

Builders' rubble: opportunities in processing and application



Summary

The market for builders' rubble is well established in the City of Cape Town (CCT), with a growing demand for builders' rubble in the construction industry.

One of the main drivers of this market is the rising price of virgin material. The goal of GreenCape's work is to facilitate industry access to additional feedstock, and unlock the considerable opportunity for the inclusion of builders' rubble in road construction.

This Industry Brief provides information on the market for processed builders' rubble in the City of Cape Town.

The brief covers:

- market opportunities
- market drivers
- recommendations to remove barriers to market development.

The brief is aimed at **crushing companies** (processors of builders' rubble), **construction and demolition companies**, consulting **pavement engineers** and **local and provincial government roads departments**.

Background

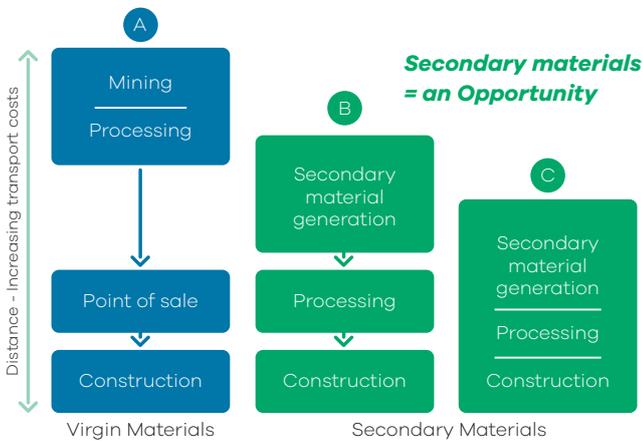
Builders' rubble¹ is usually landfilled in South Africa, in spite of its potential for re-use. Based on international experience, the biggest opportunities in the recovery, processing and application of builders' rubble lie in road building. There are opportunities both on the supply side for the crushing industry, as well as on the demand side in road construction for the public and private sectors.

The economy in builders' rubble must be considered at a regional scale, due to the low value of the material relative to handling and transport costs. Economic viability is therefore dependent on local supply and processing of materials, so that the transport and processing costs do not exceed the market value of the material.

Figure 1 illustrates the benefits of secondary materials, in that the supply chain of secondary materials, in comparison to that of virgin materials, is collapsed geographically (from A to B or C), with the source of secondary material much closer to the point of use.

Figure 1:

Supply chain benefits of secondary materials



Market opportunities in the City of Cape Town

The builders' rubble market in the CCT and surrounding areas is showing robust growth, with evidence of further opportunities for market expansion.

Untapped feedstock

Large volumes of builders' rubble (518 000 m³, or an average of 43 200 m³ per month) are landfilled every year in the city (Figure 2; CCT Solid Waste, 2015). It is estimated that 25% of this material can be used in road construction, 30% in foundations and road embankments, and about 20% in fill. In other words, **an extra 11 400 m³ per month of high-quality material, with a value of R11–R1.5 million, could be available to the market for sub-base material in road construction in the CCT (Figure 3).**

City of Cape Town - 2015



Figure 2:

Available material and crushing capacity in the City of Cape Town

¹The mineral component of construction and demolition waste (C&DW) is here defined as concrete, bricks (both clay and concrete blocks) and stone.





Existing market for processed builders' rubble - strong despite perceptions

The current crushing capacity in the CCT is in excess of 52 000 m³ per month² (Figure 2).

The primary market for crushers is smaller construction companies, which use the material for foundations and fill. Some larger construction firms do their own onsite crushing and reusing of material, for use as sub-base layers in roads and parking lots, as well as in foundations and fill (Figure 3).

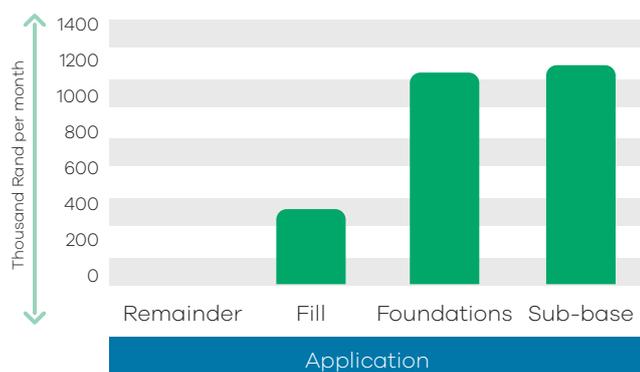


Figure 3:
Available material by application and value

Upcoming investments that will increase capacity

With known planned additional capacity and further investment by the crushing industry, it is expected that a further 40 000 m³ per month in crushing capacity will be available in the next few years (Figure 2).

Three major crushers are planning to increase their capacity in the next year or so. These crushing companies are confident that they will receive sufficient volumes and quality of feedstock to produce good-quality products, such that market demand will be high enough to move the extra material in the market.

Considering the amount of builders' rubble available and the number of jobs currently provided by the crushing industry³, the growing market provides the potential to create at least 500 new jobs in total and divert ~2.3 million tonnes from landfill over the next four years within the CCT. This is dependent on better segregation of construction and demolition waste (C&DW) at source, as well as the planned increase in crushing capacity.

² Based on a survey of five major crushers in Cape Town

³ Currently, there are 9.7 jobs per 1 000 m³ processed. Crushers producing lower-quality products average 1.2 jobs per 1000 m³ processed, while those producing high-quality products average 30 jobs per 1000 m³.

Supporting market development in builders' rubble

There are five main areas that can be considered in terms of supporting the secondary materials economy (Figure 4). In the CCT, material supply (feedstock) and economic feasibility are two aspects of the market that require only limited intervention, as illustrated above.

Areas that are in need of intervention include:

- the verification of product and process quality;
- landfill management that supports a secondary materials market;
- policy and legislation that provides incentives for the use of secondary materials such as builders' rubble.

Strict **quality control** for verified quality products is needed to capitalise on opportunities, so that end users may be confident in the material specifications for foundations for structures, and especially for inclusion in roads. The quality control process must start at the point of waste generation - separation at source is the primary factor determining material quality.

GreenCape's work to develop the builders' rubble economy, in collaboration with industry stakeholders, is focusing on **best practice guidelines for the crushing industry** to produce high-quality products that will meet the requirements of end users.

Experience shows that effective quality control measures at crushing sites have a positive feedback on the separation of material at the point of generation, and therefore on the quality and volumes of material brought to the crushing sites.

The Road Pavement Forum in May 2016, approved a resolution to scope **guidelines for the inclusion of secondary materials in roads**. The scope and content outline is being developed in consultation with stakeholder groupings. This process, similar to that followed for recovered asphalt, will be ongoing as the results of further research and in service performance testing will allow refinement of the guidelines.

In the longer term, the goal is to **facilitate the development of material specifications for road-building aggregates that include processed builders' rubble**, through a partnership of academia and road industry bodies.

Supporting the builder's rubble economy

Public bodies - policy and legislation



Figure 4:

Drivers of a secondary materials market

Municipal tenders for crushing companies

Opportunities include upcoming crushing tenders in the CCT and Stellenbosch municipalities, with both Eden and Drakenstein municipalities also planning to process and divert builders' rubble from landfill. To access the opportunity in the CCT, crushing companies need to be accredited through the Solid Waste Department as a waste management service provider.

What drives the market opportunities?

There are currently few externally imposed drivers (such as policy and legislation) dictating diversion from landfill. Furthermore, there is no particular industry body oversight governing the handling, treatment and disposal of builders' rubble.

Current drivers of the economy include:

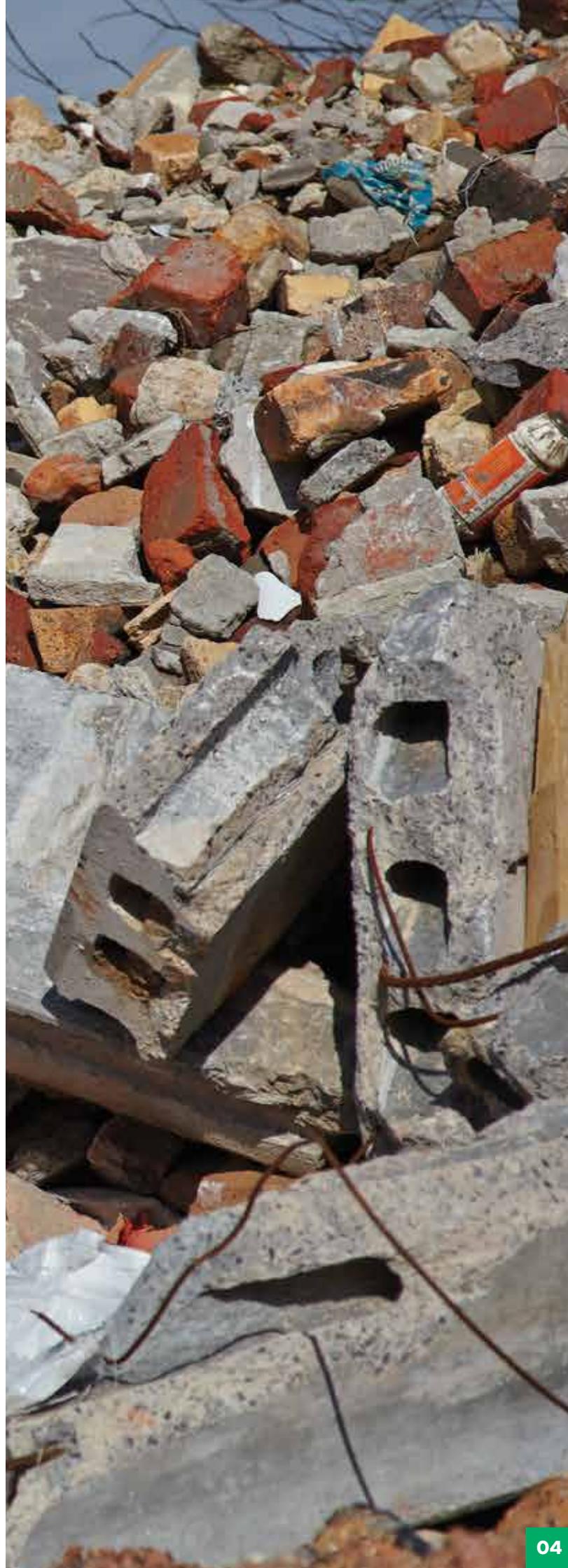
- rising virgin material prices;
- the cost of transporting materials;
- the regulation of waste flows;
- increasing disposal costs, due to limited landfill airspace.

High virgin material prices are the most cited primary factor limiting growth in the construction industry (Windapo & Cattell, 2013). Ongoing increases in virgin material prices are expected due to rising energy costs, limited supplies of building sand and gravel and environmental impact assessment (EIA) requirements for new quarries, mines and borrow pits. The annual cost increases in gravel and building sand are also anticipated to be greater, as these resources become depleted.

The **rising transport costs** associated with material supply and wastes for disposal favour a local source of secondary material and the reduction or elimination of wastes from site by reusing these 'waste' materials.

Waste flow tracking is a priority for government. Furthermore, more stringent regulations regarding landfill construction and operation are now in place. **This means that landfill gate fees are likely to rise - in some areas significantly for mixed C&DW.**

Due to the **scarcity of landfill airspace**, incentives to divert wastes and disincentives to dispose of wastes may very well be implemented at local municipal level in the next five years if the current practice of disposing of large volumes of waste continues.





Both public and private sector involvement are needed to develop the market for builders' rubble, and the secondary materials market in general. Possible interventions are presented along the secondary materials value chain in Figure 5.

Public sector actions

- **Strengthen procurement policies and municipal by-laws** by requiring recycled content where possible in construction projects, and diversion of waste from landfill.
- **Reduce regulatory requirements for general waste treatment** (including builders' rubble) by fast-tracking the drafting of norms and standards for such activities.
- Roads departments being willing to **accept secondary materials for pilot sections in roads**.
- Play a key stakeholder role in the **development of guidelines** for the application of secondary materials in roads.

Private sector actions

- **Improve separation at source** on construction sites, as well as deconstruction rather than purely demolition practices.
- Institute **quality control processes and product testing**.
- Ensure the **correct match of products** in terms of quality and volume available to the application.

GreenCape

GreenCape's work focuses on the fundamental leverage points to stimulate uptake of secondary materials:

- **Infrastructure development:** Public-private partnerships are required to identify and develop crushing sites to capture and process builders' rubble and supply good-quality material, thereby satisfying market demand.
- **Quality:** Facilitating the development of best practice guidelines for the crushing industry.
- **Specifications:** Facilitating the publication of industry guidelines, and ultimately material standards, for road-building aggregates that are inclusive of secondary materials.

City of Cape Town and provincial government

Both the CCT and Western Cape government, through the Department of Environmental Affairs and Development Planning (DEA&DP) and Department of Economic Development and Tourism (DED&T), recognise the potential to stimulate economic development and job creation, and to divert waste from landfills by supporting the market for builders' rubble in the province.

- The CCT is building a database of alternatives to landfill disposal for C&DW.
- The DEA&DP has produced a model solid waste management by-law that includes the requirement of integrated waste management plans for all construction and demolition applications.
- Both entities are working towards diversion goals for C&DW from landfill.

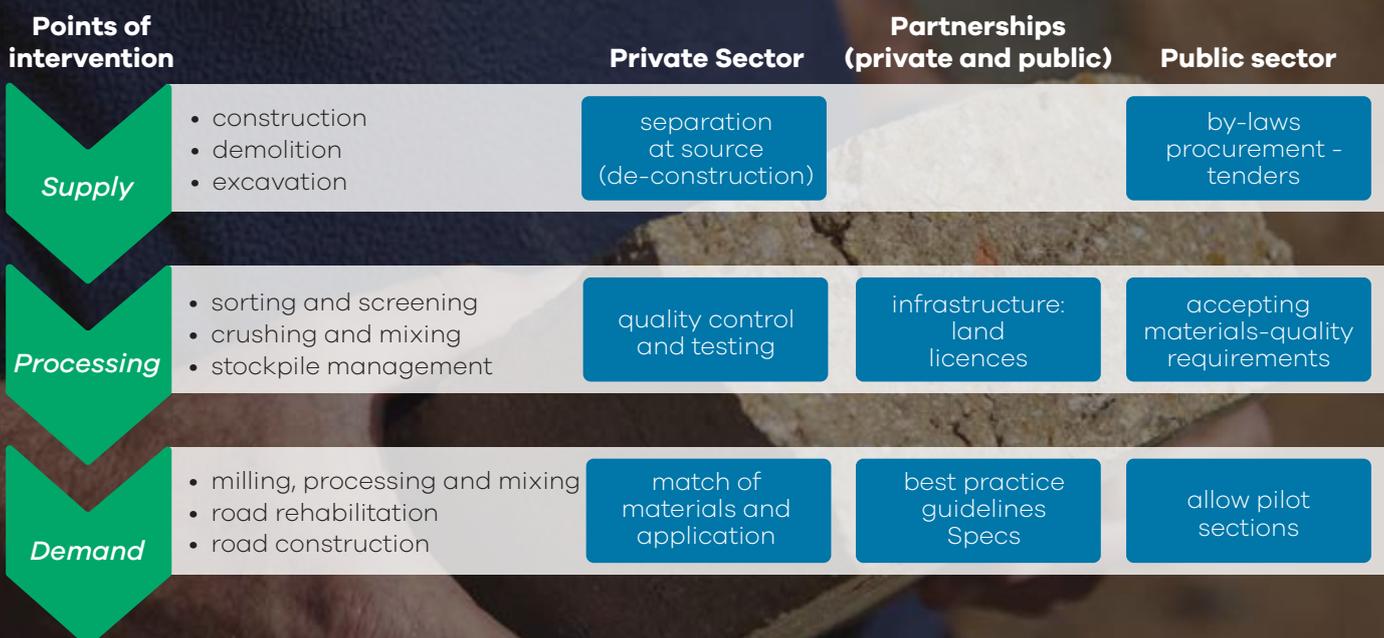


Figure 5: Possible private and public sector actions to develop the market

References

CCT Solid Waste 2015.

Builders' rubble data - disposed of at landfill July 2014–September 2015. Unpublished data.

Windapo, Abimbola O. & Keith Cattell 2013.

The South African construction industry: Perceptions of key challenges facing its performance, development and growth. *Journal of Construction in Developing Countries*, 18 (2), pp. 65–79.

This industry brief is based on GreenCape's work done on C&DW. For the full market intelligence report, or for information and assistance in taking advantage of these opportunities please contact Kirsten Barnes at kirsten@greencape.co.za or 021 811 0250.



“ GreenCape is a non-profit organisation that supports and promotes the green economy - low carbon, resource efficient and socially inclusive - in the Western Cape, South Africa. We assist businesses and investors focusing on green technologies and services to remove barriers to their establishment and growth. Our goals are twofold: 1) To increase investment and job creation in the green economy, and 2) to position the City of Cape Town and Western Cape Province as the green economic hub of Africa.

GreenCape's Industry Briefs are aimed at businesses, investors, government stakeholders and others in specific sectors of the green economy. The briefs communicate key market and other insights from our work and research in this space. They supplement our flagship Market Intelligence Reports that are published annually.

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