improved. It is not known whether composition has changed as well due to the lack of reliable follow up

surveys and is assumed to have remained unchanged. However, the composition of C&D waste treated in the Orchard Hills Waste and Resource Management Facility would differ to that presented in Figure 4. Licensing conditions would not allow asbestos waste while contaminated soil would be incoming in separate loads and therefore can be accounted for separately.

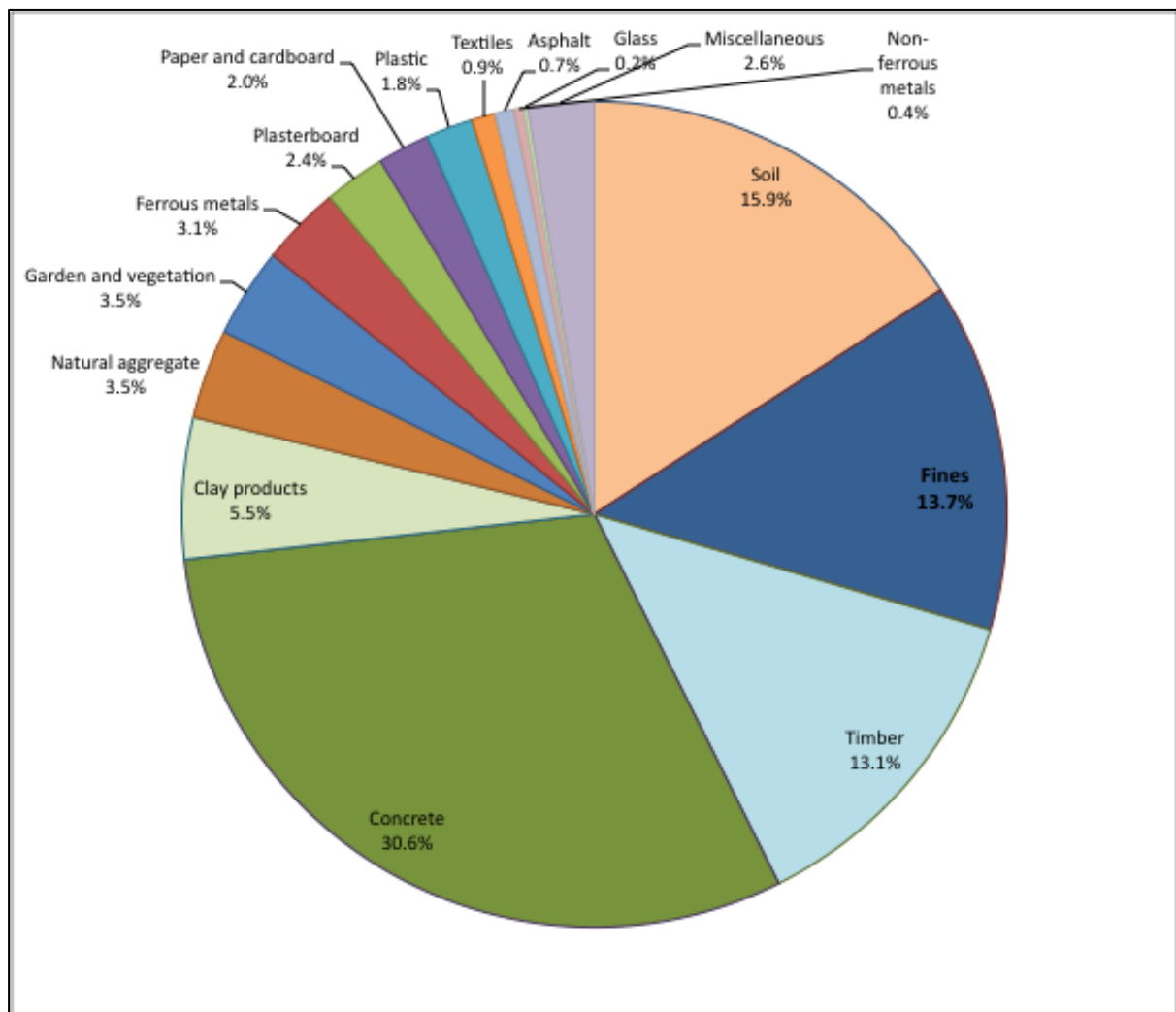
Table 3 presents C&D waste composition as identified in the DECCW survey and the composition of C&D loads expected to be delivered to Orchard Hills. The later is based on the DECCW survey results assuming that mixed loads do not contain asbestos wastes or contaminated soil and that the relative occurrence by weight between the remaining materials remains unchanged.

Expected composition of C&D waste reveals that five material categories represent over $\frac{3}{4}$ of total incoming waste (Figure 5). Concrete, timber, soil and clay products are easily recoverable with the use of appropriate equipment while there is scope for higher recycling of materials such as metals, natural aggregate, glass and plastics.

Table 3: Composition of C&D waste disposed to landfill by weight in 2004-05 and expected composition of C&D loads incoming into Orchard Hills Waste Management and Resource facility.

	2004-2005 DECCW audit composition	Expected composition at Orchard Hills
Soil	8.6%	15.9%
Fines^{viii}	7.4%	13.7%
Contaminated Soil	21.1%	<i>Separate loads (low contamination only)</i>
Asbestos and asbestos contaminated waste	24.7%	<i>Not accepted</i>
Timber	7.1%	13.1%
Concrete	16.6%	30.6%
Clay products	3%	5.5%
Natural aggregate	1.9%	3.5%
Garden and vegetation	1.9%	3.5%
Ferrous metals	1.7%	3.1%
Plasterboard	1.3%	2.4%
Paper and cardboard	1.1%	2%
Plastic	1%	1.8%
Textiles	0.5%	0.9%
Asphalt	0.4%	0.7%
Non-ferrous metals	0.2%	0.4%
Glass	0.1%	0.2%
Miscellaneous	1.4% ^{ix}	2.6%

Figure 5: Expected composition of C&D waste incoming to Orchard Hills facility by weight.



C&I Waste

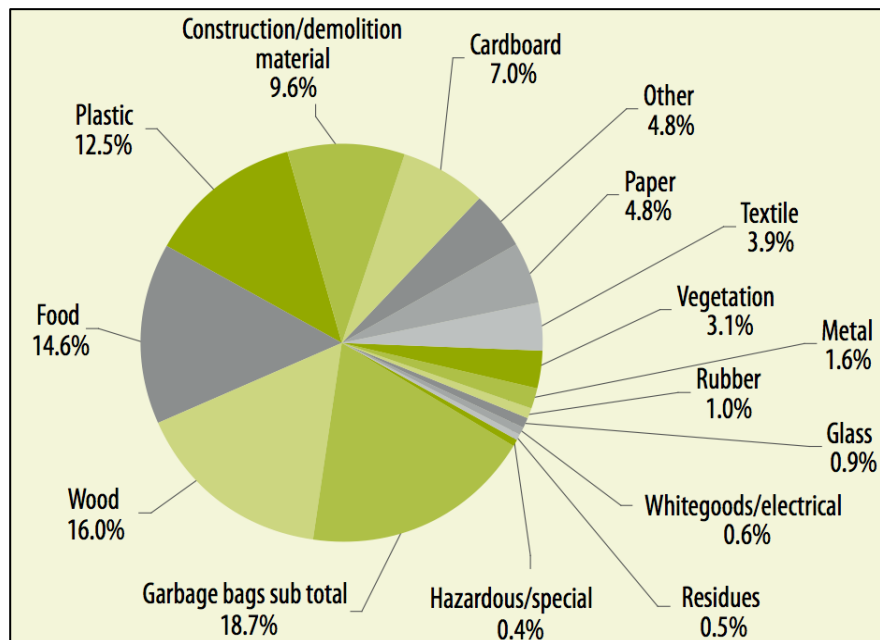
In 2008, NSW DECCW performed a similar survey on the C&I waste stream^{vi}. The findings suggest that there is scope for significant resource recovery from mixed C&I loads (amounting to 1,737,594 tonnes in 2007-2008). Figure 6 presents the findings of the 2008 C&I survey.

The Proponent wishes to pursue C&I contracts that would secure waste loads excluding certain waste types such as food and vegetation. The effectiveness of this approach remains to be seen as C&I waste composition is not consistent.

Especially since this waste stream is generated by a wide range of organisations including business, industry, government agencies, shopping centres, institutions such as hospitals and universities, and recreational facilities.

Therefore, adopting a conservative approach, it is assumed that loads of C&I waste entering the Orchard Hills facility would contain materials in the proportions presented in Figure 6. Should the Proponent succeed in excluding organics from incoming C&I, the scope for successful recycling would be even greater.

Figure 6: Composition of mixed C&I loads as identified in the DECCW 2008 survey.



Source: NSW DECCW, 2010^{vi}.

RECOVERY AT ORCHARD HILLS

The above analysis reveals that there is significant scope for resource recovery from C&I and C&D waste. As shown by DECCW audits, there is significant amount of material lost to landfill for both the C&I and C&D waste streams. The Proponent proposes to utilise state of the art technology to recover significant amounts of these resources.

Sorting Processes

As described in earlier sections, the Proponent proposes to initially establish C&D resource recovery with an accompanying Class 2 landfill for the disposal of residuals and then to build a C&I MRF and begin accepting C&I loads.

The following section provides a brief overview of the proposed sorting equipment and processes. Section 2.4 of the Proponent's Preferred Project Report describes in detail the site layout as well as recycling and re-processing plant components.

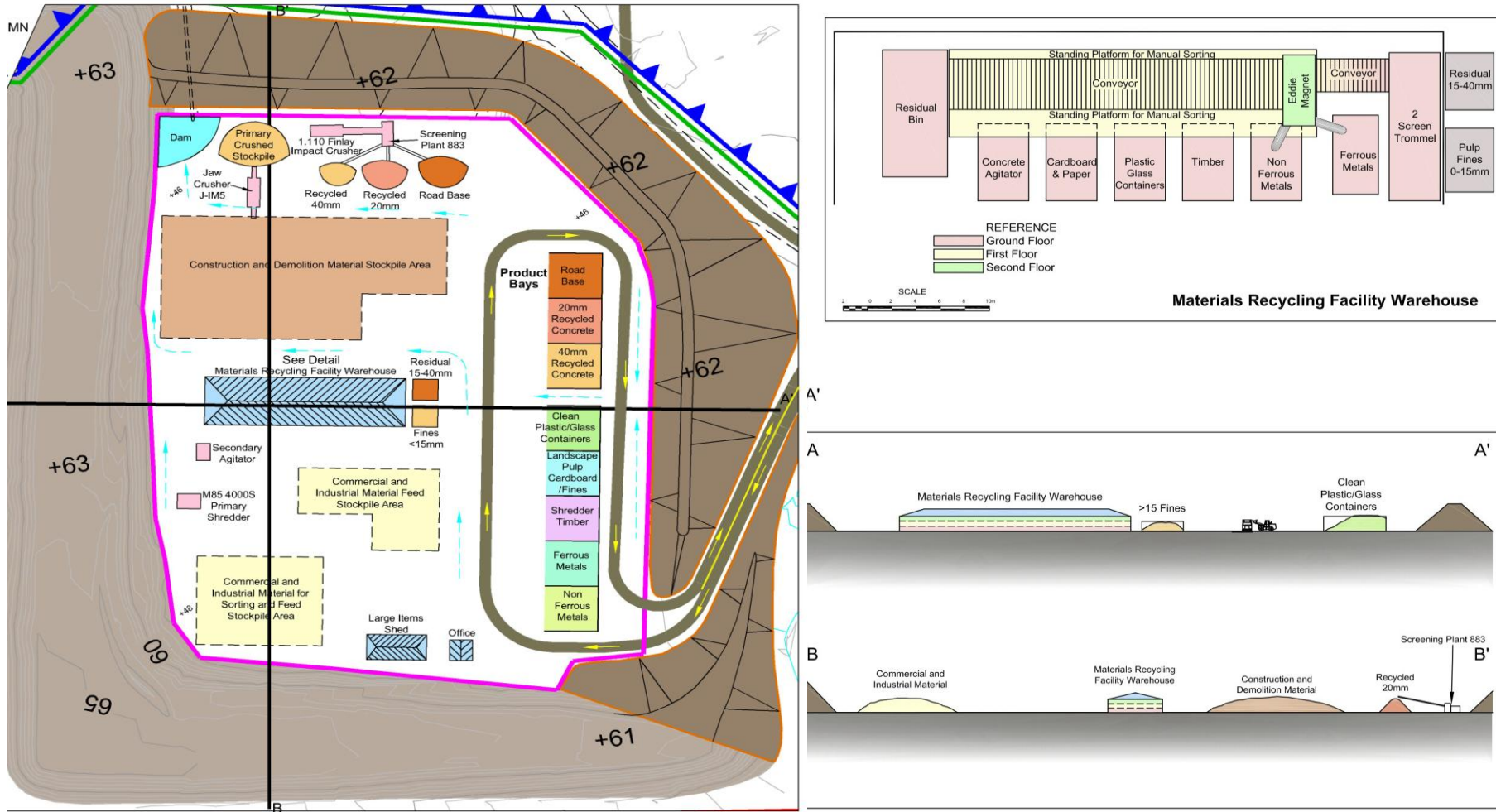
C&D resource recovery

On the outset of the project the Proponent plans to use mobile equipment (crusher, trammel and skid mounted shredder) to recycle and re-process C&D waste. Following the establishment of waste contracts to secure consistent quantities of required waste streams, additional long term recycling and re-processing plant would be installed:

1. Impact crusher (eg. Finlay 1312) fitted with a permanent steel magnet – with a throughput of 100t to 350t per hour.
2. Tracked mobile trommel (eg. Finlay J-790) – with a hopper capacity of 7m³ and throughput of 90t to 100t per hour.
3. Jaw crusher (eg. Finlay J-1175) – with a hopper capacity of 9m³ and throughput of 120t to 340t per hour.

Other supplementary equipment that may be utilised include balers, eddie current separators that remove aluminium from waste streams, a waterbath to separate timbers from heavy materials, possibly optical sorters and/or air classifiers. In the event that alternative waste technologies which would further improve the recovery and recycling of waste become available and economic throughout the life of the project, if required, approval may also be sought to implement these technologies. Figure 7 shows the anticipated location and set up of the C&D resource recovery area (upper left section).

Figure 7: Anticipated location and set up of the C&D resource recovery area and C&I MRF siting and layout.



C&I resource recovery

Following the establishment of the C&D resource recovery component of the project the Proponent proposes to build a Materials Recycling Facility (MRF) exclusively focused on maximising resource recovery from C&I waste, located within an 1800m² warehouse.

The three storey high MRF warehouse would separate the C&I waste by mechanical (conveyors, eddie magnets, shredders and trommels) and manual sorting and utilise mechanical cleaning equipment (such as an agitator).

When a load of C&I material is directed to the Recycling and Reprocessing Facility it would be unloaded into one of the two areas specified for C&I material stockpiling. Large items such as whitegoods would be removed and stored in a large items shed.

The C&I materials would be loaded into a two screen trommel (<15mm and <40mm; greater than 40mm) inside the warehouse. This allows for the removal of glass fines and other small material. The larger material is then conveyed to an elevated manual picking station.

The sorting line would include eddie currents and magnets to recover the aluminium and steel respectively and a picking station to recover timber, glass, plastic and paper and cardboard.

C&I recycling at Orchard Hills would separate and clean C&I materials to turn them into products suitable for re-sale.

Sorted materials including concrete, cardboard & paper, plastic & glass containers, timber, ferrous and non-ferrous metals would be stored separately for removal and sale offsite. Figure 7 depicts the location of the MRF facility within the resource recovery area and provides a layout of the building. Residual material would be disposed into the on-site Class 2 landfill.

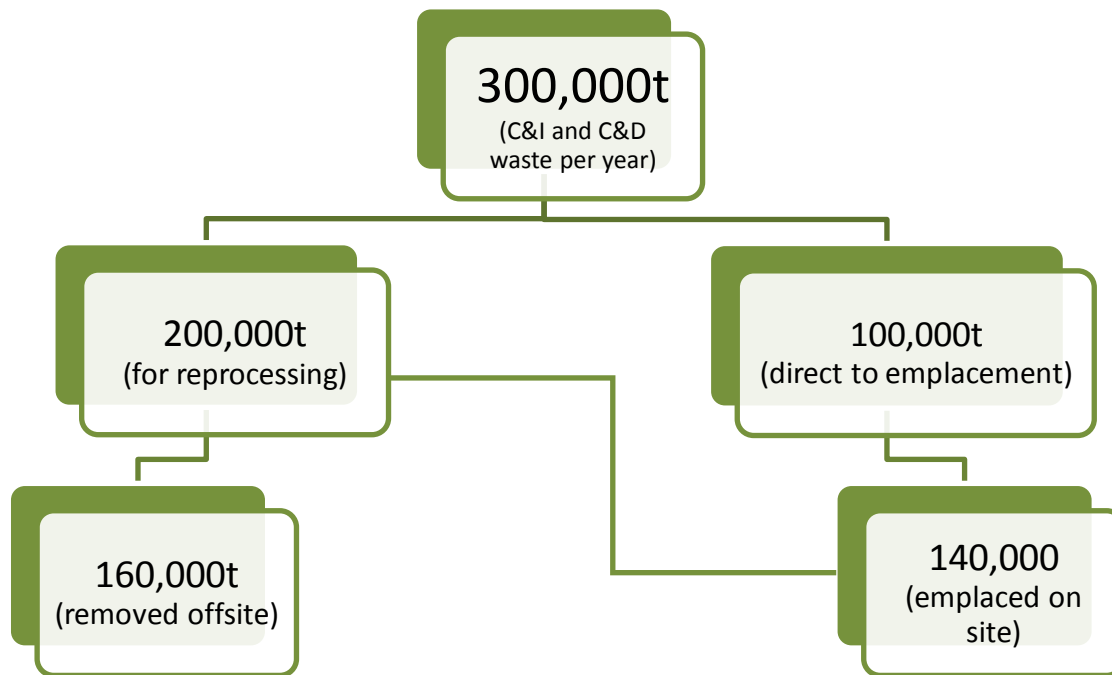
[Transport of waste and disposal to landfill are the two main sources of GHGs associated with waste management. The operation of a resource recycling facility next to a residuals' Class 2 landfill also minimises vehicle movement (direct disposal, no need for additional freight.)]

Landfill diversion and markets for resources

The addition of recycling facilities such as Orchard Hills waste and resource management is a necessity that will assist in achieving the WARR 2014 diversion targets. The Orchard Hills facility is designed for a maximum annual capacity of 450,000 tonnes. Of this amount it is projected that at least 300,000 tonnes or

67% of all waste will be recycled. This rate would be an improvement of 10% on the 2007/2008 average recycling rate of C&I and C&D waste in Sydney (Table 1). A probable option for resource recovery, at maximum capacity in the Orchard Hills facility is shown in Figure 8.

Figure 8: Average quantities of materials removed off site and emplaced on site.



C&D Stream

The principal C&D wastes targeted for receipt (and re-processing) include contaminated soils, concrete, bitumen, bricks and roofing tiles. At full capacity, C&D waste would amount to 250,000 tonnes per year. Of this waste, up to 100,000 tonnes is expected to be low-level contaminated soil. Using the sorting equipment described above, the Proponent expects to divert from landfill the majority of the economically recoverable waste as depicted in Figure 7. Diversion rates for C&D wastes are projected to exceed the 76% WARR target.

Non-contaminated soil would be screened to remove physical contaminants and then sold for landscaping purposes or as clean fill. Bitumen, concrete, bricks, tiles and rubble would be used to produce recycled concrete, re-used as road base or for pavements, drainage and general earthworks as per DECWW specifications^x. Fines would be chemically assessed and subsequently used as alternative daily cover either on site or supplied at low or no cost to nearby

landfills. Where financially viable, residuals of the C&D sorting process would be processed through the MRF along with C&I waste to maximise resource recovery of materials such as metals, plastics and glass.

The Proponent envisages minimal landfilling of contaminated soil. Due to low levels of contamination, it would be possible to either use the soil onsite or treat it screen out physical contaminants and sell it for general use. Contaminated soils are expected to contain a range of contaminants and therefore landfill disposal, reuse or remediation method would be examined on a load-by-load basis. The final decision would be based on chemical analysis of the load, contaminant type, available options and government guidelines pertaining to approved uses. Having ensured that the type and level of contaminants does not pose environmental or health risks, potential on site or off site uses would be landfill alternative daily cover and general earthworks such as embankment and road building.

However, it is expected that from time to time low-level contaminated soils would be unsuitable for reuse or remediation. In such instances, the Proponent proposes characterising the soil unrecoverable and landfilling it in the active emplacement cell. As with C&D and C&I waste, the Proponent proposes to implement a screening process for low-level contaminated soil rejecting a proportion of the unrecoverable loads. It is envisaged that such a policy would pressure waste generators into investing in the remediation of contaminated soils.

C&I Stream

By recycling a significant proportion of C&I waste, the Proponent aims to contribute to the diversion of C&I waste that is currently landfilled at an increasing rate in Sydney (by almost 150,000 tonnes between 2006-2007 and 2007-2008, see Table 1).

The composition of C&I waste received in Orchard Hills would be similar to that presented in Figure 6. Therefore, the anticipated 200,000 tonnes of C&I waste (at full capacity) would predominantly consist of wood, plastic, paper, cardboard, ferrous and non ferrous metals.

Currently, metals which are sold as two products, ferrous and non ferrous metals, and plastic which is also sold as two separate products, plastic film and rigid containers, have already got established markets. Although C&I would be the primary source for these materials, it is anticipated that C&D sorting would contribute material for sale.

Paper and Cardboard of recycled grade will be recovered and sold to paper recycling companies such as Visy or AMCOR.

New glass shredding technologies permit the recovery of glass fines for remaking container glass. OI is the primary market for recovered glass and glass fines.

Other growing markets for recycled C&I products include glass fines as a replacement material for natural sand in pipe embedment^{xi} and plastic shredder chips (along with non-reusable timber) as a fuel source for power stations.

DECCW is currently developing a range of markets for recycled products.

Shredded timber can be used for sawdust products or as a fuel source for the Sugar Mill Industry and cement kilns. DECCW is also trying to establish a system to easily identify non-recyclable timbers, such as some treated timbers, from readily reusable timber. This would remove a major barrier to increased recovery of used timber and would open up new markets, besides thermal energy recovery.

Innovation to increase diversion

The Proponent is aiming at maximising waste diversion from landfill. Therefore they are actively interested in pursuing innovative solutions that would increase resource recovery. Following the establishment of the C&D resource recovery component and the C&I MRF, the proponent would investigate ways of remediating low-level contaminated soil as it is projected to constitute a large proportion of all incoming waste (up to 22%).

Orchard Hills would only accept non-hazardous contaminated soils. The most common contaminants are expected to be hydrocarbons. The Proponent has set aside 5 hectares in which the facility may experiment with bioremediation, aeration and other commercially available non-resource intensive remediation techniques. Should such remediation approaches prove successful, the remediated soil would be certified as contaminant free and sold for general offsite use.

Both the C&I and C&D waste streams have been shown by DECCW audits to include organic waste such as food remains, garden and green waste. The proponent recognises that despite their commitment to screen out such waste market forces could render this impossible. In such circumstances the Proponent would consider setting up a small-scale composting trial to treat organics separated during the sorting process, subject to appropriate approvals. The resulting compost medium would be used in onsite landscaping or targeted at the compost market as a cleaner alternative to AWT compost.

The Proponent has expressed their commitment to maximising waste diversion from landfill and are therefore willing to consider other suitable resource recovery options, as and when they become available and commercially viable.

CONCLUSION

By providing an integrated management solution for C&I and C&D waste focused on achieving high resource recovery, the Orchard Hills Waste and Resource Management Facility would assist in the management of Sydney's waste.

Efficient waste diversion is achieved through sufficient waste separation at the source. However, source separation of C&I and C&D waste in NSW still is underdeveloped. As a result, waste management and resource recovery operators need to play an important role in achieving landfill diversion targets.

The Orchard Hills project meets a need for more recycling capacity of C&I and C&D waste in the greater Sydney region. Moreover, it is consistent with an increasing focus on maximising diversion from landfill. As such, the project would assist councils and commercial enterprises who use it to meet and exceed the NSW WARR 2014 resource recovery targets for C&I and C&D waste.

Offering landfill diversion rates exceeding the targets set in the WARR the project would satisfy community expectations for improved waste management practices and increasing standards for environmental performance and overall project sustainability including reduced truck movements.

Transport of waste and disposal to landfill are the two main sources of GHGs associated with waste management. The operation of a resource recycling facility next to a residuals' Class 2 landfill minimises vehicle movement (direct disposal, no need for additional freight).

Overall, the project aims satisfy SEPP (Infrastructure) 2007 requirements for minimising landfill disposal and are in accordance to the operating principles of the NSW Waste and Resource Recovery Strategy (WARRS) 2007:

- Avoidance and prevention of waste
- Increased use of renewable and recoverable materials
- Toxicity reduction in products and materials and
- Litter and illegal dumping reduction

In summary:

- The project targets maximum waste diversion. Once this is achieved, the need to landfill any residuals will be genuine.

- The Project would deliver outcomes consistent with state legislation (SEPP) and strategies (WARR) for sustainable waste management.
- The project would recover more than 67% of all incoming waste.
- The project would create value from the waste stream through resource recovery.
- The project would be using state of the art technology that has been tried and tested in Australia proven effective in achieving high rates of resource recovery.
- The project would assist councils and enterprises to achieve WARR 2014 targets and reduce their long-term waste management costs.
- The project would provide needed additional recycling capacity to Sydney's waste management sector.
- The project provides a credible solution for the remediation of a highly disturbed site.

REFERENCES

- ⁱ NSW Government, Department of Planning, 2010. Changes to Infrastructure SEPP – Determination of Landfill Applications. Planning Circular PS 10-016, Issued 12 July 2010.
- ⁱⁱ NSW Government Legislation, 2001. Waste Avoidance and Resource Recovery Act 2001.
www.legislation.nsw.gov.au/viewtop/inforce/act+58+2001+first+0+N
- ⁱⁱⁱ NSW DECC, 2003. NSW Waste Avoidance and Resource Recovery Strategy 2003.
www.environment.nsw.gov.au/warr/WARRStrategy2003.htm
- ^{iv} NSW DECC, 2007. NSW Waste Avoidance and Resource Recovery Strategy 2007.
www.environment.nsw.gov.au/warr/WARRStrategy2007.htm
- ^v NSW DECCW, 2009. Waste Avoidance and Resource Recovery Progress Report 2008.
www.environment.nsw.gov.au/resources/warr/09155WARRreport08.pdf
- ^{vi} NSW DECCW, 2010. Disposal based survey of the commercial and industrial waste stream in Sydney.
<http://environmentaltrust.nsw.gov.au/resources/warr/105WasteSurveypt1.pdf>
- ^{vii} NSW DECCW, 2007. Report into the Construction and Demolition Waste Stream Audit 2000-2005. Sydney Metropolitan Area.
- ^{viii} The DECCW report notes: *The 'Fines' consist of all material from mixed C&D waste that are less than 4.75mm in size. There was no compositional analysis of this material. The 'Fines' were considered distinct from similar size materials such as soil and contaminated soil, and reported as a separate material type.*
Fines were tested for a range of chemicals and found to contain low levels

of certain contaminants. Fines can be used for landfill daily cover however offsite use should be determined on a case-by-case basis and would require chemical analysis of each load.

^{ix} The proportion of *Miscellaneous* waste was increased to 1.4% from 1.2% shown in Figure 4 in order to correct total diversion to 100%

^x NSW DECCW, 2010. Specification for Supply of Recycled Material for Pavement, Earthworks and Drainage.
www.environment.nsw.gov.au/warr/greenspec.htm

^{xi} NSW DECCW, 2008. Trial of recycled glass as pipe embedment material.
www.environment.nsw.gov.au/warr/crushedrecycledglass.htm