



anderson bell + christie

Case Study:
Paisley Grammar School Community Campus

Welcome



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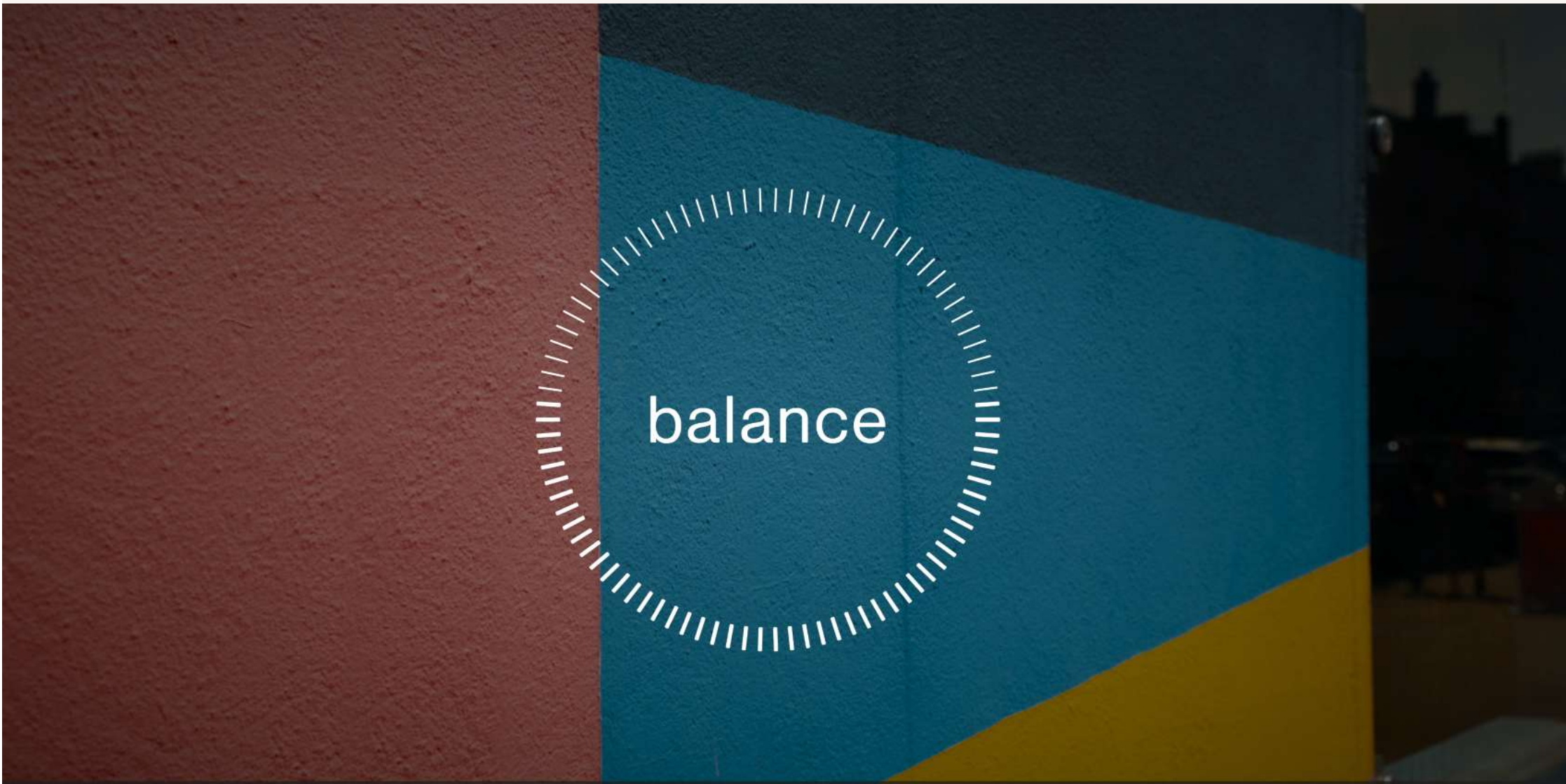
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What is **BALANCE**?



How is it related to NPF4 Policy 2 Guidance?

Theme	NPF4 Policy 2 Guidance	ABC Balance White Paper
Climate Mitigation	Emphasizes lifecycle GHG reduction, early design intervention, and use of standards like PAS 2080	Focuses on reducing embodied carbon through design, material choices, and circular economy
Climate Adaptation	Encourages siting and design to manage climate risks (e.g., flooding, overheating)	Advocates for place-based sequestration and resilient urban greening
Lifecycle Emissions	Requires assessment across lifecycle stages A-D	Uses BS EN 15978 and RICS methodology to assess whole life carbon
Place-Based Planning	Promotes local development plans and community-led adaptation	Proposes local sequestration and urban tree planting to balance emissions
Circular Economy	Encourages reuse, recycling, and design for deconstruction	Central to ABC's roadmap; includes material reuse and reclamation targets
Carbon Sequestration	Supports nature-based solutions and blue-green infrastructure	Detailed sequestration modelling using Woodland Carbon Code





Case Study: Paisley Grammar

Overview and Site Information
Operational carbon findings
Embodied carbon findings

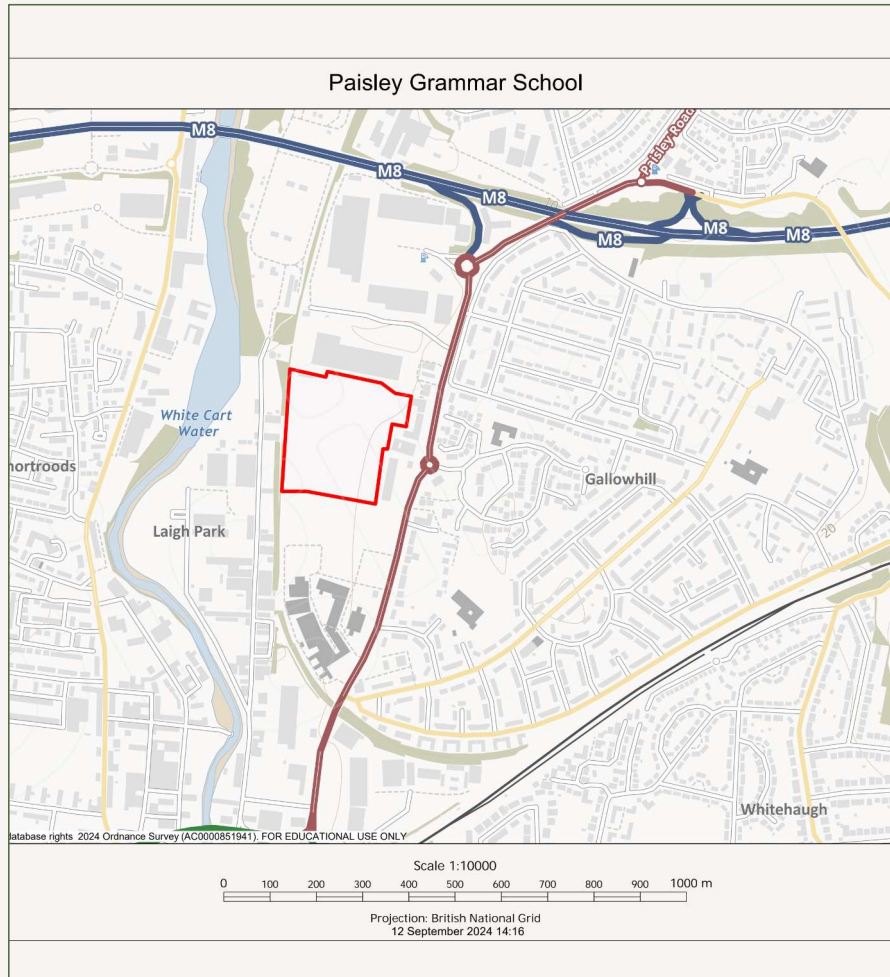
Paisley Grammar School

New Community Campus



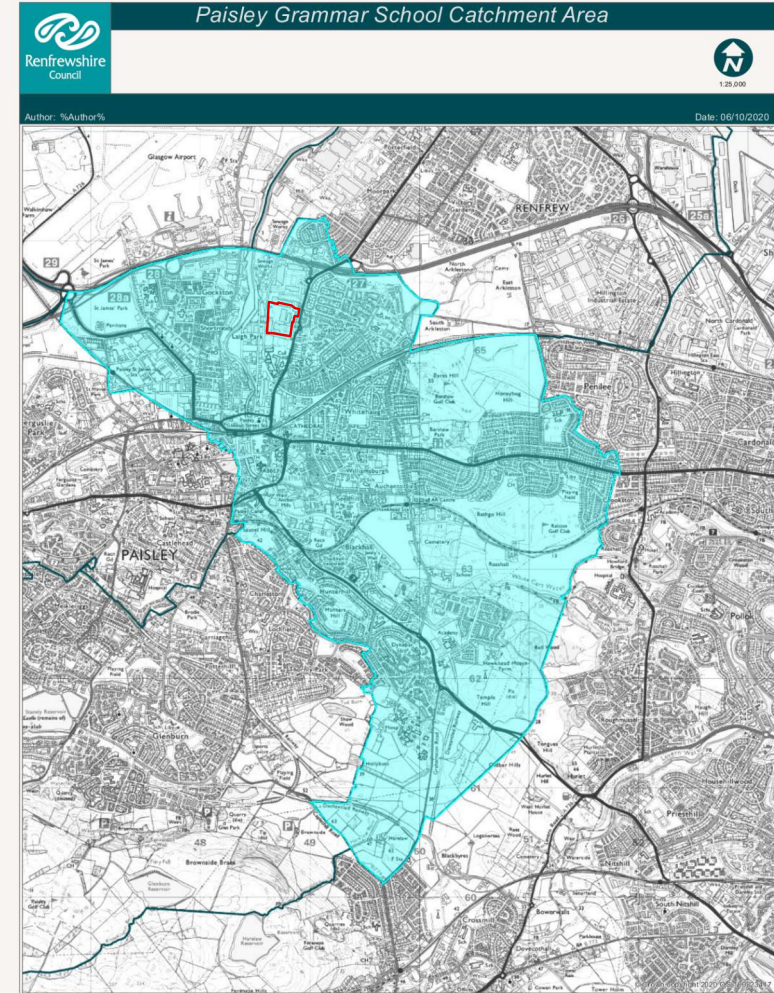
Site Location and Catchment Area

The New Paisley Grammar School community campus is situated at 111-113 Renfrew Road, Paisley (Figure 1.1), at the northern edge of the catchment area (Figure 1.2).



Area = 5.8 ha

Figure: Paisley Grammar School Community Campus



Area = 1400 ha

Figure: Paisley Grammar School Catchment Area

Operational Carbon Total

Current Design

Operational carbon - current design

Based on current design specifications, catchment area statistics, transport assessment when National Net Zero 2045 targets and UK grid decarbonisation factored in, the total operational carbon from the below categories will reach 4,451 tCO2e by 2086.

Table: Operational carbon findings for current proposal (with Net Zero 2045 targets and grid decarbonisation)

Categories	Data source	Net Zero 2045
Public transport	Transport Planning LTD	484
Private transport	Transport Planning LTD	2,356
Electricity demand	Projected operational energy analysis	1093
Mains gas	N/A	N/A
Waste	Benchmark value	440
Water consumption	Benchmark value	74
Street lighting	Benchmark value	2
Green space maintenance	Indicative planting strategy	2
TOTAL tCO2e in 2086	AB+C BALANCE	4,451

Lifetime Operational carbon
(Current design)



Figure: Operational carbon findings for current proposal

Embodied Carbon Total

Current Design

Embodied Carbon – Current Design

Based on current design specifications for Paisley Grammar School Community Campus, our modelling estimates lifetime embodied carbon emissions of **14,512 tCO₂e** over 60 years. This includes emissions from:

- Carbon released in the production of materials & the construction process. (Lifecycle Stage A/ Upfront carbon)
- The use and maintenance of a building. (Lifecycle Stage B)
- Demolition and waste processing. (Lifecycle Stage C)
- Provision of on-site renewable energy generation through PVs.

Table: Embodied Carbon footprint - comparison of current and AB+C proposal

Category	Current proposal
Total emissions (tCO2e)	14,512
Total Emissions per m2 (kgCO2e/m2)	1,049
Upfront emissions (tCO2e)	9,983
Upfront Emissions per m2 (kgCO2e/m2)	722

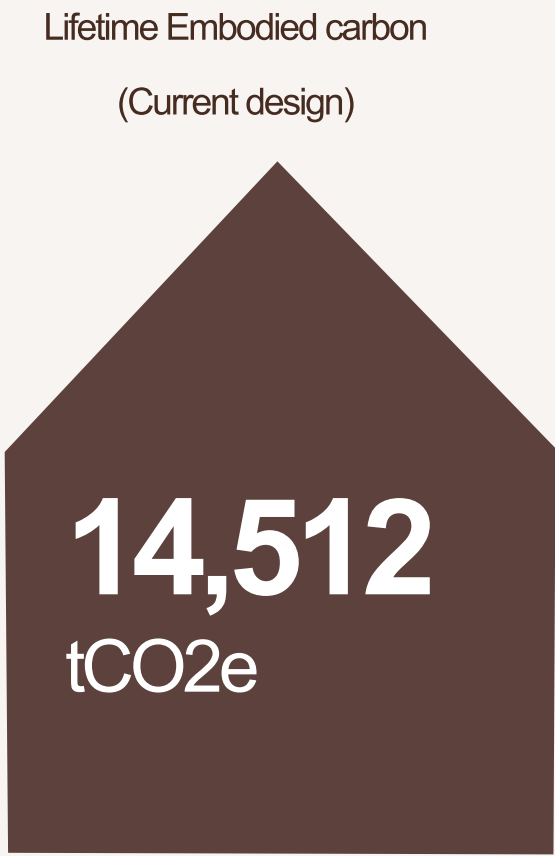


Figure: Embodied carbon findings for current proposal

Cumulative Carbon

Operational + Embodied / Current Design

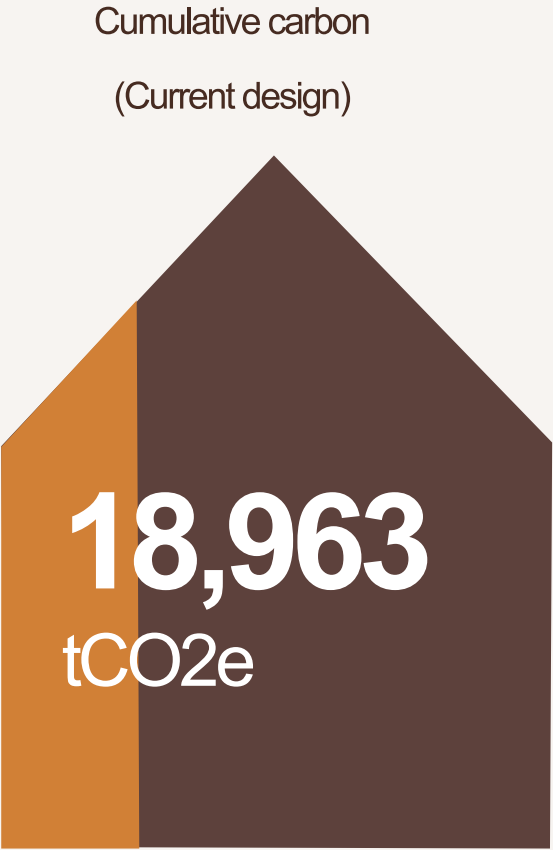
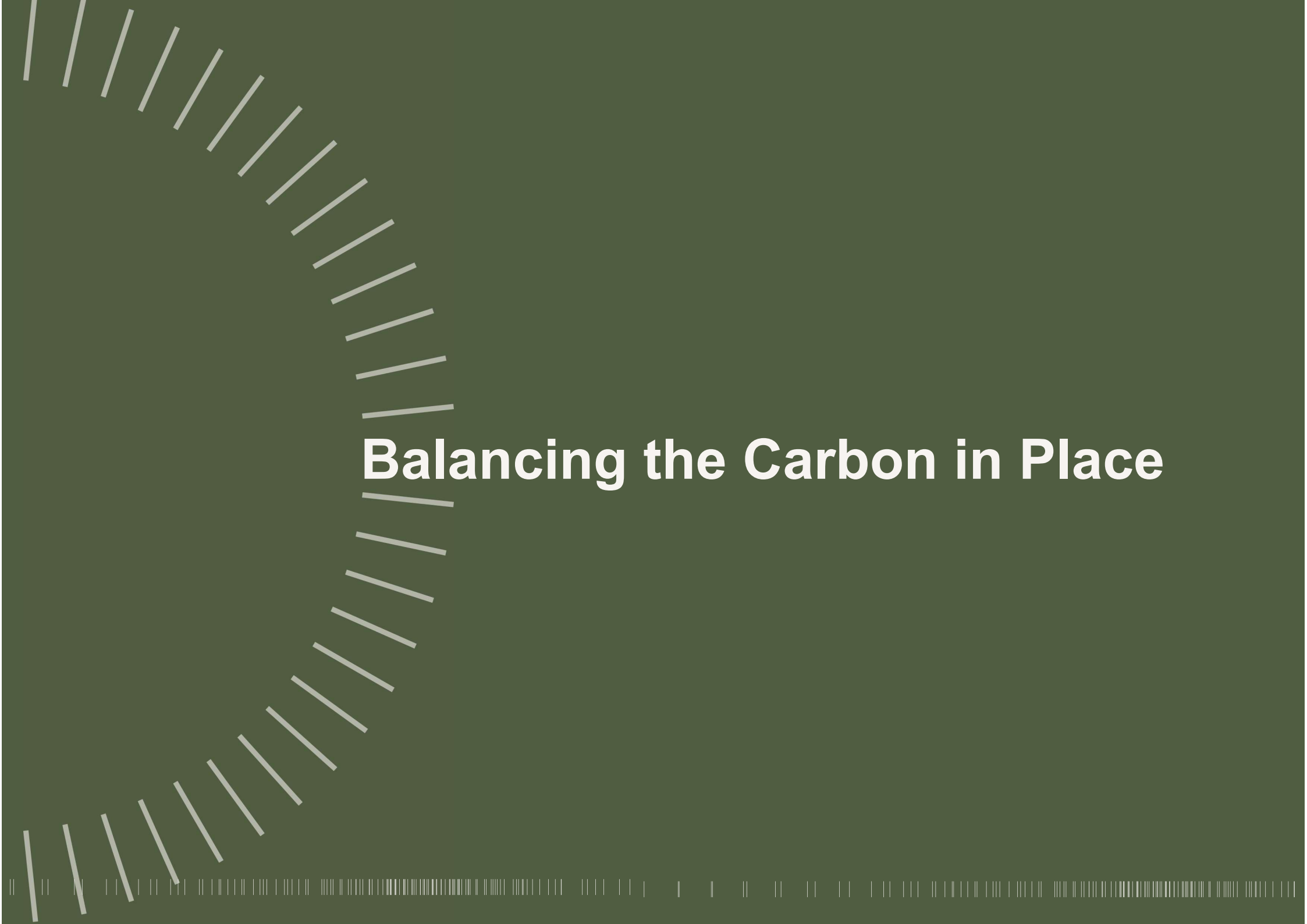


Figure: Cumulative Carbon with Current Design Specifications (Passivhaus)





Balancing the Carbon in Place

Cumulative Carbon

Operational + Embodied / Current Design

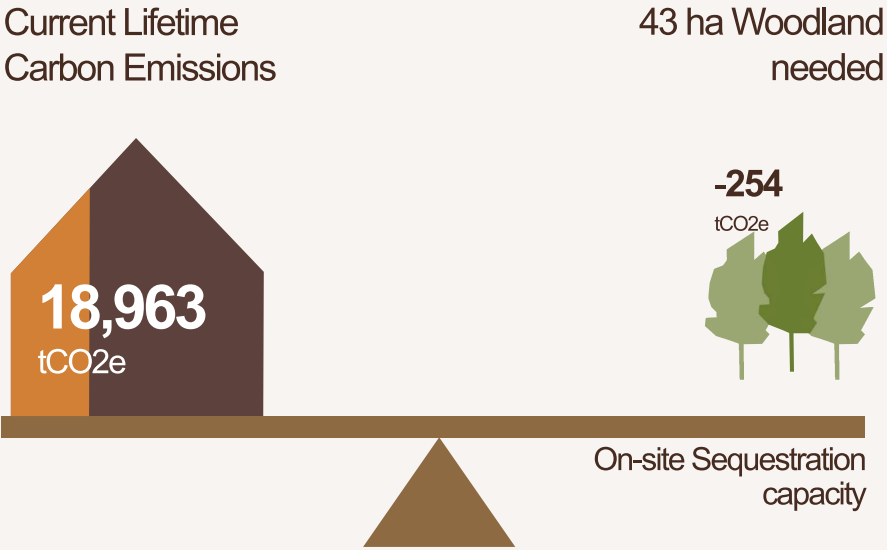
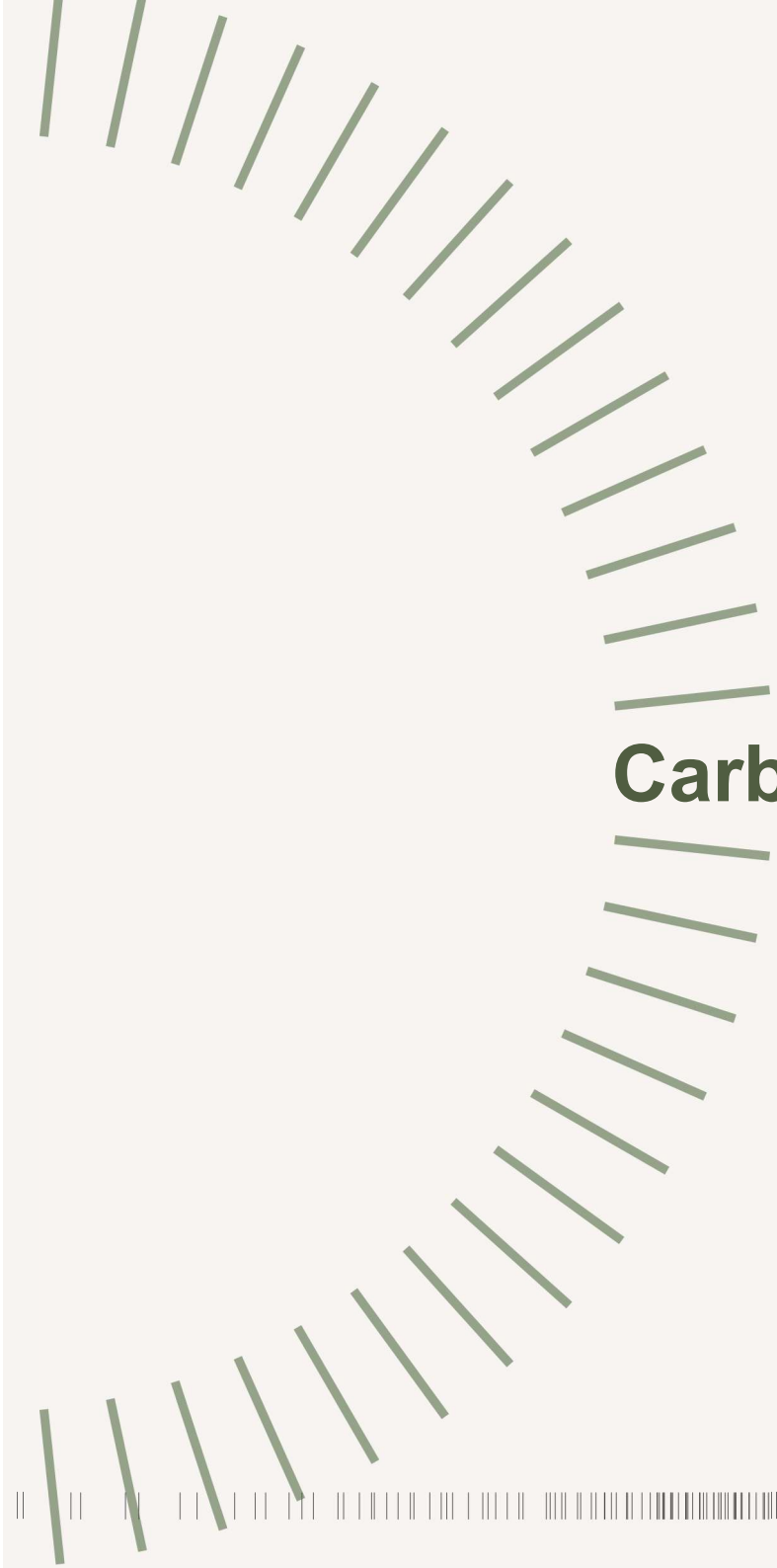


Figure: Cumulative Carbon and Woodland Requirement with Current Design Specifications (Passivhaus)



Carbon reduction strategies

Operational carbon reduction

Outline of strategies

- Active travel improvement
- Private car travel reduction
- Rapid electrification of public fleets

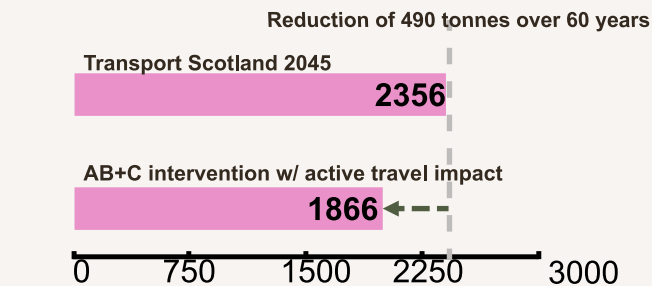
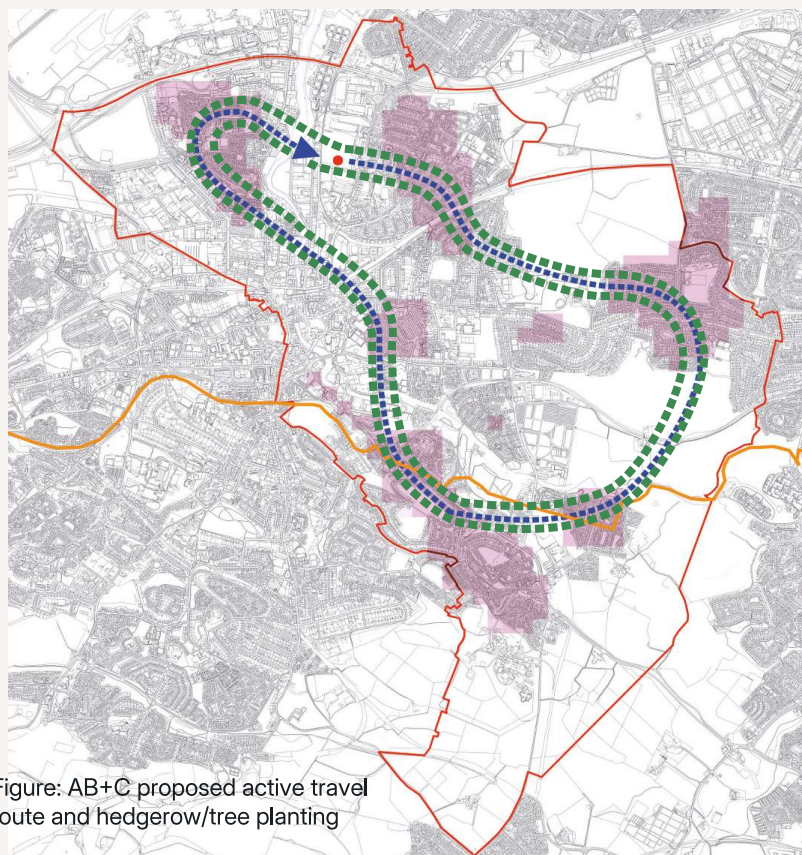


Figure: Operational transport reduction Current Design vs AB+C Interventions



- Postcode level data for pupils
- New Paisley Grammar School Community Campus
- ▬ AB+C proposed greening along the active travel path
- ▬ AB+C proposed active travel route

Figure: AB+C proposed active travel route and hedgerow/tree planting

Embodied carbon reduction

Outline of Strategies:

Massing changes

Option 1 - Condensed building form

Material replacements

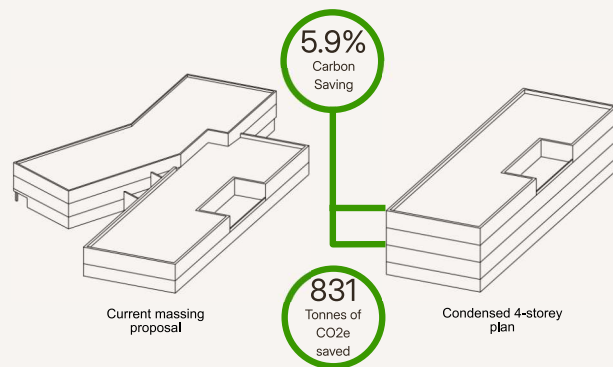
Option 2 - Ground Floor

Option 3 - Upper Floors

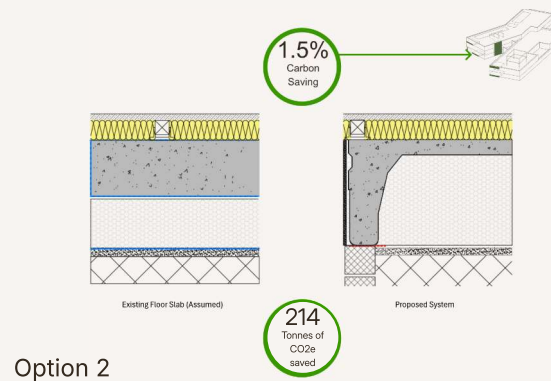
Option 4 - Structure

Option 5 - External Walls

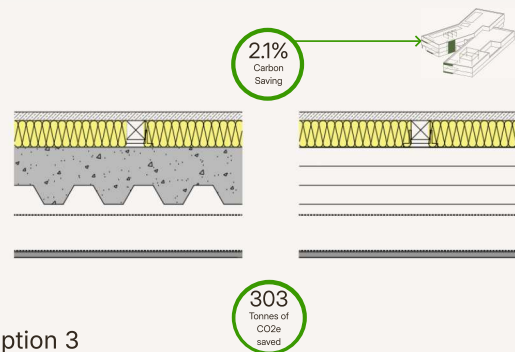
Option 6 - Internal Walls



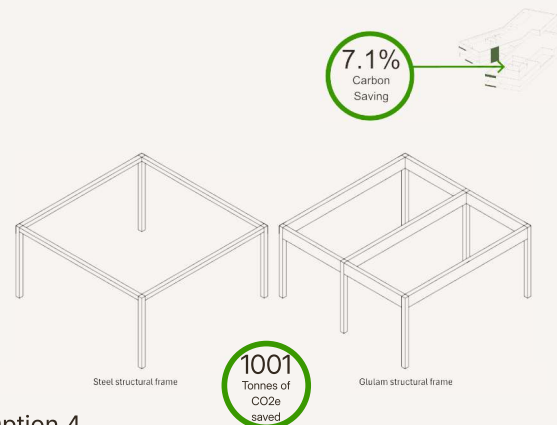
Option 1



Option 2



Option 3



Option 4



We can reduce carbon today!

Scenario 1 and 2 Comparison

The charts and the table below compare carbon emissions and environmental impacts between two scenarios for the Paisley Grammar School Community Campus (Figure 4.3):

- **Scenario 1** - The current design to **Passivhaus specifications** and
- **Scenario 2** - An enhanced design incorporating **AB+C's**

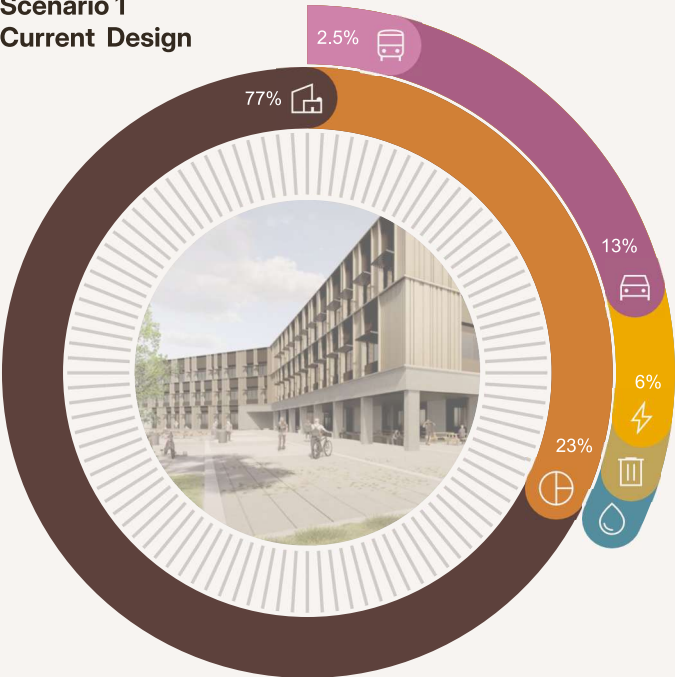
sustainability interventions.

Both scenarios are aligned with Scotland's national net zero targets and account for projected UK grid decarbonisation.

Table 4.2 demonstrates the carbon emissions reduction for each sector

shown in figure 4.3.

Scenario 1
Current Design



Scenario 2
AB+C Interventions

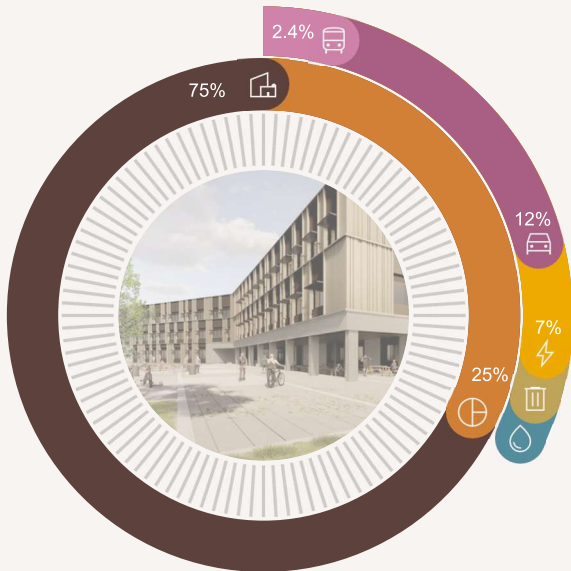
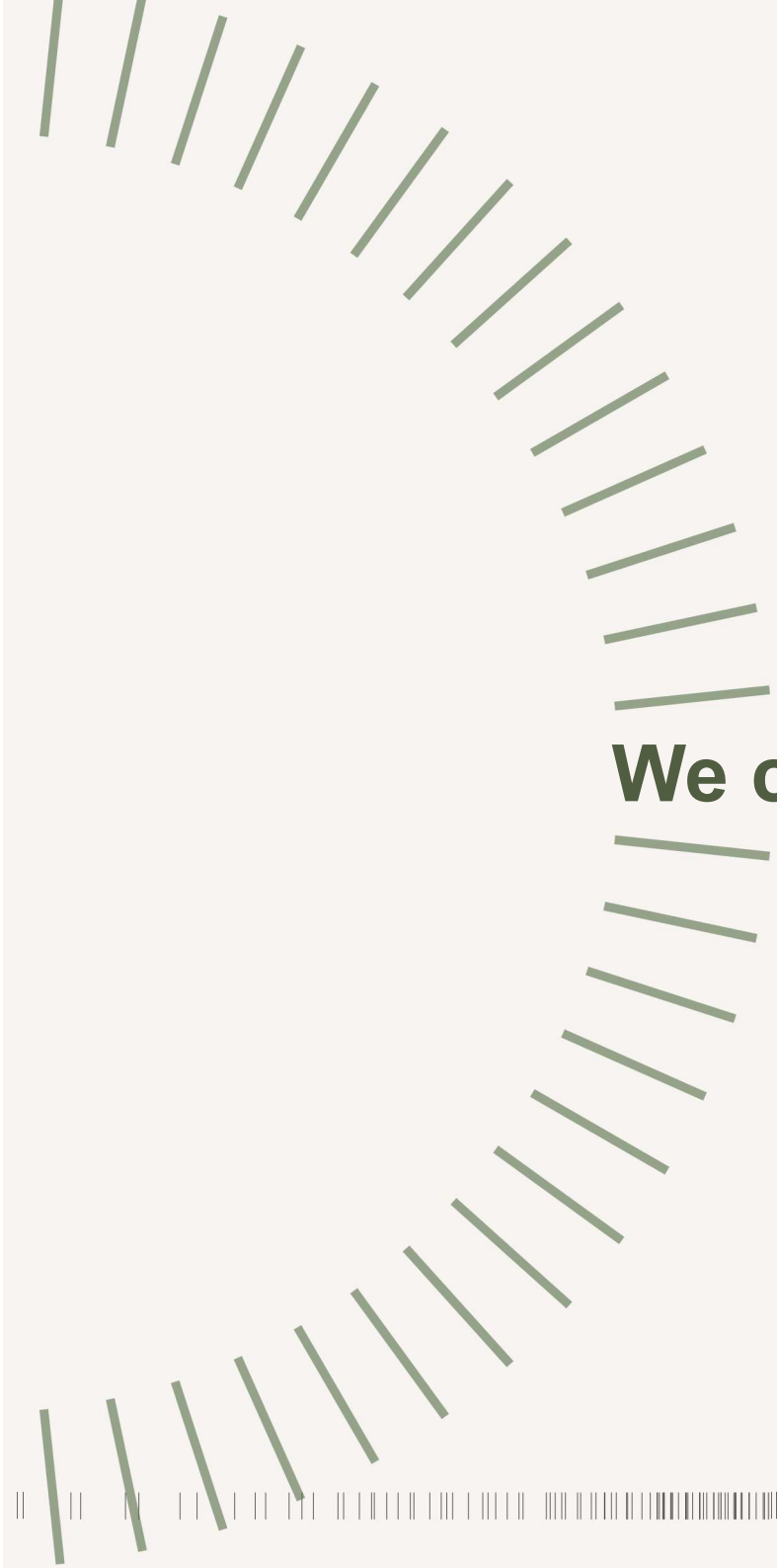


Table: Comparison of Cumulative Lifetime Emissions Current vs AB+C Interventions (Embodied and Operational tCO2e)

	Current (S1)	AB+C (S2)
Embodied carbon	14512	11975
Operational carbon	4451	3862
Public transport	484	386
Private transport	2356	1866
Electricity	1093	1093
Mains gas	-	-
Waste	440	440
Water consumption	74	74
Street lighting	2	2
Greenspace maintenance	2	0.5
Total	18963	15837

Figure: Cumulative Emissions for the Current Design and AB+C Interventions



We can sequester locally!

Renfrewshire Active Travel

Proposal for Renfrew Road to White Cart / The AMIDS South project



Renfrewshire Active Travel

AB+C enhanced / Proposal for Renfrew Road to White Cart / The AMIDS South project

Visualisations created to depict the potential landscape transformation resulting from carbon sequestration planting and the integration of active travel infrastructure, such as walking and cycling routes





Key findings

Key findings

Embodied carbon is the biggest challenge.

We need a circular construction approach.

This would mean in 2045;

- At 150 kgCO₂e/m² total embodied carbon drop to 2075 tCO₂e (Paisley Grammar School)
- Planting needed drops to 4.6 ha in 2045 (for EC only)

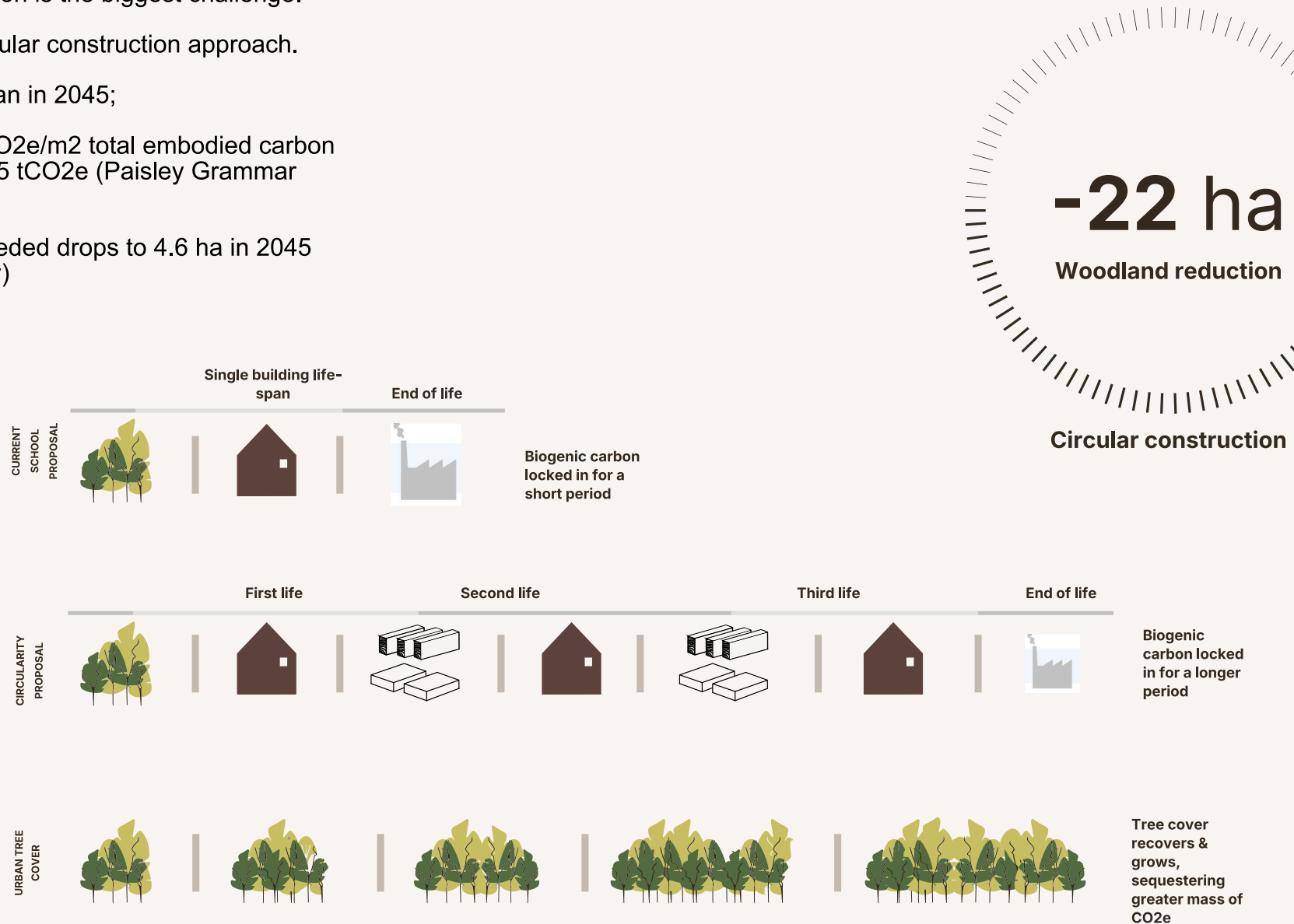
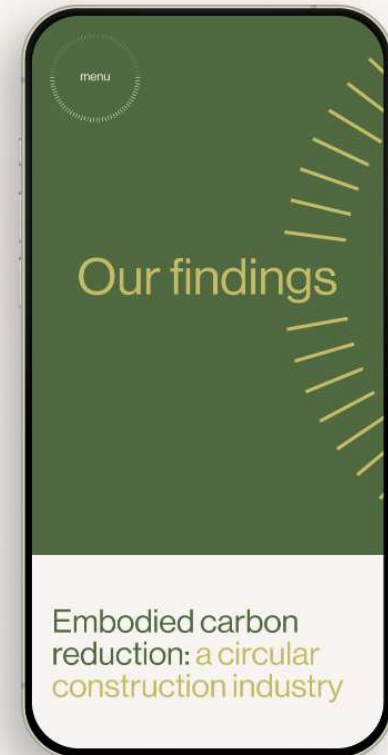
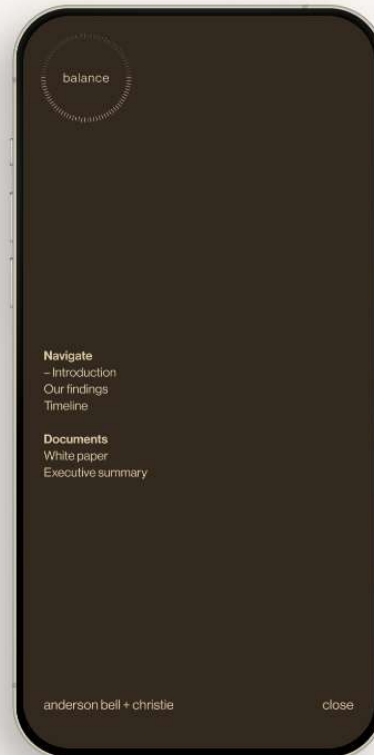


Figure: showing how circular economy strategies allow natural resources to regenerate and develop, sequestering carbon

Key findings

Presenting our white paper to Scottish government in October 2025!

<https://balance.andersonbellchristie.com/>



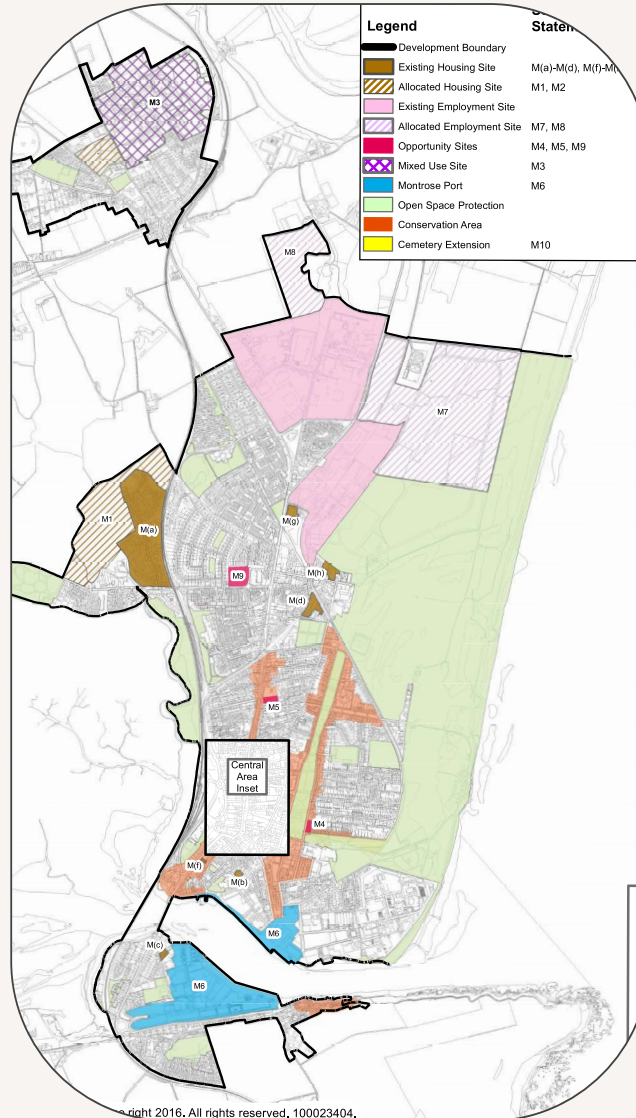
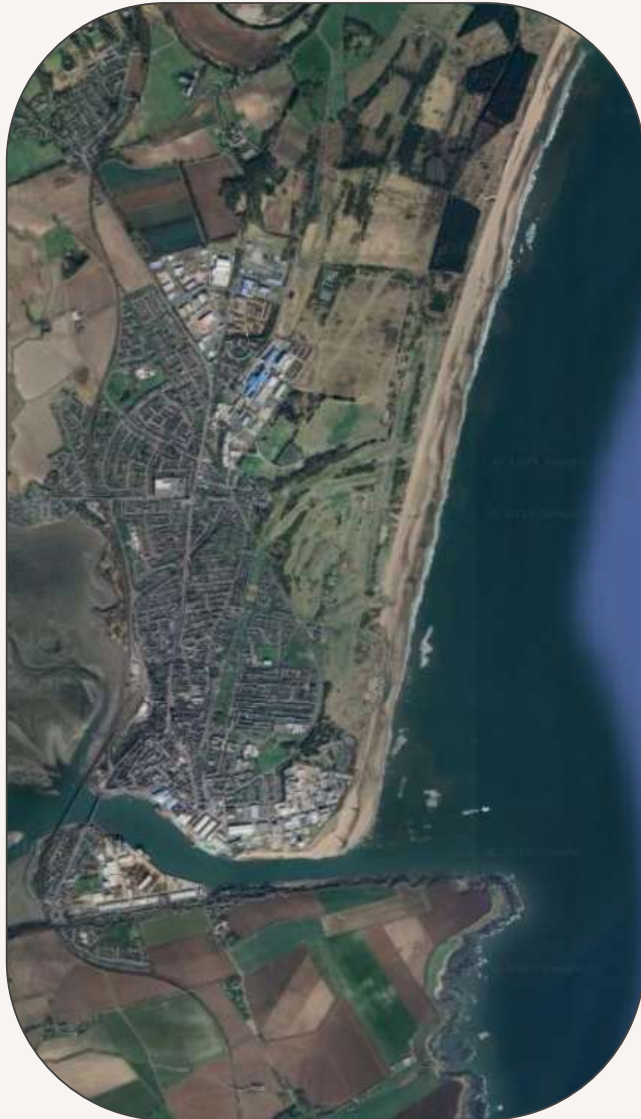
White paper and Executive Summary available to download!



Future work

Montrose Net Zero LDP 2045

- For the update RTPI Conference in September 2025





Thank you



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