

Developing a carbon inventory for a sports park

**Auckland Council Parks Services
Unit Recreation Aotearoa Award
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Can parks make a positive contribution to climate change?

Greenhouse Gas Emissions (GHG) are the primary contributor to climate change. This is an issue of global concern and a priority for Auckland Council, whose [Low Carbon Auckland Action Plan](#) aims to reduce GHG by 40% by 2040. Carbon inventories are a way of measuring [New Zealand's GHG](#).

Are parks carbon positive or negative?

As part of this commitment, the Auckland Council Parks Services Unit set out to understand how its network of parks impact on climate change.

It's all about understanding our total carbon footprint, and then what decisions we can make to reduce carbon emissions and optimise carbon sequestration. [Mark Bowater, Auckland Council]

In order to understand the impact on the whole parks network, the research has been broken down into stages based on different park typologies.

This initial project analyses a sports park which is typically infrastructure heavy and can be high in embodied carbon emissions.

An outcome of this project is evidence of the environmental impact of Auckland's network of 4000 parks. Research on Seddon Fields has made it possible for data to be extrapolated across all sports parks, forming a picture of the carbon footprint at a network level. It also provides useful findings for future parks design.



What is in the carbon inventory?

The carbon inventory was split into 3 components.

1 Operational emissions

Operational admissions follow the [Ministry for Environment Guidelines](#) and other global carbon accounting methodologies. These are split into three scopes

- *Scope 1 emissions* are directly associated with park maintenance and released directly from site, such as fuel usage and mowing
- *Scope 2 emissions* are indirect from energy used on site [i.e. electricity]
- *Scope 3 emissions* are indirect ones from park activity, i.e. waste and visitor transport.

2 Embodied carbon emissions

Each piece of infrastructure in the park contributes to overall carbon emissions which are not generated onsite but are a result of the production and transport of materials. These were calculated using [Life Cycle Assessments \(LCA\)](#), a globally used approach to carbon accounting. Life Cycle Assessments look at the infrastructure in terms of extraction, transportation, demolition and disposal of infrastructure and its component materials at the end of its life.

3 Carbon Sequestration

[Sequestration of carbon](#) is the removal of carbon dioxide from the atmosphere and storage by trees, shrubs and soil.

To be effective managers and stewards of the natural environment, we need to understand the role that parks open space plays in terms of our total carbon footprint and how we can contribute positively to the impacts of climate change. [Mark Bowater]

Seddon Fields Carbon Inventory

Seddon Fields, a 'typical' sports park, was selected to model a carbon inventory. Covering approximately 8.8 hectares it comprises multiple fields with a range of playing surfaces, a carpark, concreted footpath network, building, vegetation, specimen trees and high operational maintenance.

Results

The results show that a typical sports parks cannot offset the embodied emissions of built infrastructure through the onsite vegetation cover.

The carbon emissions for Seddon Park are 552,606 kg CO₂-e per annum. The area with the highest contribution to carbon emissions was the built infrastructure, in particular the artificial turf.

There is a positive impact of carbon sequestration with the unique ability of park vegetation to offset carbon emissions by removing carbon dioxide from the atmosphere.

Application and value to others

The research is critical to assist Auckland Council – and other local authorities - in making sustainable, evidence-based, carbon-positive decisions about sports park design, procurement and maintenance. It provides evidence so that alternative low carbon solutions can be sought - and raises the awareness of environmental impact through the decision-making and design process.

Knowledge gained from this research has informed the design decisions and concepts for [Scott Point](#), a new sustainable Sports Park in Hobsonville.¹ This practical application demonstrates the value of understanding exactly which elements of a sports park contribute most to the carbon footprint.

It's about ensuring that we are maximising all sustainable options and reducing carbon emissions to create a green, healthy NZ. [Hannah Chapman-Carr]

Want to know more? Listen to Auckland Council Parks Services Unit staff [interview](#) or read the nomination [here](#).

¹ For more information on Scott Point Sustainable Sports park, see Parks and Leisure article, Volume 21.1 Autumn 2018.

Positive management options

Five climate-positive actions for sports park design

Action	Options
1. Consider alternatives to artificial turf	Hybrid turf can lower embodied emissions without significant reduction of playing time
2. Consider infill type and use/reuse of shock pad	Cork infill and re-use of shock pads reduces embodied emissions by 50% compared with SBR (rubber crumb) infill
3. Avoid disposal of artificial turf in landfill	Look at re-purposing options to reduce the whole-of-life emissions
4. Reduce operational emissions	Source energy efficient lighting, electric vehicles and machinery and waste reduction
5. Select high sequestration shrub and tree species and maximise planting opportunities	Suggested species: Pohutukawa, Karo, Ngaio, Lemonwood

Other research

This analysis focuses on the GHG emissions related to a specific park some questions remain: *What other benefit does the community receive from this park? To what extent do changing levels of service reduce emissions? What are the comparative emissions of different turf types?*

Further Reading

[FIFA. \(2017\) Environmental Impact Study on Artificial Turf.](#)
[Infrastructure Sustainability Council of Australia \(ICSA\) Calculator Guideline](#)
[Ministry for Environment, Guidance for Voluntary Greenhouse Gas Reporting 2016.](#)
[NYC Government Parks. A Plan for Sustainable Practices within NYC Parks](#)
[Trees that count. Technical information about native trees and carbon sequestration](#)

Websites

[Seddon Fields](#)
[Measuring the green in greenspace](#)
[Creating sustainable community parks](#)