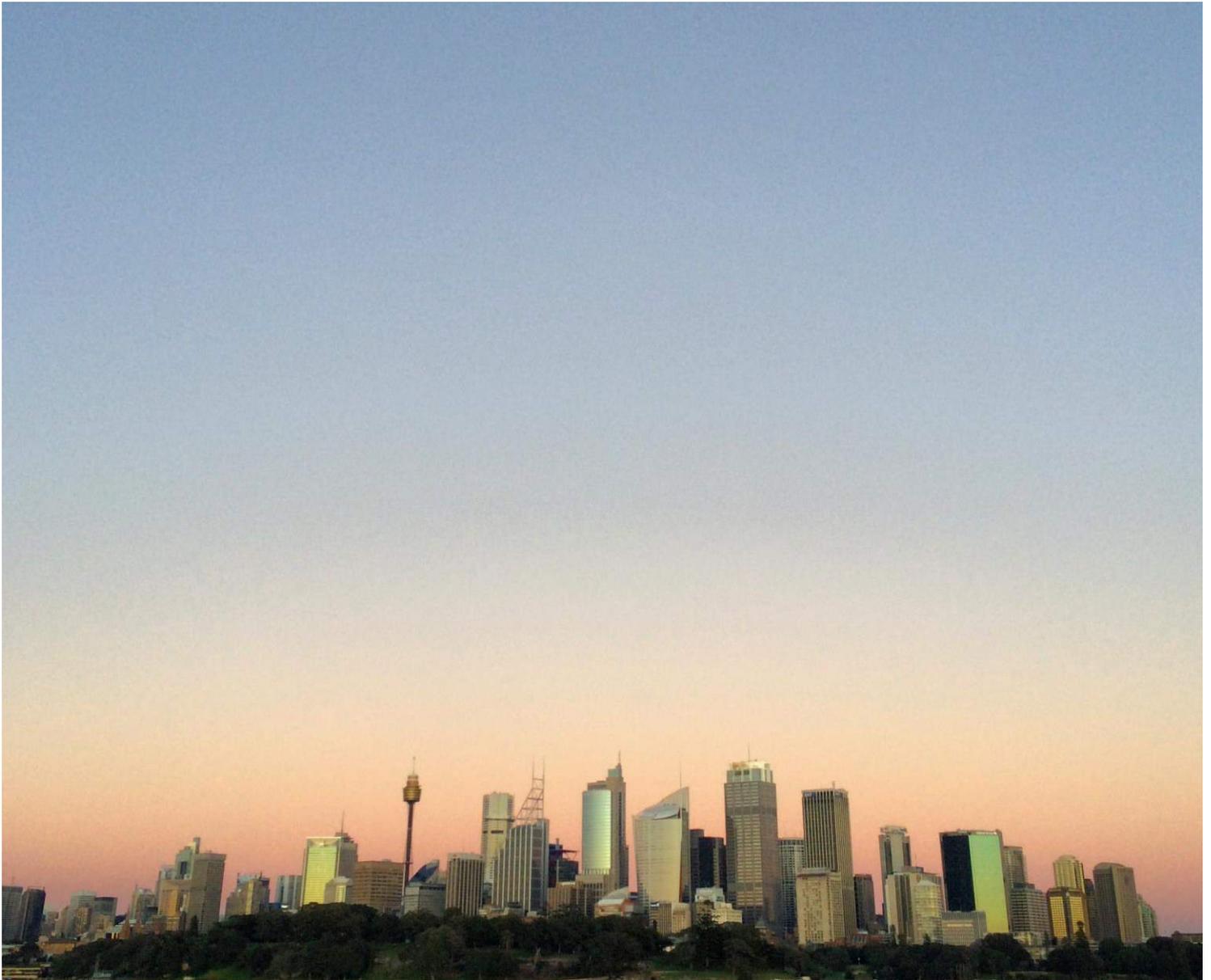




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A CASE STUDY IN RESOURCE RECOVERY FROM OFFICE STRIP OUT: GOVERNOR MACQUARIE TOWER

A joint project of the Better Buildings Partnership, DEXUS and the Sydney Industrial Ecology Network (Edge Environment)

04/05/2015

UNDERSTANDING THE ISSUE: OFFICE STRIP OUT WASTE

The extent of available knowledge on building strip out waste is somewhat limited, with prior [Better Building's Partnership](#) (BBP) reports ([Market research: tenancy fitout material procurement attitudes and practices](#), [MLC Centre Defit Trial](#)) forming the basis of Sydney based market research.

Using the best available knowledge including input from BBP Members, it is estimated that:

- 400,000m² of leased office space amongst BBP members churns each year
- Recycling rates in office strip outs can be as low as 20%
- Every 1000m² of office space generates round 63 tonnes (t) of waste during strip out.

Based on the figures above, there may be around 25,000t of strip out waste generated in the Sydney CBD annually, of which 5,000t is currently recycled.

The BBP has partnered with the Sydney Industrial Ecology Network (SIEN) (established by [Edge Environment](#) under the NSW EPA's Industrial Ecology Grants) to address this issue and facilitate greater recycling rates across the industry.

CASE STUDY: GOVERNOR MACQUARIE TOWER

Governor Macquarie Tower (GMT) is a jointly owned property of [DEXUS](#), [GPT Group](#) and [Lend Lease](#), with the site managed by DEXUS.

The strip out of levels 34--41 of Governor Macquarie Tower (GMT) were presented to the BBP and SIEN as an opportunity to trial and document the means by which high diversion rates could be achieved at no extra cost. In this project, [Buildcorp](#) acted as the construction manager and [Demolition Plus](#) performed all demolition work.

This report details the results of resource recovery efforts, identifying reprocessing pathways, introducing a standardised template for reporting strip out projects among BBP members and presents a framework to move the industry toward 80% resource recovery in office strip out.



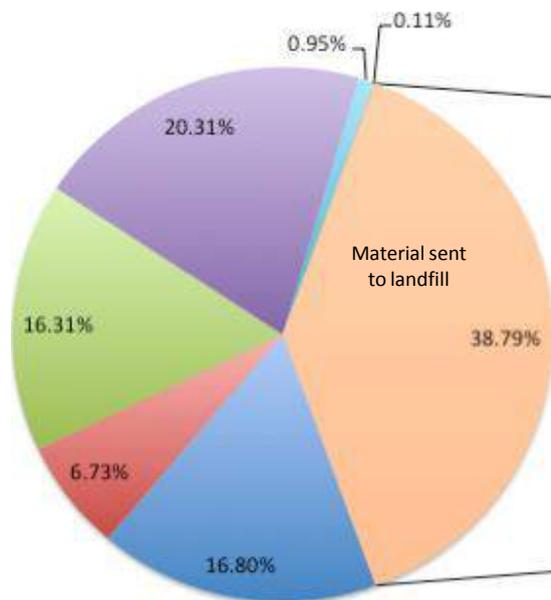
Existing fitout in Levels 34-41 at Governor Macquarie Tower

MATERIAL AND RESOURCE RECOVERY BREAKDOWN

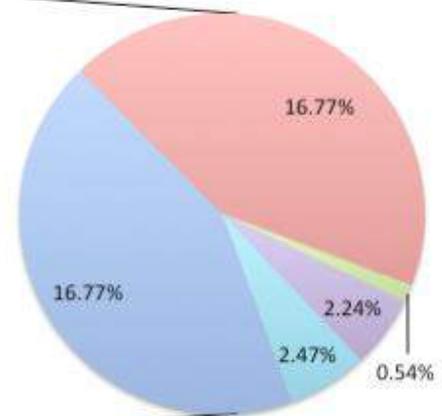
An overall resource recovery rate of 61% was achieved at GMT and tracked through receipts (where possible) from reprocessing/disposal facilities.

Material	Reuse / Recycling of Demolition Waste				Disposal at Landfill		Total Weight (t)	% of total
	Reuse		Recycling					
	Tonnes	Description	Tonnes	Description	Tonnes	Description		
Hard Fill			149.76	Concrete Recyclers (Kurnell)			149.76	17%
Timbers					149.5	Dial---a---Dump & Bingo	149.5	17%
Plasterboard			145.4	ReGyp (Kurnell)			145.4	16%
Glass			60	CSR / Camp. Recyclers			60	7%
Ceiling Tiles					20	Dial---a---Dump & Bingo	20	2%
Metals			181.06	SIMS, Sell & Parker			181.06	20%
Carpet					22	Dial---a---Dump & Bingo	22	2%
Furniture	8.5	Good 360 / Buildings Alive			149.5	Dial---a---Dump & Bingo	158	18%
Other Waste	1	Insulation re-- used by DP			4.84	Dial---a---Dump & Bingo	5.84	1%
TOTALS	9.5		536.22		345.84		891.56	
	1.1%		60.1%		38.8%			

Breakdown of Recyclables



Breakdown of Landfilled Material



BREAKING DOWN THE MATERIAL STREAMS

Mixed Waste (38.79%) – contained all currently non recyclable materials including:

- Painted, composite and laminated timber products – 16.77%
- Loose Furniture (not able to be rehomed through charity) – 16.77%
- Broadloom Carpet – 2.47%
- Ceiling Tiles – 2.24%
- Other construction waste – 0.54%

Metals (20.31%) – metal recovered from GMT was recycled through Sell & Parker and Sims Metal Management. The metal removed from GMT included: furniture items (i.e. metal storage/filing cabinets, workstation framing), internal steel stud framing, wiring, door locking hardware and plumbing fittings.

Hard Fill (16.80%) – all concrete, rubble and tiles removed from GMT were disposed of at the Kurnell Landfill site and recycled by Concrete Recyclers.

Gypsum Board (16.31%) – all plasterboard removed from GMT was recycled through Regyp.

Glass (6.73%) – all glass recovered was recycled by either CSR Bradford Insulation or Campbelltown Recyclers.

Furniture (0.95%) – [Good 360](#) and [Buildings Alive](#) were the primary recipients of furniture removed from GMT prior to strip out.

Dacron Insulation (0.11%) – Insulation from the internal walls at GMT was recovered and bagged for re-use in the yard of Demolitions Plus.



Clockwise from top left, the materials for removal separated – plasterboard; metals; insulation; example of the furniture recovered from GMT.

INCREASING DOMESTIC RE-PROCESSING CAPACITY

Recycling alternatives offer gate fees lower than landfill due to their ability to monetise the recycled product. Thus, recycling offers not only an environmentally responsible solution to landfill, but also an ability to significantly reduce costs.

Samples of indicative gate fees for companies mentioned in this report are shown below – although these are subject to variation due to quality, volume, and contamination of material, as well as market fluctuations. All re-processing facilities hold the right to refuse loads of material if they are judged to be contaminated.

Material	Re-Processor(s)	Cost (per t)
Gypsum Board	Regyp	Up to \$150
Glass	CSR Glass Recycling	No cost
	Campbelltown Recyclers	\$66
Hard Fill	Concrete Recyclers, through Kurnell Landfill	\$22
Metals	Numerous	No cost
Mixed Waste	Disposed at Landfill (including engineered timbers, furniture, ceiling & carpet tiles)	\$250

The GMT trial demonstrated the current ability of demolition contractors to achieve high diversion rates in commercial office strip outs and it should be expected that 100% of Gypsum Board, Glass, Hard Fill and Metals be fully recycled in any future office strip out.



Structured demolition of Levels 34--41 underway – furniture, gypsum board and stud walls, glass and cabinetry removed. Broadloom carpet and ceiling tiles still remain.

LOOKING FORWARD: TOWARDS 80% RESOURCE RECOVERY

The GMT trial identified the following currently (domestically) non-recyclable waste streams, each of which is being addressed to move the industry toward 80% resources recovery.

Material	Action
Ceiling Tiles	Recycling schemes already available in Europe and America – BBP and SIEN working with suppliers to develop domestic reprocessing capability.
Carpet (Tiles & Broadloom)	Many product stewardship plans already in place with various suppliers, BBP and SIEN working with the suppliers and property owners to promote the installation of these recoverable systems.
Composite Timbers	Processed timber products (melamine, MDF, laminated products) are being trialed as fuel in waste to energy projects with Crucible Carbon and the CSIRO. Unfortunately their relatively lower cost to solid timber products has resulted in the proliferation of their use in many office trimmings, cabinetry and furniture.
Furniture	Furniture is highly re-useable and the BBP is working closely with the charitable sector to promote the charitable donation of furniture destined to landfill. The use of reused furniture is also recognised under the GBCA's Greenstar – Interiors tool and can be delivered at a fraction of the price of new items.

LESSONS LEARNT FROM THE TRIAL

- Developing Sufficient Lead-time – it is vital to give as much notice to the industry when the strip out event will commence, this way charities and other organisations can remove all items they can reuse.
- 100% recyclable – glass, plasterboard, hard fill and metals are 100% recyclable
- ‘Take-Back’ schemes exist – some suppliers offer closed loop solutions for their materials. Armstrong (ceiling tiles) and Interface (carpet tiles) recover their own materials and feed them back into their supply chain to ensure their product is 100% recyclable. Specifying these suppliers guarantees greater resource recovery at strip out.
- Variation to current contract procurement – BBP property owners will be setting resource recovery targets, ensuring that demolition contractors now compete on material diversion in addition to cost.
- Demolition processes – to ensure clean material streams and an organised approach to material recovery, onsite separation and removal was identified as a key factor.
- Accountability and transparency in disposal – the BBP Waste Management Plan used in this trial provides a consistent means of reporting for strip out waste, making it measurable against other projects and against any contracted diversion target.

CHALLENGES AND OPPORTUNITIES

The trial has highlighted the challenges and opportunities for continued improvement. The table below details the actions that the SIEN and BBP are taking to ensuring they are resolved:

Challenges	SIEN & BBP Response
Lead time	The BBP is working with its membership to maintain a register of upcoming stripout projects to ensure more time is given prior to contractors moving onto the site. This will allow a more organized approach to stripout and also crucial time to remove and reuse furniture.
Adopting product stewardship	The market is already exploring innovative leasing and take---back schemes. Promoting the use of these products should be driven from the top down through greater awareness among building owners.
Variation to current contracts	The BBP is developing key contractual clauses in their <i>Strip Out Waste Guidelines</i> , which will encourage greater responsibility and market awareness. The clauses will cover the expectations for building contractors and demolition contractors and assist property owners to operate complimentarily to achieve greater resource recovery from strip out.
Onsite processes	Guidelines and information on the contamination thresholds acceptable by the various reprocessing facilities.
Developing additional re---processing capacity	The SIEN will be leading the exploration of new reprocessing facilities and markets, looking at waste to energy and business development opportunities to divert waste from landfill.
Accountability and transparency in disposal	BBP created the Waste Management Plan used in this trial. It is available for use at online and ensures a standardized template for tracking of material disposals.
Increasing recycling capacity and adopting product stewardship	The SIEN are supporting the development of greater recycling capacity by informing and educating the industry of material reuse potential and procedures for effective recycling.
Prices fluctuate over time	The BBP maintaining a Reprocessing Facilities List which provides updated services and facilities for sending material to.

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Prepared by:

Edge Environment

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