



Paving the Way

Driving end markets and infrastructural investment for recycled glass in pavements through strategic procurement

Executive summary

The SSROC Paving the Way program over time aims to create a closed-loop market for approximately one-third of council domestic glass collections (equivalent to 93 million glass bottles per year), reduce greenhouse gas emissions and quarry depletion, and stimulate regional infrastructural development by replacing natural sand with recycled crushed glass (RCG) in asphalt, non-structural concrete, and pipe bedding.

An initial 16 metropolitan Sydney councils have committed to joining a regional procurement of these materials with RCG based on Transport for NSW (TfNSW) and NATSPEC's AUS-SPEC specifications (see below). This will be the largest joint local government-led procurement of recycled civil works materials in NSW to date. By leading councils in this strategic procurement, the intent of TfNSW and SSROC is to signal aggregated demand to industry to drive end markets for recycled materials, create a favourable environment to invest in critical reprocessing infrastructure, and secure the cost-effective provision of sustainable materials and services for councils without compromising performance or safety.

This procurement-led approach to products with recycled content aligns with strategic local, state and federal policies, as well as regional economic and social strategies. Consultation with a range of council working groups and industry will inform an innovative contract model that enables monitoring and reporting of recycled material volumes, potential greenhouse

gas emissions reduction, pricing and contract performance.

Early contractor involvement (ECI) was held on 5 August 2020, and provision of materials and services will commence on 1 July 2021.

Background

The announcement of China's National Sword policy in 2017, which effectively barred imports of Australia's recyclable materials, and the Coalition of Australian Governments' (COAG) subsequent decision in 2019 to ban exports of a range of unprocessed recyclable materials revealed a critical shortage of domestic markets and infrastructure to process materials for use in a circular economy. A lack of viable end markets for recyclable materials threatens the continuity of kerbside recycling services, increases price pressure for councils and residents, and threatens to lose valuable resources to landfill.

Local governments, especially through a joint collaborative approach, are in a strategic position to support and indeed create end markets for products with recycled content, as well as safeguard the future resilience of regional resource recovery systems by supporting key infrastructural development (i.e. glass beneficiaries). SSROC identified glass as a high-impact candidate for a regional procurement due to the high kerbside tonnages collected,¹ high processing cost,² limited end markets³ and a growing body of data supporting the viability of RCG as an alternative to natural sand in civil works.

Since 2018 the Southern Sydney Regional Organisation of Councils (SSROC) has run a series of forums bringing together key stakeholders in government and industry to explore challenges and opportunities to increase the use of recycled glass in asphalt, pipe bedding, and non-structural concrete. SSROC has worked closely with NATSPEC to support the development of their AUS-SPEC specification for recycled materials in civil works, as well as with Roads and Maritime Services (RMS) and TfNSW to strategically align parallel approaches to the market and increase government and industry confidence in RCG. Both organisations released updated specifications in 2019 (Appendix 1: TfNSW specifications. AUS-SPEC available to NATSPEC members), establishing RCG as a safe and high-performing alternative to natural sand in civil works.

In November 2019 all 11 Southern Sydney Regional Organisation of Councils (SSROC) member councils signed a Memorandum of Understanding (MoU) to prioritise recycled materials in procurement (Appendix 2), where cost and quality requirements are met, which has since been joined by Northern Beaches Council, Willoughby City Council, Ryde City Council and Hornsby Shire Council. NSW Minister for Energy and Environment Matt Kean enthusiastically supported the initiative, saying, "We need all levels of government and industry working together and embracing initiatives like this, to tackle waste in NSW."

In February 2020 SSROC facilitated a forum on recycled civil works materials with presentations by TfNSW and NATSPEC on previous research and existing specifications

¹ Approximately 30% by weight of all recyclables collected, as reported by material recovery facilities (MRFs). This equates to approximately 39,000 tonnes per annum in SSROC, and 59,270 tonnes per annum across all 16 participating councils.

² Current council recycling processing contracts are long-term gate-fee based, with increases linked to the Consumer Price Index (CPI). Gate fees are calculated by weight of all recyclables received at the MRF. If there are not sufficient end markets for recycled glass, councils will be required to pay higher gate fees, with the possibility that collected glass will not be recycled and then possibly disposed at landfill.

³ About 60% (23,000t) of this collected glass can be recycled back into glass bottles and containers ([Australian Packaging Consumption & Resource Recovery Data, December 2019](#)), while the remaining 40% (16,000t) can be recycled into secondary uses, such as RCG for use in civil road construction.

on RCG, attended by over 60 senior engineers and waste managers from metro Sydney councils. SSROC also coordinated with TfNSW, the NSW Department of Planning, Industry and Environment (DPIE) and the NSW Environment Protection Authority (EPA) to produce a fact sheet detailing the process to turn kerbside glass into RCG, regulatory requirements for producing and procuring it, and responses to common FAQs (Appendix 3).

Paving the Way is the largest joint local government-led procurement to initiate the use of recycled glass in local roads in NSW to date. Initially, 16 metropolitan councils (Bayside, Burwood, Canada Bay, Canterbury Bankstown, City of Sydney, Fairfield, Georges River, Hornsby, Inner West, Northern Beaches, Sutherland, Randwick, Ryde, Waverley, Willoughby, Woollahra) have committed to joining the procurement, which over time will create a market for approximately one-third of the glass collected through these councils' domestic kerbside collections, or the equivalent of 93 million glass bottles per year.⁴ It is anticipated that this will provide a framework for councils across the country to adopt a similar approach to further develop closed-loop markets for recycled materials.

Summary of planned approach

- Joint open market tender to all eligible NSW suppliers seeking supply of asphalt, asphalt ex-bin, supply and lay asphalt, profiling, mill and fill, pavement patching, pipe bedding, and non-structural concrete for an initial expected 3-year period with 2 x optional one-year extensions;
- All eligible materials must contain the allowable percentage by volume of recycled crushed glass based on TfNSW specifications;
- Panel contract supported by a competitive schedule of rates will have a staggered start from the end of March 2021, for provision of materials and services from 1 July 2021;
- ECI will be held on 5 August 2020 to inform and consult with industry on a collaborative procurement model to encourage innovation and best practice;
- Regional monitoring and reporting of recycled material volumes, potential greenhouse gas emissions reduction (due to shorter transport distances for local glass versus natural sand from distant quarries), and contract performance that is currently unavailable to councils; and
- Procurement steering group comprised of members with expertise in engineering, procurement, resource recovery, and legal.

Costs

There is no fee for councils to participate in the procurement in lieu of a commitment to use the contract. A small ongoing management fee of 0.75% of the contract value will be collected from the successful panel of contractors. SSROC has chosen a small contract management fee to maximise benefit/advantage for councils. This is lower than the typical cost of individual councils staging a large tender and also provides ongoing contract performance and sustainability reporting, including monitoring of recycled content, potential greenhouse gas emissions reduction, pricing and contractor performance.

Benefits

- Collective procurement based on aggregated demand will enable participants to procure

⁴ Total indicative RCG volume of 20,700 tonnes per year x 4.5 glass bottles/kg of glass (based on NSW Government Container Deposit Scheme Regulatory Impact Statement).

standard approved materials and services cost-effectively while ensuring performance and safety;

- Indicative volume of approximately 20,700 tonnes of RCG per year is expected to create a market for around one-third of the glass collected through participating councils' domestic kerbside collections, or the equivalent of 93 million glass bottles, without compromising higher-order recycling of glass back into beverage containers, etc;
- Ongoing council demand for recycled glass is expected to support net cost stabilisation of council recycling services by increasing the value of MRF glass;
- Provides an innovative contract model that monitors and reports volumes of recycled materials, potential greenhouse gas emissions reduction (due to shorter transport distances for local glass versus natural sand from distant quarries), and contract performance;
- Provides media and community communications assets to reinforce the importance of source separation;
- Creates a framework for future joint council procurements to drive end markets for other recycled materials; and
- The panel contract will be available for other councils to join at any time.

Policy alignment

- 2018 National Waste Policy [Sustainable Procurement Guidelines](#);
- Coalition of Australian Governments (COAG) waste exports ban [response strategy](#): creating local demand through government procurement;
- NSW 20-Year Waste Strategy [Issues Paper](#): create end markets through recycled content in government procurement (Direction 4), and plan for future resource recovery infrastructure needs (Direction 3);
- SSROC regional policy:
 - Develop procurement that drives innovation, influences markets and creates new opportunities.
 - Collaborate on a metropolitan scale together with state and federal governments.
- A range of participating council policies, including sustainable procurement, develop alternative local markets for recycled materials, minimise waste, maximise resource recovery, reduce greenhouse gas emissions, embrace innovation and support a circular economy.

RCG supply chain

SSROC commissioned Morrison Low to investigate the opportunities and barriers to increase the use of RCG as a natural sand substitute in road construction materials. The report analysed such considerations as glass available on the market, current recycling rates based on end use, RCG pricing and supply chain logistics, infrastructure, and supplier capacity to meet demand (Appendix 5).

The report confirmed that there is adequate supply of glass in metro Sydney to use as feedstock to meet the indicative demand for RCG in this procurement. Whilst regional beneficiation infrastructure (the process of colour sorting, cleaning, crushing and sizing glass to be either 'furnace-ready' for sale to bottle manufacturers or suitable for other markets such as civil construction) is currently at or near sufficient capacity to meet demand, a number of companies in the region are in the process of upgrading or building new facilities to meet the combined demand from this procurement and the demand from a parallel large-scale procurement by TfNSW by 1 July 2021.

The price of asphalt with RCG is expected to be comparable to asphalt with natural sand. It should be noted that any price premium on RCG versus natural sand is expected to decrease over time as regional beneficiation capacity rises, and that the volume of RCG is so low (i.e. 25kgs per tonne of asphalt wearing course) that it is not expected to have a significant impact.

Commercial arrangements

Councils must clearly have an intent and commitment to the procurement by signing an MoU with SSROC (Appendix 4).

The invitation to tender will be publicly advertised for 21 days through the Bayside City Council TenderLink portal and SSROC website. Following the tender evaluation process, a panel of contractors will be created to supply the various categories of goods and services for an initial expected period of 3 years with an optional extension of 2 years awarded in 1 + 1 years subject to the contract and contractor performance.

Further information

For further information on Paving the Way, please contact Cathy Dizon or Justin Bonsey on 02 8396 3802 or pavingtheway@ssroc.nsw.gov.au.

Appendix 1

Recycled products and relevant specifications - recycled materials NSW

(As of August 2020)

Recycled Materials	NSW SPECIFICATIONS
Recycled Crushed Glass (RCG)	<p>Allowed in TfNSW/RMS asphalt, concrete for pavements and non-structural concrete and road base specifications.</p> <p>Asphalt: 2.5% Wearing Course in asphalt, 10% base and subbase layers in asphalt (increased from 2.5% to 10% in mid-2019) Concrete: 15% of the fines in the concrete mix Road base: 10% allowed</p> <p>The following specifications were amended accordingly:</p> <ul style="list-style-type: none"> • R116 Heavy Duty Dense Graded Asphalt • R117 light Duty Dense Graded Asphalt • R118 Crumb Rubber Asphalt • R121 Stone Mastic Asphalt
Reclaimed Asphalt Pavement (RAP)	<p>Allowed in TfNSW/RMS asphalt specifications.</p> <p>Wearing course: Maximum 20% RAP Base and subbase layers: maximum 40% RAP (typically 5 to 30% used)</p> <p>TfNSW/RMS is undertaking a study into the NSW RAP supply to be completed in 2020</p> <ul style="list-style-type: none"> • Laboratory results from this investigation will then be used to review use of higher RAP content asphalt mixtures in NSW. <p>The current QA specification is R 3153 and will be reviewed in 2020 together with associated asphalt specifications following the study.</p>
Crumb Rubber	<p>Allowed in TfNSW/RMS spray seals (for over 40 years) and asphalt (over 30 years).</p> <p>Spray seals: 25% of sprayed sealed roads contain crumb rubber. Asphalt: 5% of asphalt roads contain crumb rubber.</p> <p>The current RMS specifications are:</p> <ul style="list-style-type: none"> • R107 Sprayed Bituminous Surfacing (with PMB) • R118 Crumb Rubber Asphalt • QA Specification 3256 Crumb Rubber
Construction / Demolition Waste	<p>Allowed in TfNSW/RMS road base specifications.</p> <p>Used extensively in NSW for over 20 years, particularly Sydney. TfNSW/RMS allow 100% crushed concrete and max 20% crushed brick to be blended to be used as road base aggregates.</p> <p>The following specifications relate to:</p> <ul style="list-style-type: none"> • R82 Lean Mix Concrete Subbase • R83 Concrete Pavement Base • QA Spec 3211 Cements, Binders and Fillers

Appendix 2



Memorandum of Understanding to Prioritise Recycled Materials in Procurement

between
Southern Sydney Regional Organisation of Councils, Inc (SSROC)
and
[Enter council name]

1 Background

Widely-recognised standards now enable the safe and cost-effective adoption of a range of recycled materials across various applications, including, for example, civil works materials. With Coalition of Australian Governments (COAG) environment ministers set to ban the export of recyclable materials contingent on the development of domestic secondary markets, councils need to act to ensure the continuity of recycling services. SSROC's Regional Waste and Resource Recovery Strategy recognises that local governments are in a strategic position to support state and federal circular economy policy, drive end markets for recycled materials, and stimulate regional infrastructural investment by prioritising recycled materials in procurement.

Joint regional procurement by a significant number of councils is expected to create sufficient demand to influence market development beyond the capabilities of individual councils and allow councils to cost-effectively procure safe, high-quality materials that meet specifications and resource recovery targets.

2 Purpose

The purpose of this Memorandum of Understanding (MoU) is to record that [enter council name] agrees to work together towards prioritising recycled materials in procurement, where cost and quality requirements are met, and collaborating to develop a common framework for regional procurement of these materials to support and drive the development of a circular economy.

3 Scope

This MoU will be effective until [enter council name] chooses to withdraw from it, or the MoU is superseded by another agreement.

4 Understanding

We agree to work together towards:

- Prioritising recycled materials in council procurement, where cost and quality requirements are met;
- Identifying as a participating council in a regional initiative to increase the use of recycled materials in local government procurement;
- Collaborating with SSROC and other participating councils to develop a common framework for regional procurement of recycled materials.

Signed on behalf of [enter council name]
[Enter name and title]

Signed on behalf of SSROC
Helen Sloan, A/ General Manager

Date:

Date:

Recycled Crushed Glass (RCG) in asphalt

Who should use this guide?

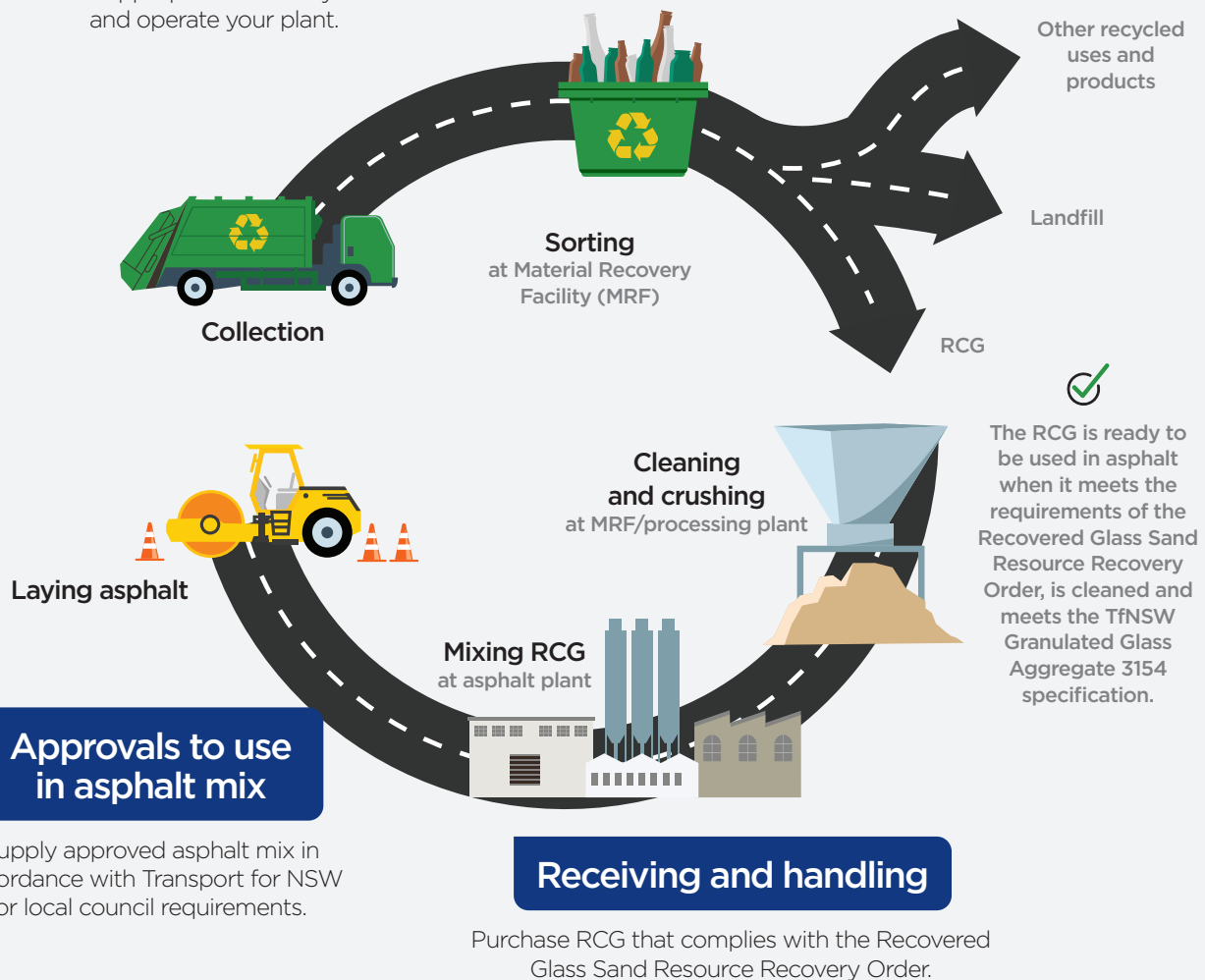
All levels of government are working together to increase opportunities to use recycled materials in construction. This promotes innovation and greater efficiency, enables our transition to a circular economy and leverages better environmental and economic outcomes. If you're in the glass recycling or asphalt business, these are the steps to follow when producing, supplying, purchasing and using recycled crushed glass (RCG) for use in asphalt.

Approval for your plant

Obtain a Development Approval from the appropriate authority to build and operate your plant.

Licence approvals to process

Determine whether you need an Environment Protection Licence and apply to the Environment Protection Authority if you need one.



Transport for NSW would like to acknowledge the Southern Sydney Regional Organisation of Councils and the NSW Environment Protection Authority for their valuable contribution to this guide.

Frequently asked questions

Why does RCG need to be cleaned before using in asphalt?

RCG needs to be cleaned to reduce odour and leachate, and remove glues, stickers and other contaminants that can affect the technical performance of asphalt and safety of workers. The asphalt will be recycled into new asphalt in future, which is another reason for it to be contamination free.

Following cleaning and crushing, the RCG needs to comply with the [TfNSW Granulated Glass Aggregate 3154 specification](#). Your testing can be performed by any laboratory certified by the National Association of Testing Authorities.

What is the waste levy and how does it apply to RCG?

The waste levy is calculated on every tonne of waste entering certain recovery facilities. When waste is processed for lawful reuse under a resource recovery order and leaves the site, the levy is extinguished. If your site is managed well, no levy should actually be paid unless waste is stockpiled for over 12 months, your facility exceeds its stockpile limit or waste is illegally disposed. The purpose of the waste levy is to reduce the amount of waste being landfilled and promote recycling and resource recovery. The waste levy doesn't apply to RCG if it meets the requirements of the Environment Protection Authority's Recovered Glass Sand Resource Recovery Order and Exemption.

What do I need to know about the Recovered Glass Sand Resource Recovery Order?

If you produce RCG, you must follow the requirements of the [Recovered Glass Sand Resource Recovery Order](#). When you sell the RCG it is exempt from the normal levy requirements as long as your customers use it in line with the exemption requirements. The order enables the exemption. A resource recovery order requires things like sampling, testing and record keeping. You can use the RCG as you would any other resource.

In which asphalt specifications is RCG allowed?

Transport for NSW (TfNSW) allows you to use RCG in the following asphalt specifications for main roads: heavy and light duty dense graded asphalt ([R116](#) and [R117](#)), crumb rubber asphalt ([R118](#)), and stone mastic asphalt ([R121](#)). Many local councils may use AUS-SPEC Specifications 1144 Asphalt (roadways) for local roads.

Does including RCG in asphalt affect its performance?

Since May 2019 TfNSW specifications have allowed a higher proportion of RCG in asphalt mix. This change was based on a study by the Australian Road Research Board that was commissioned by TfNSW on the adoption and use of RCG as a sand replacement in asphalt. TfNSW has incorporated RCG in asphalt on a number of sites and will continue to promote its use in asphalt for current and upcoming projects.

In October 2019, AUS-SPEC Specification 1144 Asphalt (roadways) was amended to include the use of RCG.

What happens when reclaiming asphalt that contains RCG?

RCG is treated the same as any other reclaimed material. The [Reclaimed Asphalt Pavement Order](#) and [Exemption](#) sets out the requirements for supplying and using reclaimed asphalt pavement.

Additional information

Recycling plant approvals

You need consent under the *NSW Environmental Planning and Assessment Act 1979*. The application process includes forms, supporting technical reports and plans. You usually need to provide this to the local council.

Licence approvals to process waste glass into RCG

This section explains when you need an Environment Protection Licence from the EPA.

Schedule 1 of the *Protection of the Environment Operations Act 1997* lists the activities that require EPA licensing. You need an Environment Protection Licence if you:

- process waste glass in the 'regulated area' and have more than 1000 tonnes or 1000 cubic metres of waste on site at any one time, or process more than 6000 tonnes of waste per year
- process waste glass outside the 'regulated area' and have more than 2500 tonnes or 2500 cubic metres of waste on site at any one time, or process more than 12,000 tonnes of waste per year.

Where is the regulated area?

For more information consult the [EPA's guide to licencing](#) or call the Environment Line on 131 555.

Cleaning RCG

The Recovered Glass Sand Resource Recovery Order and Exemption are designed to reduce the environmental impacts of using recycled glass, such as odour and leachate. TfNSW specifications require RCG to be cleaned in order to meet performance requirements for asphalt. You need to comply with both EPA specifications and TfNSW specifications.

Receiving and handling RCG

The waste levy and RCG – information for asphalt mixers

If the RCG you purchased complies with an order and exemption, then:

- you don't need an Environment Protection Licence to apply it to land, as long as it's applied consistent with the order and exemption
- you don't have to pay the waste levy on RCG used in roads
- you don't have to report to the EPA if you apply the RCG to land.

However, you must:

- keep the following records for six years:
 - the quantity of RCG received
 - the name and address of the supplier of the RCG
- make the records available to EPA authorised officers on request
- use the RCG within a reasonable time after you receive it.

You must still meet the other requirements of the *Protection of the Environment Operations Act 1997*, including not allowing your stockpiles of RCG to cause land or water pollution.

Approvals to use RCG in asphalt mix

Where your client is TfNSW, their asphalt mix registrars will review your mix design against the asphalt and constituent material specifications. If the constituent material and asphalt mix complies with the relevant specifications, then it will be approved for use on NSW roads. [A register of approved asphalt mixes](#) can be found on the internet.

If your client is a local council they may have different requirements. Contact them for details.

Some other potential road applications of RCG

Other applications include, but aren't limited to:

- road base – see [TfNSW's Granular Pavement Base and Subbase Materials specification 3051](#) for more information
- pipe bedding – see [TfNSW's Stormwater Drainage specification R11](#) for more information
- non-structural concrete – see [TfNSW's General Concrete Paving specification R54](#) for more information
- concrete pavements – see [TfNSW's Lean-Mix Concrete Subbase R82](#) and [Concrete Pavement Base R83 specifications](#) for more information.

Additionally, a number of AUS-SPEC specifications incorporate the use of RCG, including for rigid pavement base and sub-base; flexible pavements and pavement marking uses.

For more information see the [Technical Note GEN 028 Specifying recycled materials for roadworks using AUS-SPEC](#).

For more information

- Call 13 22 13
- Visit roads-maritime.transport.nsw.gov.au/contact-us

Transport for NSW now administers the activities and responsibilities which were previously the remit of the former Roads and Maritime Services agency.

Appendix 4



Memorandum of Understanding:
Joint Procurement of Recycled Civil Works Materials
between
Southern Sydney Regional Organisation of Councils, Inc (SSROC)
and
[Enter council name]

1 Purpose

The purpose of this Memorandum of Understanding (MoU) is to record the commitment of the Southern Sydney Regional Organisation of Councils (SSROC) and participating councils to procure recycled civil works materials and/or civil works materials with recycled content, through a joint procurement and/or contract for the following materials:

- recycled crushed glass (RCG), asphalt base and wearing course, pipe bedding and non-structural concrete (i.e. footpaths);

2 Reference

An overview of the Procure Recycled program is in the MoU to Prioritise Recycled Materials in Procurement signed by all SSROC member councils in November 2019. SSROC aims to approach the market jointly with Transport for NSW (TfNSW), with the opportunity for councils to join a whole of government contract with TfNSW in mid-2020, to aggregate demand in order to influence the growth of the sector, establish end markets, and reduce supply costs. Should the plan to work with TfNSW not eventuate, the procurement will still proceed for participating councils.

3 Term

This MoU is intended to be effective to the completion of the tender process and subsequent contract expiry. It represents an intent to enter into a contract or contracts with the selected provider(s).

4 Understanding

Participating councils agree to:

- participate in the tender process, join a contract or, if appropriate, introduce a variation in relevant existing contracts to preference recycled content, including RCG;
- base allowable recycled content on TfNSW and AUS-SPEC specifications;
- nominate a primary contact for the procurement;
- provide estimated annual volumes of asphalt base and wearing course, pipe bedding and non-structural concrete (ie footpaths); and relevant existing materials contract arrangements;

Signed on behalf of [enter council name]
[Enter name and title]

Signed on behalf of SSROC
Helen Sloan, Acting General Manager

Date:

Date:



SSROC

Recycled Crushed Glass Value Chain Analysis

June 2020

Document status

Job #	Version	Approving Director	Date
7455	1	Greg Smith	April 2020
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Executive summary

This report identifies the opportunities and issues for the Southern Sydney Regional Organisation of Councils (SSROC) to understand the supply and recycling processes to increase the use of recycled crushed glass (RCG) as a natural sand substitute in road construction materials.

NSW is the largest generator of waste and recycling products in Australia. The recycling of glass in Australia into new glass bottles and containers has been well established for over 30 years. It is estimated that NSW collects 436,000-460,000 tonnes¹ of glass for recycling per annum. The majority of this glass (80%) is collected from the municipal recycling stream and recovered from material recovery facilities (MRFs).

The recycled glass market has been impacted over the last 5 years by a number of local and global changes, leading to an increased cost for MRF operators to process collected glass. Recycled glass that was previously sold (income), to be made back into glass containers, is now charged a gate fee (expense) for the same purpose. A number of factors, one being the decrease in newspaper print in the mixed domestic recycling stream, have resulted in an increase in the breakage of glass and therefore a reduction in the quality of MRF glass.

The lower value of recycled glass, and the introduction of higher quality glass collected through the NSW container deposit scheme (CDS), has reduced the value of recycling glass in the kerbside system. However, the NSW Waste Levy still provides a strong enough financial incentive to keep glass out of landfill, so it is likely that kerbside glass recycling will continue.

SSROC have an opportunity to demonstrate actions that support the rudimentary circular economy principle, by taking steps to ensure the glass they collect is recycled back into bottles and similar high-order products; or, where this is not possible, recycled into an engineered sand (recycled crushed glass) that can be used in road construction as a substitute for natural sand, which is a finite resource.

The research detailed in the body of this report indicates that technological improvements in glass beneficiation are resulting in 60% of the collected glass being recycled back into glass containers². The remaining 40% can then be recycled into secondary uses, such as RCG, which can be substituted for natural coarse sands³.

This report has reviewed the available technical and statistical information and finds there is an opportunity for SSROC to stimulate end markets and drive investment in metropolitan reprocessing infrastructure to produce an RCG that can be used in civil works across the region.

¹ Australian Packaging Covenant Organisation, March 2019, *Glass Working Group 2018*, p 11.

² Australian Packaging Covenant Organisation, December 2019, [Australian Packaging Consumption & Resource Recovery Data](#).

³ Glass cullet yield is dependent on the quality of the glass supply and material sorting and screening technology. The latest optical sorters are able to screen cullet down to 4mm whereas older optical sorters in 2015 could only sort down to 7mm.

Key findings

Based on the research and data detailed in this report the key findings were:

1. SSROC councils collect and process 39,000 tonnes of glass annually from the domestic waste kerbside recycling services⁴.
2. It is estimated that about 60% (23,000t) of this collected glass can be recycled back into glass bottles and containers⁵.
3. The remaining 40% (16,000t) can be recycled into secondary uses, such as RCG for use in civil road construction.
4. The five-year forecast for recycled glass is estimated to increase across the entire waste stream. Recycled glass from the domestic waste stream has decreased by 5% since the introduction of the container deposit scheme (CDS) in 2017 and is expected to drop by a further 5% by 2021 and to then stabilise.
5. Transport for NSW (TfNSW) and AUS-SPEC have released an asphalt specification that specifies up to 2.5% RCG in the wearing course and up to 10% RCG in the base and subbase asphalt layers.
6. The asphalt supply industry is supportive of the use of RCG in asphalt, as long as it meets the required industry specification for engineered RCG.
7. There is currently no supplier in Sydney producing an RCG that meets the requirements of the asphalt industry.
8. It is estimated that SSROC can currently use up to 20,000 tonnes of RCG per annum.
9. It is estimated that the Sydney asphalt market is 2.5m tonnes per annum and could use up to 125,000 tonnes of RCG per annum.
10. The cost to process and supply RCG (\$60-100/tonnes) cannot currently compete with the cost of natural sands (\$30-40/tonnes), but this needs to be balanced against the landfill costs (\$250/tonnes) if there is no market for recycled glass fines⁶.
11. There is minimal impact on tonnage price for asphalt, as 2.5% RCG equates to only 25kg per tonne of asphalt.
12. Current council recycling processing contracts are long-term gate-fee based, with increases linked to the Consumer Price Index (CPI). Introducing outcome-based specifications that encourage suppliers to develop improved recycled outputs should be considered in new contracts. The outcomes would be based on sustainability measures derived from waste performance metrics that are contained in councils' sustainability strategies and based on circular economy principles.
13. Local government has an important stewardship role in setting the resource strategies that introduce circular economy principles. This can be achieved by councils acting collectively to set policies and strategies, including procurement processes, with specifications that support these policies and strategies.
14. As a matter of priority, councils should consider undertaking a feasibility study of establishing a glass fines processing facility on one of the existing licenced material recovery facilities.

⁴ 2018/2019 kerbside yellow-lidded bin glass volumes reported by SSROC councils.

⁵ Australian Packaging Covenant Organisation, December 2019, [Australian Packaging Consumption & Resource Recovery Data](#).

⁶ Based on best-available estimates using the current construction and demolition indicative crushing and screening tonnage rate. This range also factors in RCG transport costs to asphalt suppliers. There is still no market rate in Sydney as RCG is not available as a product.

15. SSROC councils support a joint procurement of road-making materials with RCG.

Background

SSROC is an association of 11 Sydney councils. The region extends from the southern shores of Sydney Harbour to the edge of the Royal National Park in the south, and from the Tasman Sea in the east halfway to Parramatta in the west. The 11 councils that make up the SSROC region are responsible for 1.7 million people. SSROC plays a key role in helping member councils define their procurement requirements and scope of works, to obtain what they need at best value.

SSROC has been working with councils on a number of strategic waste projects, as part of a regional approach to increase the use of recycled crushed glass in civil works, to stimulate end markets and investment in regional reprocessing infrastructure.

This also includes investigating joint procurement or a contract framework as part of a regional approach.

Approach and methodology

This report has been undertaken as a high-level review for SSROC, to specify the use of RCG in civil works, and is based on the available technical reports and industry statistics for current MRF glass fines to be processed into RCG for reuse across the SSROC region. The methodology included:

- desktop research and analysis of existing reported quantities
- discussions with MRF operators
- discussions with asphalt suppliers
- encompassing all supply chain logistics
- checking EPA legislative requirements.

Definitions

MRF - material recovery facility where co-mingled recyclables are sorted into the various product streams.

Glass cullet - glass which has been recovered, colour sorted and crushed and is suitable for recycling back into glass containers (typically 8-50mm). In some instances, sorting technology can recover cullet down to 4mm.

Glass fines - glass which has been recovered but is considered unsuitable for use in glass manufacturing, due to the particles being too small (typically 1mm- 8mm), mixed coloured or contaminated with ceramic, stoneware, Pyrex and plastic.

RCG - recycled crushed glass is the manufactured glass made from glass fines.

Beneficiation - the process of colour sorting, cleaning, crushing and sizing glass to be either 'furnace-ready' for sale to bottle manufacturers, or suitable for other markets such as civil construction.

Stakeholder consultation

Stakeholder engagement has been undertaken with parties in the supply chain and included:

- councils
- material recovery facility (MRF) operators
- construction and demolition (C&D) recycling operators
- asphalt suppliers
- Transport for New South Wales
- SSROC.

Consultations were conducted through face to face interviews, site visits, telephone calls, emails and, more recently, online video sessions. Stakeholders were asked a series of questions and their feedback was recorded, providing valuable insight into the complexity of the issues they have experienced. It was agreed during the consultation process that the identity of some participants would remain confidential due to commercial reasons. This has been reflected in the report by discussing some of the findings in more general terms, where appropriate.

Analysis

Circular economy principles

“Circular economy is all about making growth sustainable. It means using our natural resources and designing our products in way that extracted raw materials are used as sensibly and as many times as possible”⁷.

Research of international waste management practices indicates there is a global trend towards adopting circular economy principles in approaches to material reuse, recycling and waste management.

The 2019 PwC Australia report⁸ prepared for the NSW Environmental Protection Authority (EPA) provides advice on recommendations for the NSW Government in the development of the 20-year Waste Strategy for NSW. The report identifies that implementing a circular economy requires the establishment of a framework to define minimum requirements for waste processing in NSW, and to also address the issues at the individual material level.

In this report we are discussing the reuse and recycling of glass collected by councils’ domestic recycling service. The circular economy principle in its simplest (pure) form is that all glass containers are collected and processed back into glass containers. We know this is not possible nor feasible based on the current collection and material sorting processes, nor is it necessarily the best outcome in terms of the required embedded energy, so the next option is to put in place measures that support the recycling of glass to the highest possible order:

1. Recycle the highest possible percentage of glass back into glass containers (we do not recommend a specific target).
2. Process the remaining glass into a value-added product (this may include supporting the establishment of a market for some products).

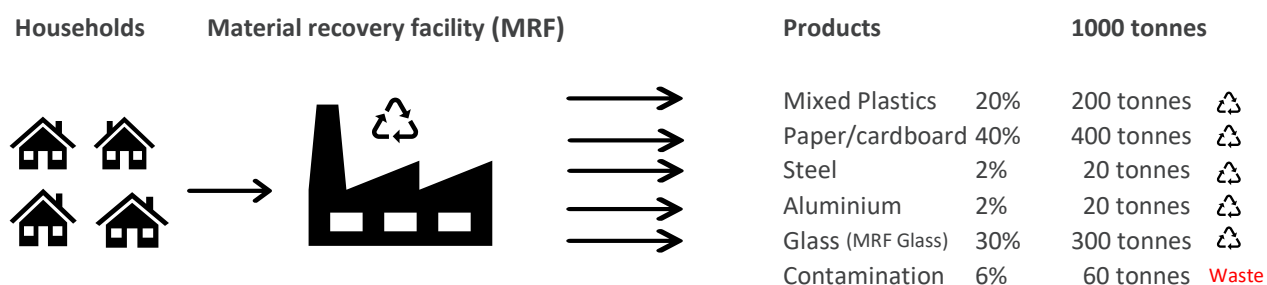
⁷ The Danish Government, September 2018, *Strategy for Circular Economy*.

⁸ PwC, April 2019, *NSW Waste Sector Volume 1: Key Findings*.

The recycling processes

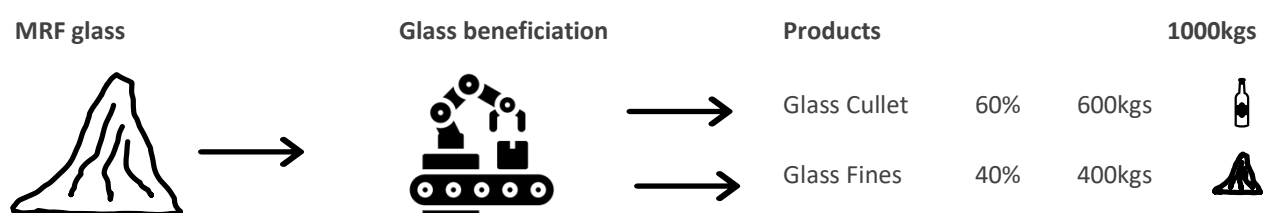
Understanding the current recycling processes and the various product streams is key to implementing strategies to improve the yields for all products in the recycling stream. The simple flow chart below is based on consolidated information from SSROC councils on various product streams and quantities for each product as a percentage output of the MRF process for the comingled recycling process.

Figure 1 Flow chart of percentage output of MRF process



The flow chart below shows processing of the MRF glass and is called beneficiation. This process separates and cleans the glass to make two products - glass cullet and glass fines. The glass cullet is recycled into new glass containers and is the highest order of value.

Figure 2 Flow chart of MRF glass beneficiation



Note: The efficiency of the glass beneficiation plant and the quality of the glass provided will determine the actual percentages. It has been reported that in some cases the glass cullet may drop to as low as 40%.

It is important to note that glass fines are not the same as RCG. Glass fines are the feedstock or raw input to produce an engineered RCG that is suitable for asphalt.

SSROC glass supply and demand

This section summarises the supply and demand conditions of the potential glass cullet and fines recycling markets. The recycling of glass waste to glass cullet or RCG is mutually exclusive. As cullet is valuable and essentially a 'higher grade' product, the potential supply of cullet will draw on existing supplies of glass fines and therefore RCG.

It is estimated that the annual volume of glass collected by SSROC councils is 39,000 tonnes. The following table indicates that the estimated range of glass fines available in the SSROC region is 15,600-23,400tns.

The construction of a new glass beneficiation plant at Enfield in 2020 should be able to assist in meeting the higher level of glass cullet in the future; therefore, we have estimated the volume of RCG to be towards the lower end at approximately 16,000 tonnes per annum.

Table 1 Estimated range of glass fines generated across SSROC region

MRF glass annual (tonnes)	%	Glass cullet (tonnes)	%	Glass fines (tonnes)
39,000	60	23,400	40	15,600
39,000	50	19,500	50	19,500
39,000	40	15,600	60	23,400

Recycled glass tonnages processed at MRFs have dropped on average by 5% since the introduction of CDS in 2017.

SSROC regional road-making materials

SSROC councils have reported the following annual volumes of road-making materials, including asphalt, road base, pipe bedding and non-structural concrete. These quantities were used to calculate estimated baseline tonnages for the potential use of RCG across the region, which can be used to signal potential aggregated regional demand for RCG to the market to stimulate secondary markets and investment in glass processing infrastructure.

Table 2 SSROC baseline tonnages for potential RCG use

Material	Road base	Asphalt	Pipe bedding	Concrete (m ³)	Totals
Total Annual Tonnage	76,000	100,000	3,524	30,186	209,710
RCG %	15%	2.5% in wearing course 10% in base layers	50%	2.5%	
RCG (tonnes)	11,400	5,000	1,762	1,811	19,973

Note: The figure of 19,973 is an estimate based on current annual volumes provided by SSROC councils. The asphalt RCG volume was based on an estimated average of 5%.

Sand – Sydney supply and demand

It has been estimated by the institute of Quarrying Australia and NSW Planning and Environment that the annual usage of sand in Sydney is around 7million tonnes. This refers to all sand, including fine sand and coarse sand.

RCG has been identified as a suitable replacement for medium to coarse sand, which has been estimated at 36%, or 2.5 million tonnes, of the Sydney sand market.

A study undertaken in 2016 for the NSW Department of Industry by Pienmunne and Whitehouse⁹ also estimates that the majority of medium to coarse sand is used in the following:

Table 3 Estimate of medium-coarse sand usage in Sydney

Industry type	Annual tonnes medium - coarse sand	Percentage of Sydney market
Readymix concrete	2,000,000	78.8%
Asphalt	140,000	5.6%
Fill	166,000	6.6%
General construction	78,000	3.1%
Concrete products	68,000	2.7%

The current market price for coarse sand in Sydney is approximately \$30-40 per tonne.

Role of councils in the supply chain

Local government has an important role in setting the resource strategies that introduce circular economy principles. This can be achieved by councils acting collectively to set policies and strategies, including procurement processes, to signal baseline demand for products with recycled materials to the market, thereby strengthening the business case for industry to invest in capacity upgrades.

Understanding the role councils play is integral to understanding the supply chain logistics for recycled glass. Councils are positioned at two very important parts of the supply chain: the start and the end.

At the start, councils domestic recycling services collect, deliver to material recovery facilities (MRFs), and pay for glass, supplying initial glass inputs to the logistics chain.

At the end of the supply chain, councils can influence the market as a buyer. By specifying and purchasing products which contain recycled glass, which is a replacement for natural sand that has to be mined and transported. A simple rule is that every cubic metre of recycled glass used will save one cubic metre of virgin natural sand that does not need to be mined. There are other environmental benefits including reduced GHG emissions and transport efficiencies with reduced heavy vehicle movements.

It is the middle of the material supply chain that councils do not control, though there is an opportunity for some councils to play a more active role as some Sydney councils already have an existing licenced facility to process road-making materials, which could easily be modified to process MRF glass fines into an RCG product. It is also important that the supply chain is supported with a range of options for the use of recycled glass, including price signals to the market for future support and sales.

It is important to note that if there are not sufficient end markets for recycled glass, councils will be required to pay higher gate fees at the MRF, with the possibility that the collected glass will not be recycled and then possibly disposed at landfill.

⁹ Pienmunne, JT., Whitehouse, J., 2001, *Supply and Demand for Construction Sand in the Sydney Planning Region*, Geological Survey of New South Wales, Department of Mineral Resources.

Recycling processing contract – the new model

There is a need to review the current procurement model of long-term fixed price contracts, where the only price adjustment is a CPI increase based on predetermined quarterly or annual reviews. The introduction of outcome-based specifications that encourage suppliers to develop improved outcomes should be introduced in new contracts. The outcomes would be based on sustainability measures, derived from waste performance metrics in councils' sustainability strategies, and based on circular economy principles.

The inflexibility of the current collection and processing contract model has been attributed to the continued production of glass fines, which are not suitable for the highest order of re-manufacturing using recycled glass. The compaction rates effectively govern the productivity of local government kerbside collection services. The compaction rate is stipulated in domestic recycling collection contracts and between the collection contractor or councils and MRF operators.

A lessening of the compaction ratio will increase the collection time and number of collection vehicles required to provide services. This, in turn, would increase the cost to the community.

The current industry uncertainties may even require a review of current comingled collection services to determine if increased source separation of household recyclables and the introduction of additional collection services would yield improved outcomes.

The waste and recycling industry - MRF operators

MRFs, which sort and recover the various recyclables from councils' domestic recycling services, have been operating in Sydney for over 20 years. Technological improvements and automation have greatly improved yields of the recyclables into the various recycling streams and improved the efficiency of facilities by increasing the processing speed and reducing the manual hand sorting used in the past. A fully automated MRF is capable of processing up to 400 tons per day and can separate paper, glass, steel, aluminium and plastic containers. All of these products are able to be sold to manufacturers for use in making new products.

MRF operators are highly reliant on recycling commodity prices to recover their operating and fixed costs and derive a profit. The global collapse of the recycling market in 2017, caused by China's ban on foreign waste, placed additional pressure on the financial viability of MRFs, in particular those with long-term council contracts entered into before the market collapsed.

The recycled glass market is primarily a local market within each individual state, with some minor interstate transfer of product (cullet), but it has still been affected by the global collapse. As the global glass price dropped, glass containers produced overseas at a lower cost and imported into Australia were costing less than locally-produced glass containers. In order to compete with the lower priced imports and continue manufacturing glass containers in Australia, glass container manufacturers required a higher quality recycled glass, causing the price for MRF glass to crash.

To improve the yield price for the glass recovered from MRFs, some MRF operators have constructed glass beneficiation plants to process and improve the yield of MRF glass so that up to 60% of this glass could be sold as cullet to glass container manufacturers.¹⁰ To meet this standard the glass must be cleaned and colour sorted. This is achieved by first screening the glass using colour sorting technology (automated optics) to sort glass larger than 4mm wide, crushing the sorted glass, then cleaning the glass cullet in a drum cleaner with hot air between 600-800°C to remove any contaminants on the glass.

¹⁰ Based on a confidential discussion with industry.

The residual glass is commonly called glass fines and is comprised of mixed coloured glass less than 4mm wide and other residual material from the screening and colour sorting process. Whilst the glass fragments meet the required specification for coarse sand aggregate in civil engineering, the residual material is a contaminant for most engineering processes such as asphalt and concrete production.

MRF operators are presently finding it very difficult to find suitable operators willing to accept MRF glass fines, which has resulted in the MRF operator paying \$50-100 per tonne to the next licenced operator for recycling (usually a C&D recycler). A gate fee is required to cover the ongoing processing costs to make an RCG compliant product. The gate fee to receive the glass fines is commercially sensitive and confidential between individual parties.

Construction and demolition material recycling

The recycling of C&D material has been a major success, with over 75% of material recycled for reuse. The industry commenced in the 1990s, when it was discovered that crushing and screening excavated concrete could produce quality products to replace naturally excavated material in civil construction. These products included road base, drainage aggregates and bedding sands for paving.

Success was primarily driven by economic factors as the cost to dispose and then purchase recycled C&D material was far less than the cost to dispose of excavated C&D material at a licenced landfill and then purchase natural excavated construction materials. A number of the current C&D facilities are co-located on category 2 (dry waste, C&D) landfill sites as the recycling process has extended the life of the landfill facility.

The C&D recycling market is in general an agile and adaptive industry and continually on the lookout for opportunities to compete in the large civil construction industry. Whilst a competitive price has assisted the market, the production of quality products has resulted in long-term success and wide acceptance by the civil construction industry.

The C&D recycling industry has demonstrated that glass fines can be used as an acceptable civil construction material (RCG sand). Benedict Industries was processing more than 150,000 tonnes of glass fines at their peak¹¹ and was the main producer of RCG in NSW before closing in February 2015.¹² The Benedict facility had both manual and optical sorting technology to remove contamination and had undertaken extensive testing to produce products by blending the RCG with both virgin and recovered materials. A number of contributing factors for the closure have been reported, including:

- Lack of market acceptance for these products from the construction industry.
- Work Health and Safety (WHS) and environmental protection issues relating to use and storage.
- Contamination in feedstock including asbestos.
- Odour and leachate from stockpiles.

The C&D recycling industry across Sydney has the capacity and capability to process MRF glass fines into a conforming RCG, though it will be at a cost. Indicative costs to screen and remove contaminants to produce industry compliant RCG would be in the order of \$50-60 per tonne.

¹¹ CIE The Centre for International Economics, September 2017, *NSW Glass Recycling* prepared for New South Wales Environment Protection Authority.

¹² Australian Packaging Covenant Organisation, March 2019, *Glass Working Group 2018*, p 11.

The asphalt supply industry

The asphalt industry has already established itself as an early adopter for reuse and recycling in the production of asphaltic concrete. Currently asphaltic concrete suppliers are using a number of recycled products for asphalt production. Depending on the asphalt design mix, some of the products being used include fly ash from power generation, blast furnace slag from steel production, recycled asphalt pavement (RAP) and crumbed rubber from truck tyres.

There are hundreds of different mix designs for asphaltic concrete (AC), each designed for a particular application to maximise the life of the asphalt for the intended use. All of these mix designs have been tested to meet industry specifications and the quality assurance (QA) processes of asphalt suppliers.

The use of RCG as coarse sand replacement has been supported by the asphalt industry for over 15 years. The substituting of natural sand with recycled glass was trialled in asphalt footpath across Sydney during the 2000s. In 2010, a demonstration project using various percentages of RCG to replace natural sand was undertaken by Waverley Council in partnership with NSW Roads and Maritime Services (RMS; now TfNSW), National Packaging stewardship forum and Downer. The asphalt pavement has performed well for the last 10 years.

Since RCG in asphalt has been a proven success, the question remains as to why there has not been wider uptake of RCG by asphalt suppliers. The reason relates to the quality and quantity of supply of RCG, as a product that meets the QA requirements and guarantee of supply for the asphalt industry.

Introducing RCG as a standard input into asphalt mixes also requires capital expenditure as additional storage bins and feed hoppers are required to feed RCG into the mix.

Glass fines generated through MRF processing meet the grading (size) requirements of RCG but fail as a product for asphalt production due to contaminants in the stockpile affixing to the glass particles. Asphalt suppliers have indicated there have been examples of RCG causing odour issues during asphalt batching. The batching of asphalt is undertaken at high temperatures to liquify the bitumen and binders so they can attach to the aggregates, including RCG. This requires preheating the aggregates before adding them to the mix. Any contaminants attached to the RCG particles are oxidised by the heat, creating odour. In one case these contaminants ignited, causing a fire.

The asphalt industry is a very competitive market across Sydney and market share has been continually traded between the major asphalt companies for many years. Market positioning as a leader in innovation and recycling has been highly valued by some asphalt companies over the last three years, with a number of initiatives and projects undertaken in collaboration with local government and NSW EPA.

Most asphalt industry suppliers are reliant on purchasing the products used in asphalt from the construction aggregate supply chain; that is, they do not control the supply chain or produce aggregates for themselves, except for RAP which they receive and stockpile at the asphalt plant. They are not currently in the market or set up to make an RCG product that can be used for asphalt production.

Asphalt suppliers have indicated that the required capital cost to modify an asphalt plant for RCG requires extra storage bins, hoppers and feed belts, which costs approximately \$250,000. Some asphalt plants may already have sufficient storage bins, eliminating this cost. The mix designs also require laboratory and field testing as part of the asphalt supplier's quality assurance programme. The estimated cost to introduce a new mix design is around \$50,000. Whilst this may appear to be a large upfront expense, this becomes negligible when spread across the 2.5million tonnes of asphalt laid in Sydney each year.

NSW container deposit scheme impact

The NSW container deposit scheme (CDS) commenced on 1 December 2017 and was introduced as a litter reduction programme with the aim of reducing the volume of litter across NSW by 40% by 2020. The scheme has been a success, with over 1 billion containers being processed every 6 months at the various reverse vending machines (RVM), counter collections and automated depots (AD).

The most recent six-month report (July 2019 – December 2019)¹³ showed that over 45,000 tonnes of glass were collected across NSW and nearly 7,000 tonnes across the SSROC region.

The annual 90,000 tonnes of additional glass recovered under CDS has impacted councils' domestic recycled glass market as this new tonnage is cleaner and contains fewer contaminants, making it preferable for both processors and the end market. This new glass has displaced MRF glass and led to market instability for MRF glass with a lower commodity price. MRF glass also requires further processing to meet the higher standard of CDS glass.

NSW environmental legislation

It has been suggested that the licensing requirements to operate a recycling facility that processes MRF glass fines into RCG are one of the reasons some operators are reticent to actively pursue changes to their current licence. There is a need to explore how the NSW EPA and other regulatory agencies can support the recycling of MRF glass fines for use as a substitute for sand. This could include ensuring that there are approval processes for new glass sand manufacturing facilities, and resolving uncertainty regarding asbestos in stockpiles, including guidelines on testing and minimum thresholds.

Another option is to establish a client relations team for recycling operators to act as the first point of contact with the agency and who will guide and advocate activities that support the NSW 20 Year Waste Strategy.

Findings

Based on the available technical reports and industry statistics and analysis in the section above, Morrison Low has identified the following findings.

RCG tonnage available versus required

Calculation of the available glass from SSROC councils' domestic recycling service was compared against the RCG required for road construction materials across the region.

The next table provides estimated quantities of MRF glass from SSROC councils, based on three different glass beneficiation yields for MRF glass cullet and MRF glass fines. The MRF glass fines will then be processed to produce the estimated volume of RCG for road construction across the SSROC region.

The calculations are of the average annual tonnes of road construction materials and applied the TfNSW specification of 2.5% RCG in the asphalt wearing course and the IPWEA Specification for Supply of Recycled Material for pavements, earthworks and drainage.

¹³ <https://www.exchangeforchange.com.au/2019-20%20Half%20yearly%20report%20by%20LGA%20ending%20Dec-19.pdf>.

Table 4 Estimated quantities of MRF glass from SSROC

Annual MRF glass (tonnes)	%	MRF glass cullet (tonnes)	%	MRF glass fines (tonnes)	RCG for SSROC road construction (tonnes)
39,000	60	23,400	40	15,600	19,973
39,000	50	19,500	50	19,500	19,973
39,000	40	15,600	60	23,400	19,973

Based on the best available information, there appears to be sufficient MRF glass fines to support SSROC councils specifying RCG in a road construction material contract.

Table 5 Mix design SSROC wearing course 2.5% RCG AC10 material quantities

Material	% total mix	kg / tonne
10mm aggregate	18%	180kg
7mm aggregate	12%	120kg
Crusher dust	34%	340kg
Natural sand	11%	110kg
Filler	1.5%	15kg
Crushed glass RCG	2.5%	25kg
Bitumen	6%	60kg
RAP	15%	150kg

The above table provides a list of the materials and quantities to produce one tonne of 2.5% RCG asphalt. Please note the asphalt mix design for base and subbase asphalt with 10% RCG will be 100kg per tonne, whilst road base with 15% RCG has a greater capacity to utilise 150kg per tonne and therefore the greatest amount of RCG.

Supply chain

The current supply chain for road construction materials is based on longstanding industry knowledge, reliable and quality products and adequate supply. The introduction of RCG into the supply chain as a replacement for coarse sand is a fairly small portion of the Sydney coarse sand market of 2.5 million tonnes.

There is a reliable supply of MRF glass fines being produced in Sydney on a daily basis, with a guaranteed supply that should be enough to establish the infrastructure needed to produce RCG from MRF glass fines.

The RCG must be produced to a standard that can be used by the asphalt industry. Secondary markets for RCG include blending with road base and other sand filling materials.

Role of local government

Local government has an important role in setting the resource strategies that introduce circular economy principles. This can be achieved by councils acting collectively to set policies and strategies, including procurement processes, to signal baseline demand for products with recycled materials to the market, thereby strengthening the business case for industry to invest in capacity upgrades.

The NSW 20 Year Waste Strategy Discussion Paper recognises local councils as the “backbone of waste management planning and services and will continue to play a critical role in shaping waste and resource recovery services.”

Joint procurement

Joint procurement lends a number of advantages to participating councils by creating a larger-scale bulk purchasing contract that can provide some market certainty for current and emerging suppliers in the market. Regional reporting and monitoring of recovery rates, carbon emissions, contract performance that councils currently do not have information on.

Joint regional procurement by local councils has been recognised in the NSW 20 Year Waste Strategy Discussion Paper as a means for local councils to increase negotiating power to drive circular economy outcomes beyond the capabilities of individual councils and allow councils to cost-effectively procure safe, high-quality materials that meet specifications and resource recovery target. In addition, the Coalition of Australian Governments (COAG) Communique from March 2020 highlights the importance of local government procurement to drive end markets for recycled materials¹⁴.

¹⁴ <https://www.coag.gov.au/sites/default/files/communique/phasing-out-waste-exports-response-strategy.pdf>.

Appendix A Recycled products and relevant specifications - recycled materials NSW

Recycled Materials	NSW SPECIFICATIONS
Recycled Crushed Glass (RCG)	<p>Allowed in TfNSW/RMS asphalt, concrete for pavements and non-structural concrete and road base specifications.</p> <p>Asphalt: 2.5% Wearing Course in asphalt, 10% base and subbase layers in asphalt (increased from 2.5% to 10% in mid-2019)</p> <p>Concrete: 15% of the fines in the concrete mix</p> <p>Road base: 10% allowed</p> <p>The following specifications were amended accordingly:</p> <ul style="list-style-type: none"> • R116 Heavy Duty Dense Graded Asphalt • R117 light Duty Dense Graded Asphalt • R118 Crumb Rubber Asphalt • R121 Stone Mastic Asphalt
Reclaimed Asphalt Pavement (RAP)	<p>Allowed in TfNSW/RMS asphalt specifications.</p> <p>Wearing course: Maximum 20% RAP</p> <p>Base and subbase layers: maximum 40% RAP (typically 5 to 30% used)</p> <p>TfNSW/RMS is undertaking a study into the NSW RAP supply to be completed in 2020</p> <ul style="list-style-type: none"> • Laboratory results from this investigation will then be used to review use of higher RAP content asphalt mixtures in NSW. <p>The current QA specification is R 3153 and will be reviewed in 2020 together with associated asphalt specifications following the study.</p>
Crumb Rubber	<p>Allowed in TfNSW/RMS spray seals (for over 40 years) and asphalt (over 30 years).</p> <p>Spray seals: 25% of sprayed sealed roads contain crumb rubber.</p> <p>Asphalt: 5% of asphalt roads contain crumb rubber.</p> <p>The current RMS specifications are:</p> <ul style="list-style-type: none"> • R107 Sprayed Bituminous Surfacing (with PMB) • R118 Crumb Rubber Asphalt • QA Specification 3256 Crumb Rubber
Construction / Demolition Waste	<p>Allowed in TfNSW/RMS road base specifications.</p> <p>Used extensively in NSW for over 20 years, particularly Sydney. TfNSW/RMS allow 100% crushed concrete and max 20% crushed brick to be blended to be used as road base aggregates.</p> <p>The following specifications relate to:</p> <ul style="list-style-type: none"> • R82 Lean Mix Concrete Subbase • R83 Concrete Pavement Base • QA Spec 3211 Cements, Binders and Fillers