



COLLABORATION FOR CHANGE

# Case Study: Geopolymer Concrete

Embodied CO2e reduction  
(tCO2e)

TBC

### CATEGORY

PRODUCT	SYSTEM	PROJECT	CONCEPT
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### SUPPLY CHAIN

MANUFACTURING	PROCESSING	TRANSPORTATION	CONSTRUCTION
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### REGION

WA	NT	SA	QLD
NSW	ACT	VIC	TAS

## Profile

Organisation: City of Sydney

Website:

<https://www.cityofsydney.nsw.gov.au/>

About: The City of Sydney is the local government authority responsible for the City of Sydney local area.



## Section 1: Opportunity

Roads, cycleways and pavements account for around one quarter of the embodied emissions associated with the City of Sydney capital works program.

Geopolymer concrete can be used to replace traditional concrete made with Portland cement. Significant emissions reductions are possible once commercial products become available.

## Section 2: Solution

In 2019, a 3x15m section of geopolymer concrete road pavement was constructed in a real world test environment on a busy road in Alexandria (City of Sydney local area) in a project delivered by the City of Sydney in conjunction with Wagners, a diversified Australian construction materials provider. Using a combination of slag and fly ash (waste products) combined with alkali binders for full replacement of carbon intensive Portland cement, the objective of this trial was to move geopolymer concrete into a mainstream construction. UNSW's Stephen Forster was instrumental in activating the trial.



### Section 3: Lessons

This demonstration project shows that geopolymers can be manufactured and delivered to a busy city site with reasonable workability and handling and meets requirements for compressive strength, stress-strain and tensile strength. Performance to date indicates that geopolymers is a viable option for cement-based pavements using conventional contractors and modest WHS variations compared to standard concrete works.

### Section 4 : Impact measurement

The geopolymers concrete road section was built adjacent to a new section of Portland cement roadway. Sensors and gauges have been installed in-situ to evaluate performance under high volume and heavy vehicle traffic loading over 5-years or more. The data will be used to inform design engineers and Australian standards. The limiting factor presently to further deployment is the absence of a commercial supply of product.

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