



## Case Study

Silverstream/Whakawhirinaki Bridge Construction

**62% reduction in Carbon Emissions during ECI**

**Client:** Wellington Water Limited

**Head Contractor:** Brian Perry Civil Limited

## Silverstream Construction Project

Brian Perry Civil (BPC) is managing the construction of Silverstream Pipe Bridge, which consists of replacing the region's most critical water supply asset and supplying all water to Porirua City and North Wellington. Carrying the drinking water pipe, the new bridge will also feature a shared path for cyclists and pedestrian access across Te Awa Kairangi/ Hutt River, linking both sides of the Hutt River Trail.

Carbon management and reporting help us understand industry challenges and develop solutions aligning to net zero carbon transition and positive environmental outcomes. Carbon measurements are divided into 3 scopes:

- **Scope 1:** Direct GHG emissions from sources that BPC generates, including stationary petrol and diesel (10%)
- **Scope 2:** Indirect GHG emissions associated with the purchase of electricity (<0.1%)
- **Scope 3:** All other indirect GHG emissions, including materials manufacturing and its transportation (90%)

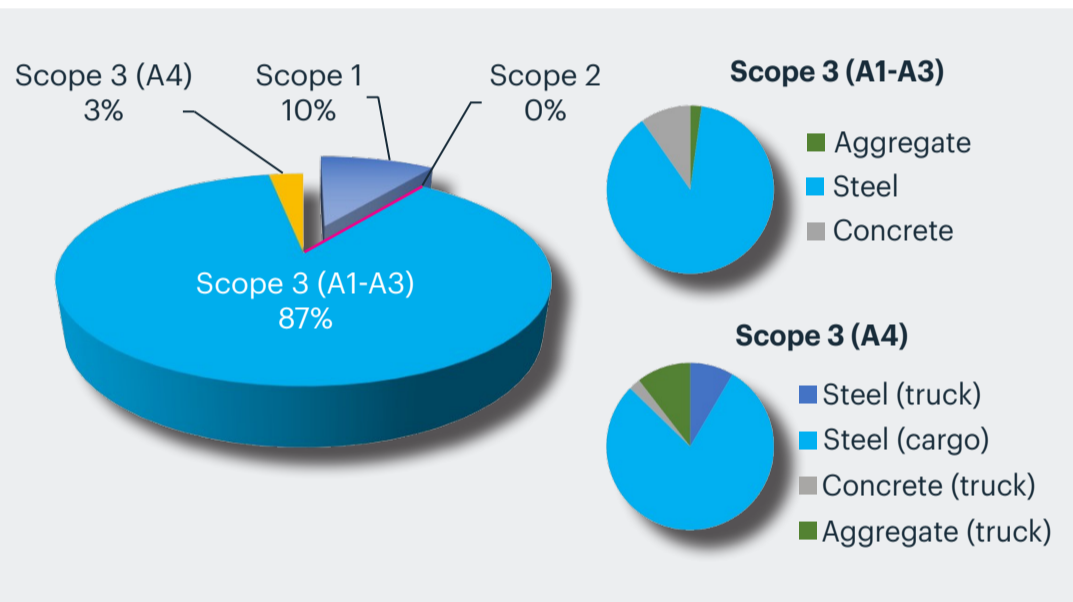
Indirect GHG emissions associated with the manufacturing of materials (A1-A3) were dominated by steel (88%), concrete (10%) and aggregate (2%).

The transportation of steel by cargo ship was the highest GHG emitted, representing 79% of A4 emissions, followed by the transportation of aggregate (11%), steel (8%), and concrete (2%) by trucks. This finding showed the importance of incorporating sustainable KPI during procurements, including the product's life cycle.

the bridge and related transportation to the site. Most savings are related to replacing a concrete deck with a steel structure, which decreases the number of piles and, thus, the amount of steel required for the bridge's construction.

**This saving translates to two years worth of BPC NZ operational emissions, which is Scope 1 and 2.**

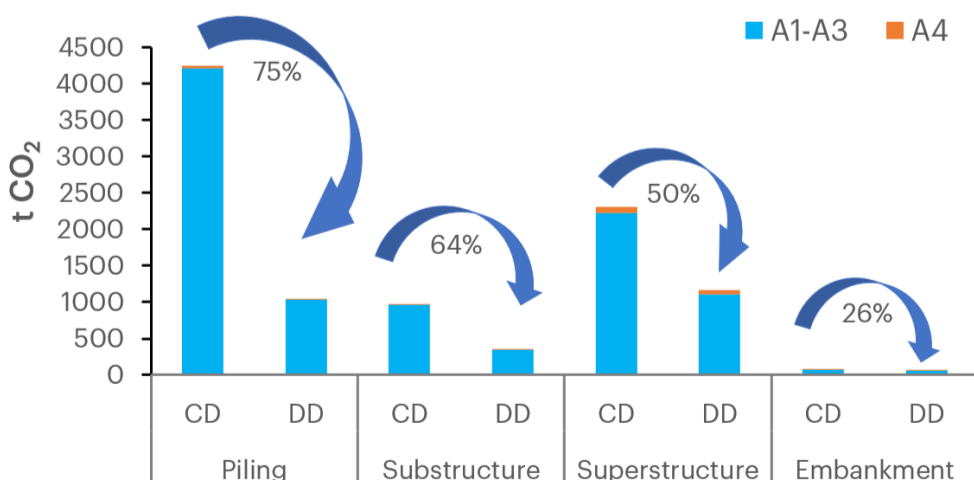
Clear environmental benefits included reduction of aggregate required to construct the embankment (new design) and the ability to reuse on-site materials, which decreased demand on the local quarry and associated transportation. Environmental risks significantly decreased as piling was no longer required within the river.



## Before Construction

**Re-design of the Bridge = 62% Carbon Emission Reduction!**

A total of 4,983,925 kg CO<sub>2</sub> (~5000 tCO<sub>2</sub>) was saved during the early contractor involvement process involving BPC and the project partner, Holmes. A new bridge design was proposed and accepted, reducing the quantity of materials required to construct



Comparison of carbon emission (tCO<sub>2</sub>) between concept design (CD) and detailed design (DD). A1-A3: Manufacturing process; A4: Transport to site

## During and after construction

The Silverstream project team, including the project manager, supervisor, engineers, administrator and subcontractors, are currently measuring project emissions to be compared with the carbon baseline. Additional information to the baseline is recorded, such as transportation of BPC staff commuting to the site and monthly energy reports by Mill Alberts and E Carson & Sons. This new information will guide us in identifying the most significant contributors to total carbon emissions and support the development of digital solutions, such as reporting software to capture carbon data based on invoicing.

Other sustainable actions include waste reporting to be compared with the company target to divert >50% from landfills, the use of sieving equipment by E Carson & Sons team to reuse excavated materials, the transition of the petrol fleet into hybrid vehicles, and case studies looking at applying circular economy concept for the Silverstream construction project.



**5000T equivalent to:**

963 return flights from Auckland to London

228,914 propane cylinders used for home barbecue

628 home's energy use for the year

12,774,164 miles driven by an average gasoline-powered passenger vehicle