Net Zero Design & SHTN 02-01 Sustainable Design and Construction (SDaC) Guide

NHS Assure Conference

NHSScotland Sustainable Design and Construction (SDaC) Guide: SHTN 02-01

- *Building a sustainable path to Net Zero*

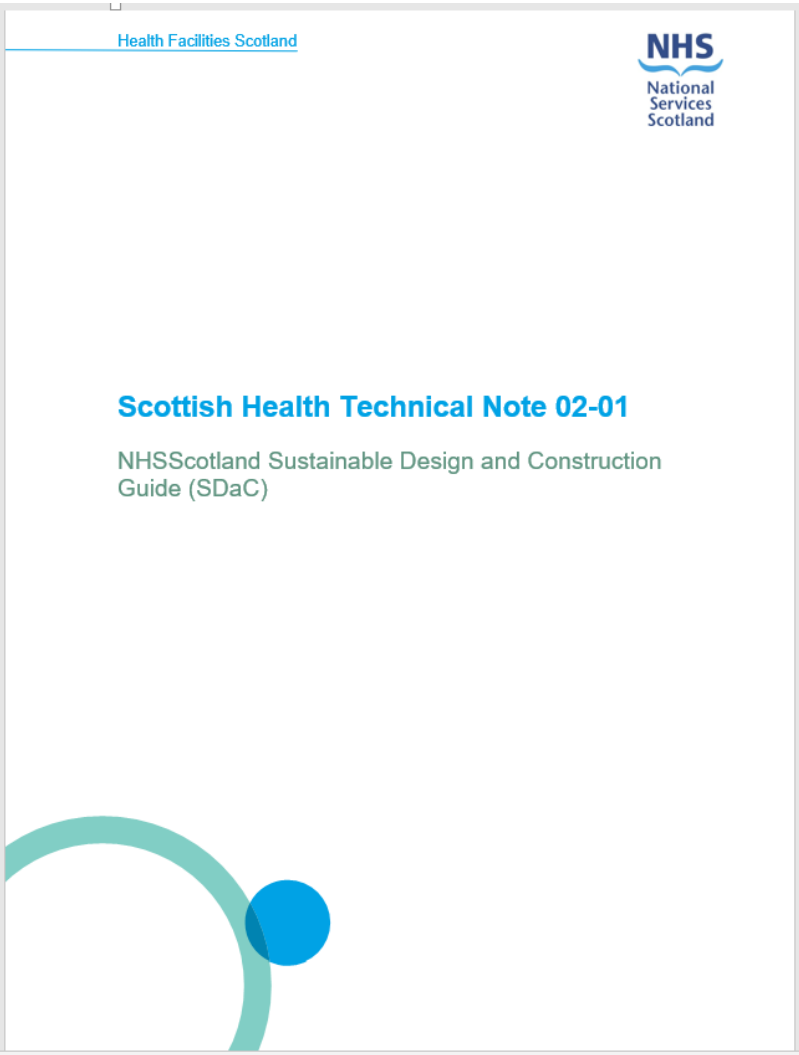
Leanne Hannah, ARMILA Sustainability Services

A Policy for NHS Scotland on the Climate Emergency and Sustainable Development - DL (2021) 38

Policy requirements:

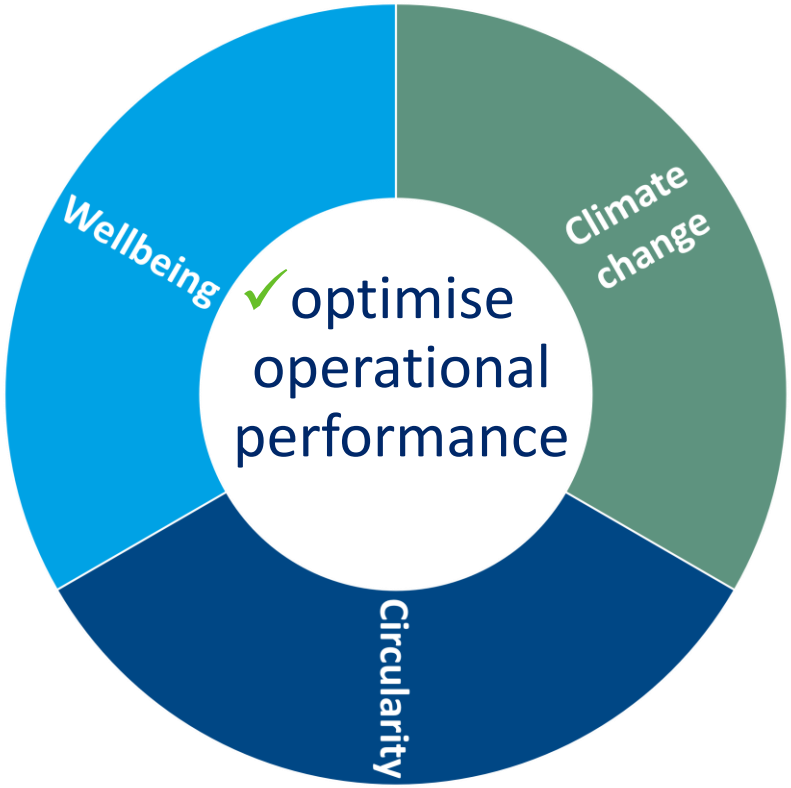
- Net-zero by 2040 or earlier where possible
- Buildings must be heated from renewable sources by 2038 or earlier
- Reduce scope 3 emissions from following sources to net-zero:
  - energy transmission and distribution, having regard to national plans to decarbonise the UK's electricity supply by 2035
  - waste disposal
  - business travel, including grey fleet
  - Water consumption
  - Waste water treatment
  - Leased assets
- Undertake annual Climate Change Risk Assessment
- Assess and enhance building resilience
- Update sustainable procurement strategy annually, prioritising net-zero transition and circular economy practices – The Sustainable Duty
- Promote Community Wealth Building initiatives
- Meet 2025 waste targets:
  - Reduce domestic waste by 15% and ensure no more than 5% to landfill
  - Reduce food waste by 33%
  - Ensure at least 70% of domestic waste is recycled or composted
- Enhance biodiversity and quality of greenspace
- Incentivise more active and sustainable travel:
  - Remove petrol and diesel vehicles 2025
  - Decarbonise fleet by 2032

NHSS Sustainable Design and Construction Guide



How we deliver sustainably

- ✓ Single process, but allows project specific standards to meet local needs
- ✓ Stakeholder engagement & co-production
- ✓ Tools for collaboration & assessment



NHSS Sustainable Design and Construction Guide

Collaborative co-production workshops

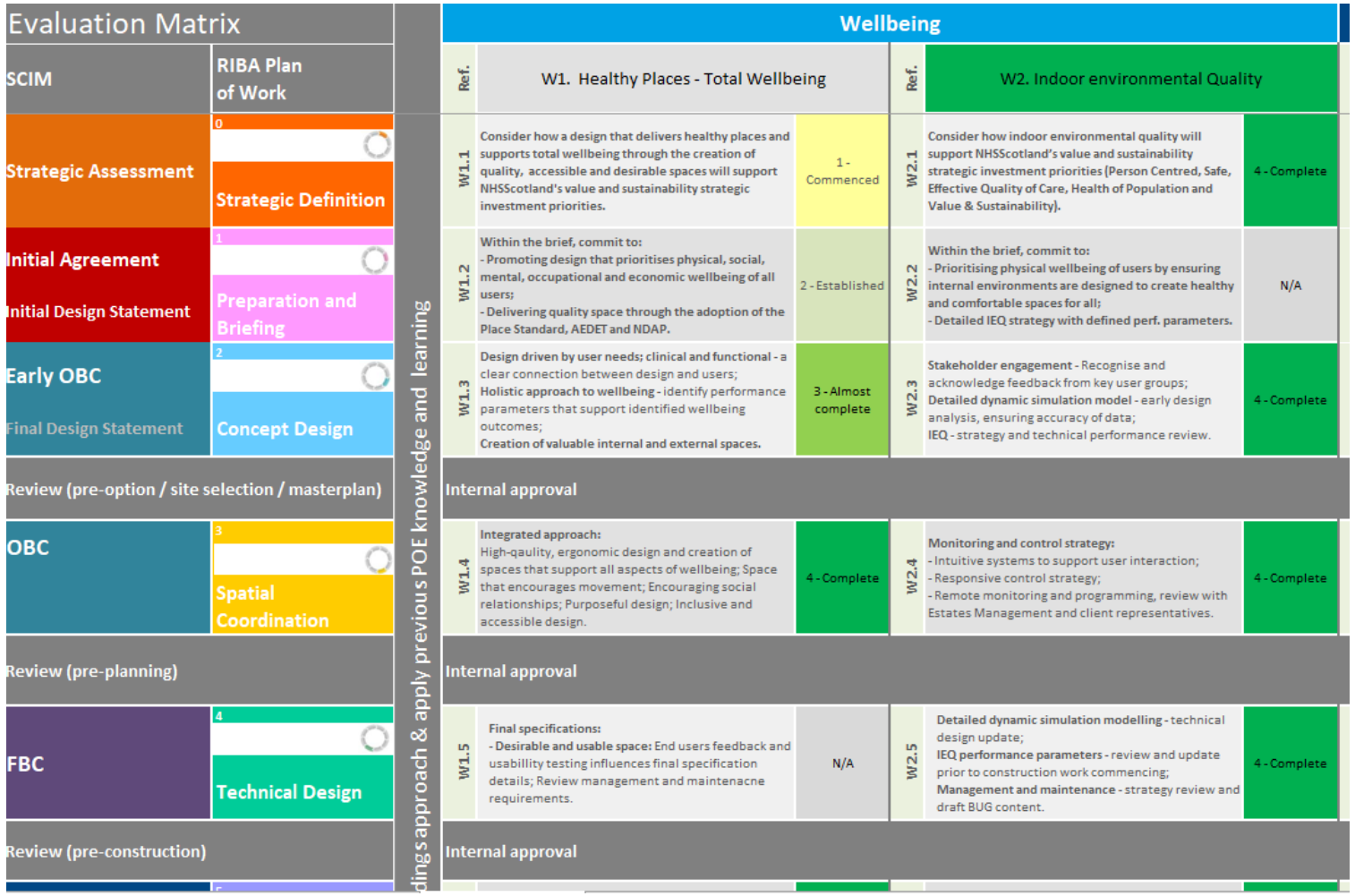
Evaluation Matrix		Adopt soft landings approach & apply previous POE knowledge and learning	Wellbeing				Circularity				Climate Change			
SCIM	RIBA Plan of Work		Ref.	W1. Healthy Places - Total Wellbeing		Ref.	W2. Indoor environmental Quality		Ref.	CE1. Circular design and construction		Ref.	CC1. Operational emissions		Ref.	CC2. Embodied carbon		Ref.	CC3. Water consumption	
Strategic Assessment	0 Strategic Definition		W1.1	Consider how a design that delivers healthy places and supports total wellbeing through the creation of quality, accessible and desirable spaces will support NHSScotland's value and sustainability strategic investment priorities.	1 - Commenced	W2.1	Consider how indoor environmental quality will support NHSScotland's value and sustainability strategic investment priorities (Person Centred, Safe, Effective Quality of Care, Health of Population and Value & Sustainability).	4 - Complete	CE1.1	Consider how circular economy principles will support NHSScotland's value and sustainability strategic investment priorities.	2 - Established	CC1.1	Consider how a building designed to achieve net zero operational GHG emissions will support NHSScotland's value and sustainability strategic investment priorities.	3 - Almost complete	CC2.1	Consider how a building that achieves significantly reduced levels of embodied carbon will support NHSScotland's value and sustainability strategic investment priorities.	4 - Complete	CC3.1	Consider how a building that integrates a water efficiency strategy can support an overall reduction in the operational carbon footprint and will support NHSScotland's value and sustainability strategic investment priorities.	4 - Complete
Initial Agreement / Initial Design Statement	1 Preparation and Briefing		W1.2	Within the brief, commit to: - Promoting design that prioritises physical, social, mental, occupational and economic wellbeing of all users; - Delivering quality space through the adoption of the Place Standard, AEDET and NDAP.	2 - Established	W2.2	Within the brief, commit to: - Prioritising physical wellbeing of users by ensuring internal environments are designed to create healthy and comfortable spaces for all; - Detailed IEQ strategy with defined perf. parameters.	NA	CE1.2	Within the brief, commit to circular design and construction processes & circular procurement hierarchy - prevent / reduce / reuse / recycle / recover Identify opportunities for intervention - refer to industry guides e.g. UKGBC circular economy guide for construction clients.	NA	CC1.2	Within the brief, commit to: Delivery of a net zero GHG emissions development; Use of existing data to inform an EUI benchmark; & Min. design performance measures (as referenced within guidance document).	NA	CC2.2	Within the brief, commit to: A lower embodied carbon development; Comprehensive embodied carbon reduction strategy;& Adoption of consistent methodology for WLC analysis.	3 - Almost complete	CC3.2	Within the brief commit to: -Adopting the water efficiency hierarchy for the development; - Water efficient components; - Monitoring and leak detection; - Responsible procurement: EU water label scheme	NA
Early OBC / Final Design Statement	2 Concept Design		W1.3	Design driven by user needs; clinical and functional - a clear connection between design and users; Holistic approach to wellbeing - identify performance parameters that support identified wellbeing outcomes; Creation of valuable internal and external	3 - Almost complete	W2.3	Stakeholder engagement - Recognise and acknowledge feedback from key user groups; Detailed dynamic simulation model - early design analysis, ensuring accuracy of data; IEQ - strategy and technical performance review.	4 - Complete	CE1.3	Inform project strategy with suitable metrics: - Design out waste and pollution / Responsible design, procurement and construction practices / Design for assembly, disassembly and recoverability. - Identify intervention points & analyse design.	4 - Complete	CC1.3	Initial and detailed passive design analysis; Consider healthcare operational process and the accuracy and availability of operational templates; Early detailed simulation modelling and results review workshop; Review optimsation and renewables	NA	CC2.3	Options appraisal- refurb. or new build / site selection. Establish baseline reporting figure to guide design; Detailed carbon reduction strategy; Ensure accuracy and robustness of data; Iterative WLC assessment - options	4 - Complete	CC3.3	Options appraisal for reducing consumption for building and landscaping: - Feasibility study for rainwater harvesting system; - Avoid the need for dedicated irrigation that requires mains supply. - Effective strategy for waste water pollution	1 - Commenced
Review (pre-option / site selection / masterplan)			Internal approval																		
OBC	3 Spatial Coordination		W1.4	Integrated approach: High-quality, ergonomic design and creation of spaces that support all aspects of wellbeing; Space that encourages movement; Encouraging social relationships; Purposeful design; Inclusive and accessible design.	4 - Complete	W2.4	Monitoring and control strategy: - Intuitive systems to support user interaction; - Responsive control strategy; - Remote monitoring and programming, review with Estates Management and client representatives.	4 - Complete	CE1.4	Supply chain engagement and viability testing: Review of circular product innovations; Review existing and new procurement routes (services as opposed to products). On-going reviews: Monitor design developments, conduct regular reviews, evaluate the overall impact.	4 - Complete	CC1.4	Performance review workshop: - Detailed Simulation Model walkthrough: Consider operational assumptions, internal environmental conditions, performance outcomes & EUI; - Detailed review of metering, programme & control; - CTH and Estates / FM strategy review.	4 - Complete	CC2.4	Carbon budgets, reportinig and updates - Iterative process. Life Cycle Assessment and Life Cycle Cost integration to inform options appraisal. Continue to review and update during design development stages.	4 - Complete	CC3.4	Detailed review of water sub-metering provision, location, specification and operation. Full integration with BMS platform for ease of monitoring and reporting.	4 - Complete
Review (pre-planning)			Internal approval																		
FBC	4 Technical Design		W1.5	Final specifications: - Desirable and usable space: End users feedback and usability testing influences final specification details; Review management and maintenacne requirements.	NA	W2.5	Detailed dynamic simulation modelling - technical design update; IEQ performance parameters - review and update prior to construction work commencing; Management and maintenance - strategy review and draft BUG content.	4 - Complete	CE1.5	Update results of LCA, LCC and carbon budget: Communicate information with full project team and supply chains before moving to construction stage. Encourage circular supply chains: Inform procurement and tender documentation.	NA	CC1.5	Change control - Approve any changes before construction and agree change control strategy; Quality assurance - Plan for inspection during construction stage (who, how and when?) Soft Landings review - Technical design 'reality checking'.	4 - Complete	CC2.5	Supply chain engagement - viability assessment; Inform tender / procurement documentation. Update carbon budgets at technical design stage and obtain LCA verification (final technical design).	4 - Complete	CC3.5	Specification of leak detection system: - Automated alert, programmable system; - Integration with BMS (for remote monitoring, programming and alerts).	1 - Commenced
Review (pre-construction)			Internal approval																		
Construction & Commissioning	5 Manufacturing and Construction		W1.6	Provision and purpose of design features and accessible and inclusive spaces to be included and communicated within building user guides.	4 - Complete	W2.6	Quality assurance and pre-completion testing to be completed prior to handover / occupation: - Acoustic pre-completion inspection and testing; - Internal environment - air quality results etc.	4 - Complete	CE1.6	Responsible construction practices: - Responsible procurement and resource management strategies; Agreed metrics and reporting schedule. Change control: - Management of issues, client approval required.	4 - Complete	CC1.6	Quality monitoring: -Quality assurance inspections & client reporting; -Programme of physical testing: Fabric integrity / air-quality. Building user guides - review and sign-off	NA	CC2.6	Carbon management and mitigation strategy implemented and impacts monitored and reported during construction; Quality assurance - Scheduled reviews and regular monthly reporting.	4 - Complete	CC3.6	Quality assurance: - Change control procedure in place requiring client sign-off.	4 - Complete
Project Monitoring & Evaluation	6 Handover		W1.7	Aftercare strategy - part of soft landings approach: - Showcasing of total wellbeing features communicated to end users during handover and aftercare sessions.	NA	W2.7	Aftercare strategy - part of soft landings approach: - Communication and promotion of internal environment quality aspects and associated benefits to end users during handover and aftercare sessions. - Seasonal commissioning inspections.	4 - Complete	CE1.7	Lessons learned and measuring success: - Workshop to review benefits of applying circular economies to project; - Lessons and learning captured in report.	4 - Complete	CC1.7	CTH strategy in action - review aftercare programme; EPC - Net Zero Carbon 'as-built'; Client in receipt of multi-disciplinary model - BIM, Detailed Simulation Modelling, (to support asset management, maintenance, in-use, adaptation).	4 - Complete	CC2.7	'As-built' review and final WLC assessment report; Carbon budget comparator exercise; Review and document lessons learned.	4 - Complete	CC3.7	Programming of leak detection systems - client / end user engagement as part of soft landings training and aftercare programme.	3 - Almost complete
Review (pre-occupation)			Internal approval																		
Project Monitoring & Evaluation	7 Use		W1.8	Extended POE monitoring - Functional performance analysis: occupant consultation, use of space, qualitative data, positive user interactions. Data disclosure - Capture and share lessons.	4 - Complete	W2.8	Extended POE - Functional performance analysis - qualitative and quantitative data; occupant consultation, internal environment monitoring; link with KSAR process. Data disclosure - Capture and share lessons.	4 - Complete	CE1.8	Extended POE - Review of circular business models in operation, updated LCC and WLC operational models Data disclosure- knowledge share, support supply chain development	4 - Complete	CC1.8	FM contracts - performance based energy consumption and prioritising comfort & wellbeing; Extended POE - commence 3 year programme; Data disclosure - capture and share lessons.	4 - Complete	CC2.8	Extended POE - WLC impacts monitored and reported during operation and at end of life; Data Disclosure - capture and share lessons.	4 - Complete	CC3.8	Extended POE - consumption monitoring, maintenance and management; Data Disclosure - capture and share lessons.	4 - Complete
Review (in-use)			Internal approval																		

Key:
1 - Commenced
2 - Established
3 - Almost complete
4 - Complete
N/A

www.nss.nhs.scot/publications/sustain

NHSS Sustainable Design and Construction Guide

Collaborative co-production workshops



Evaluation Matrix			Wellbeing					
SCIM	RIBA Plan of Work		Ref.	W1. Healthy Places - Total Wellbeing		Ref.	W2. Indoor environmental Quality	
Strategic Assessment	0 Strategic Definition		W1.1	Consider how a design that delivers healthy places and supports total wellbeing through the creation of quality, accessible and desirable spaces will support NHSScotland's value and sustainability strategic investment priorities.	1 - Commenced	W2.1	Consider how indoor environmental quality will support NHSScotland's value and sustainability strategic investment priorities (Person Centred, Safe, Effective Quality of Care, Health of Population and Value & Sustainability).	4 - Complete
Initial Agreement / Initial Design Statement	1 Preparation and Briefing		W1.2	Within the brief, commit to: - Promoting design that prioritises physical, social, mental, occupational and economic wellbeing of all users; - Delivering quality space through the adoption of the Place Standard, AEDET and NDAP.	2 - Established	W2.2	Within the brief, commit to: - Prioritising physical wellbeing of users by ensuring internal environments are designed to create healthy and comfortable spaces for all; - Detailed IEQ strategy with defined perf. parameters.	N/A
Early OBC / Final Design Statement	2 Concept Design		W1.3	Design driven by user needs; clinical and functional - a clear connection between design and users; Holistic approach to wellbeing - identify performance parameters that support identified wellbeing outcomes; Creation of valuable internal and external spaces.	3 - Almost complete	W2.3	Stakeholder engagement - Recognise and acknowledge feedback from key user groups; Detailed dynamic simulation model - early design analysis, ensuring accuracy of data; IEQ - strategy and technical performance review.	4 - Complete
Review (pre-option / site selection / masterplan)			Internal approval					
OBC	3 Spatial Coordination		W1.4	Integrated approach: High-qaulity, ergonomic design and creation of spaces that support all aspects of wellbeing; Space that encourages movement; Encouraging social relationships; Purposeful design; Inclusive and accessible design.	4 - Complete	W2.4	Monitoring and control strategy: - Intuitive systems to support user interaction; - Responsive control strategy; - Remote monitoring and programming, review with Estates Management and client representatives.	4 - Complete
Review (pre-planning)			Internal approval					
FBC	4 Technical Design		W1.5	Final specifications: - Desirable and usable space: End users feedback and usabillity testing influences final specification details; Review management and maintenacne requirements.	N/A	W2.5	Detailed dynamic simulation modelling - technical design update; IEQ performance parameters - review and update prior to construction work commencing; Management and maintenance - strategy review and draft BUG content.	4 - Complete
Review (pre-construction)			Internal approval					

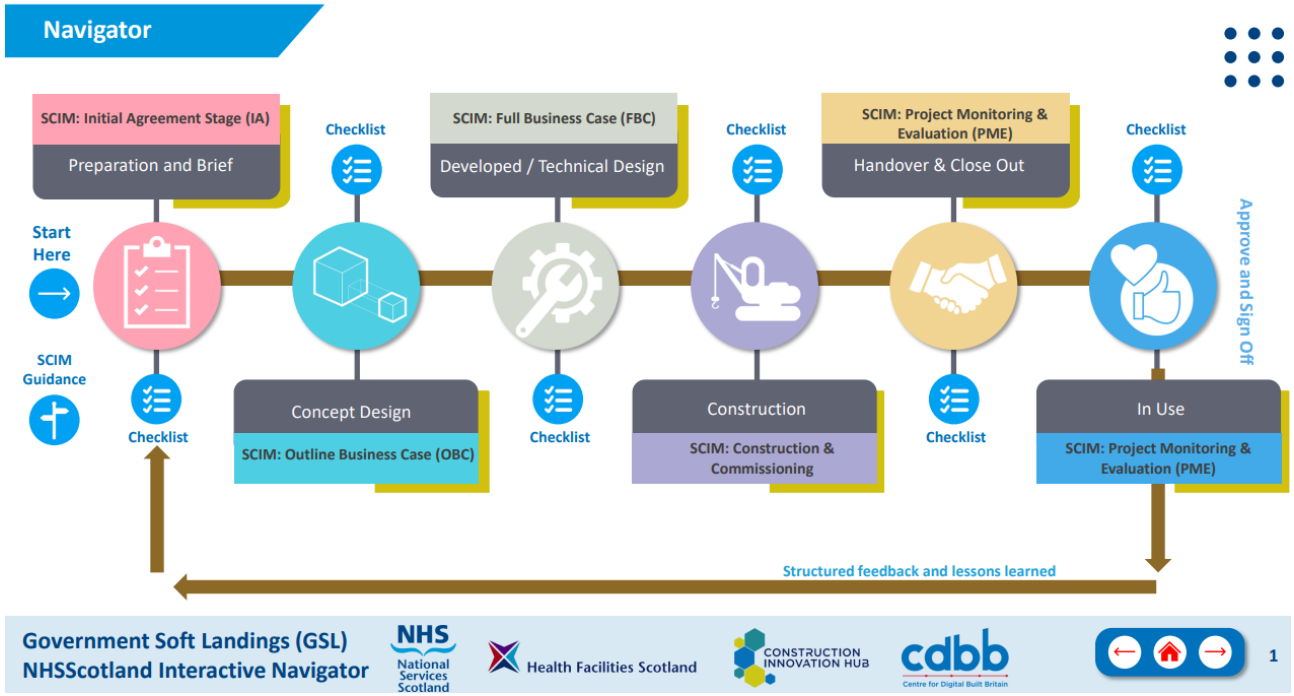
dings approach & apply previous POE knowledge and learning

- Consider how your project can support strategic aim
- Make a commitment
- Inform the brief / design
- Review and approval
- Process of optimisation
- Review and approval
- Detailed design evaluation
- Review and approval

NHSS Sustainable Design and Construction Guide

Overarching theme: Optimisation

- Soft Landings Principles
  - ✓ End user needs
  - ✓ Narrow ‘performance gap’
  - ✓ Smooth transition from construction to operation
  - ✓ POE - Verified outcomes in use



NHSS Sustainable Design and Construction Guide

Stakeholders: Roles, responsibilities, contributions

Internal

- Project Managers
  - Governance
- Sustainability and Environment Managers
  - Ownership and delivery
- Soft Landings Leads
  - Key delivery roles
- End user representation
  - User needs (clinical, estates, patients, support etc.)
- Energy and Estate Management
  - Delivery
- Asset and Facilities Managers
  - Delivery
- Capital Projects
  - Business Case
- NHS Assure
  - Governance, quality assurance

External

- A&DS
  - Delivery support
- Project team
  - Key delivery roles
- Specialist consultants
  - Specialist delivery roles

…. and others

NHSS Sustainable Design and Construction Guide

The themes and corresponding issues included in the matrix are summarised below:

Wellbeing

Issues under the wellbeing theme promote the design and operation of an estate that is considerate to and prioritises the wellbeing of users, through the creation of comfortable, inclusive and healthy places. These include:

W1: Healthy Places - Total wellbeing
Social, Physical, Mental, Occupational, Economic Wellbeing
Place-making
Quality of outdoor space

W2: Indoor environmental quality
Thermal comfort
Indoor air quality
Air pollutants
Sound levels
Light levels
Functional space
Controls

Circularity

Issues under the circularity theme focus on establishing practices that support a more circular economy by aiming to eliminate waste and extract maximum value from resources. This includes:

CE1: Circular design and construction practices
Designing out waste and pollution
Keeping products and materials in use
Regenerating natural systems
Circular procurement and supply chains

Climate change

Issues under the climate change theme seek to enable the delivery of a sustainable and resilient estate that effectively manages climate and ecological risk. These include:

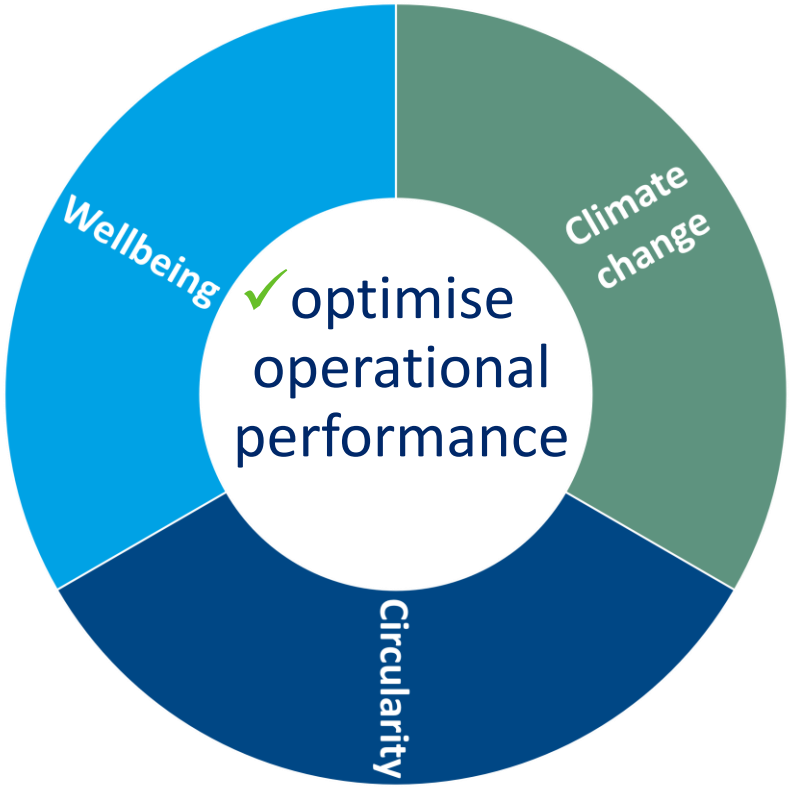
CC1: Operational emissions
CC2: Embodied carbon
CC3: Water consumption
CC4: Environmental security
CC5: Active travel and sustainable transport

Priority themes

✓Wellbeing

✓Circularity

✓Climate Change

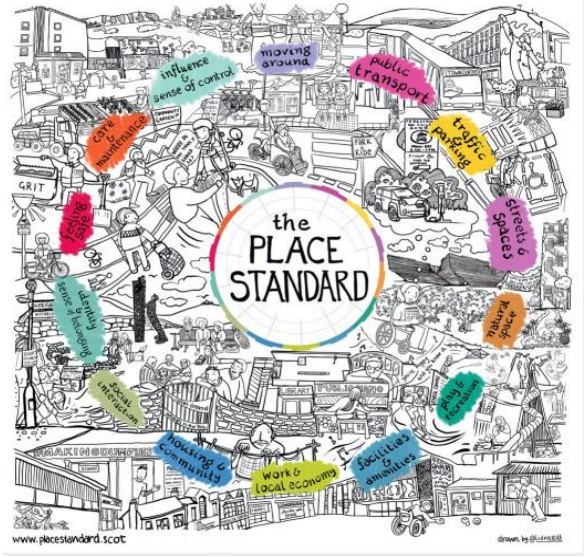


NHSS Sustainable Design and Construction Guide

Priority theme: Wellbeing

Healthy Places

- ✓ Total wellbeing
- ✓ Place-making
- ✓ Quality of and connection to outdoor space



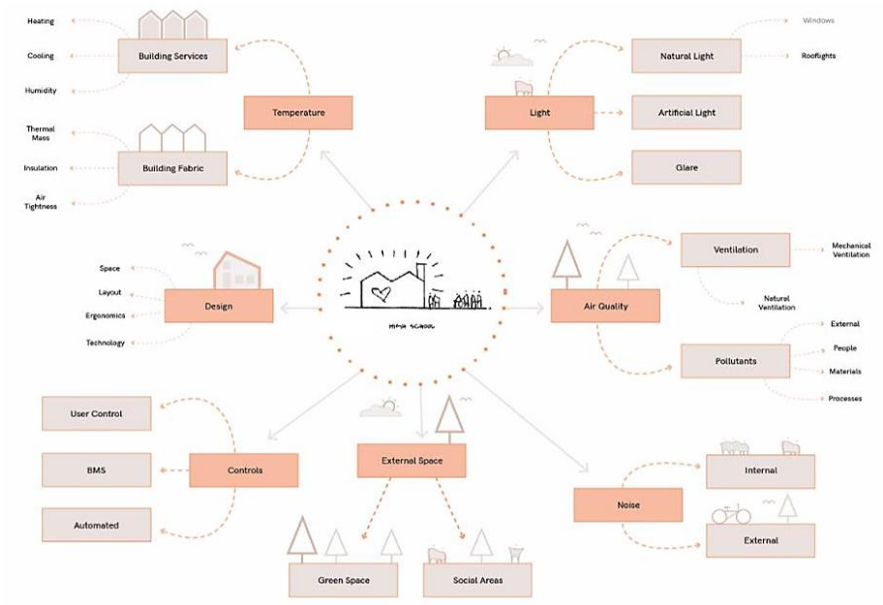
- Approach:
  - Place-based approach, delivery of healthy places
  - Consider and optimise total wellbeing
  - Use of place-making tools (AEDET and The Place Standard) in addition to NDAP
  - Apply Building With Nature principles
  - Identify design performance parameters that support agreed wellbeing and quality outcomes
  - Benefits of holistic design approach clearly communicated and demonstrated

NHSS Sustainable Design and Construction Guide

Priority theme: Wellbeing

Indoor Environmental Quality

- ✓ IEQ strategy promotes wellbeing of all users
- ✓ Intuitive control and effective response
- ✓ Mitigate and manage Pollutants



- Approach:
  - Apply Soft Landings principles, identify and understand end user needs (functional, operational, management and maintenance), capture lessons and learning
  - Identify aspects of design that closely link with physical wellbeing and inform an IEQ strategy
  - Consider IEQ impact during option appraisal / site selection
  - Establish a fully transparent monitoring, review and evaluation process

NHSS Sustainable Design and Construction Guide

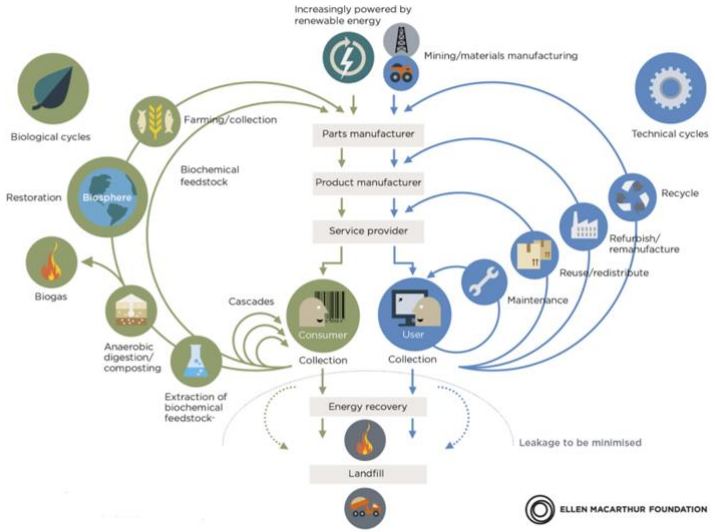
Priority theme: Circularity

Circular design and construction

- ✓ Design out waste and pollution
- ✓ Keeping products in use
- ✓ Regenerating natural systems

Circular procurement

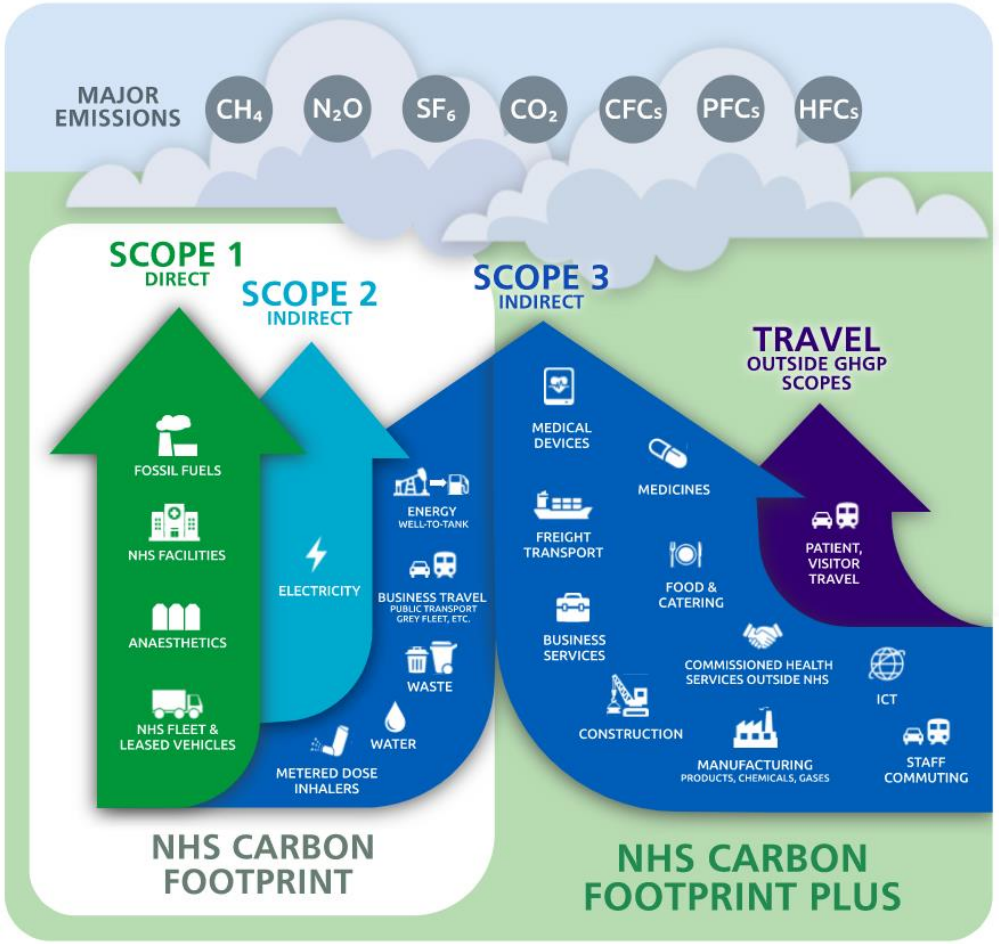
- ✓ Responsible supply chains

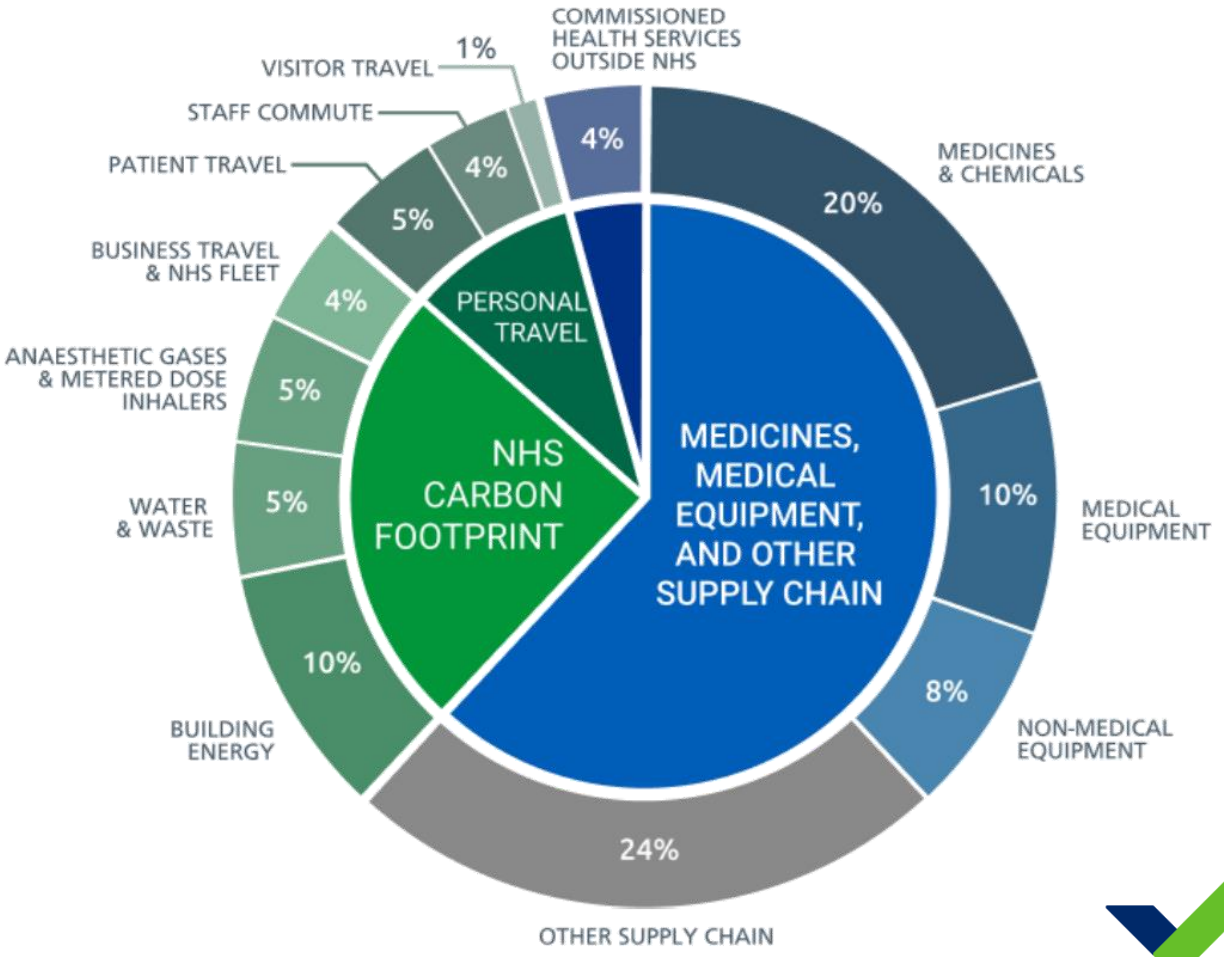


- Approach:
  - Adopt a circular procurement hierarchy approach, prioritising reuse / repurpose opportunities
  - Develop a project specific circular economy strategy, requiring circular design and construction processes
  - Design in layers, aiming to optimise durability, resilience and lifespan
  - Agree metrics and establish a monitoring, review and evaluation process (e.g. considering volume of recycled content specified and future opportunity for reuse / repurpose / recycle)

NHSS Sustainable Design and Construction Guide

NHSScotland Carbon Footprint





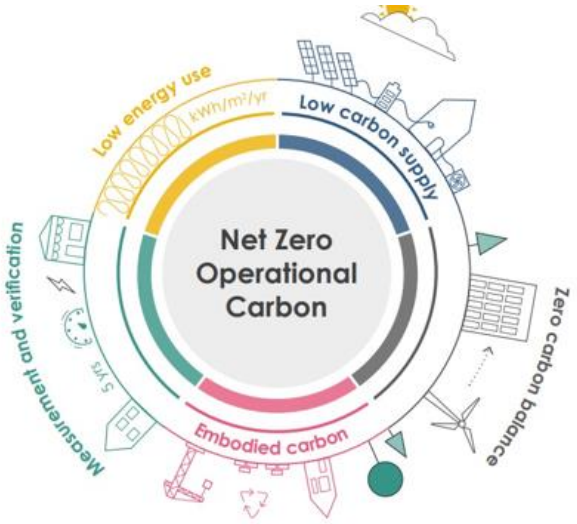
Source: Delivering a net zero NHS

NHSS Sustainable Design and Construction Guide

Priority theme: Climate Change

Operational energy and emissions

- ✓ Net Zero strategy
- ✓ Zoning and metering strategy that supports end user needs
- ✓ Performance review workshops
- ✓ Quality Construction monitoring
- ✓ Soft landings principles



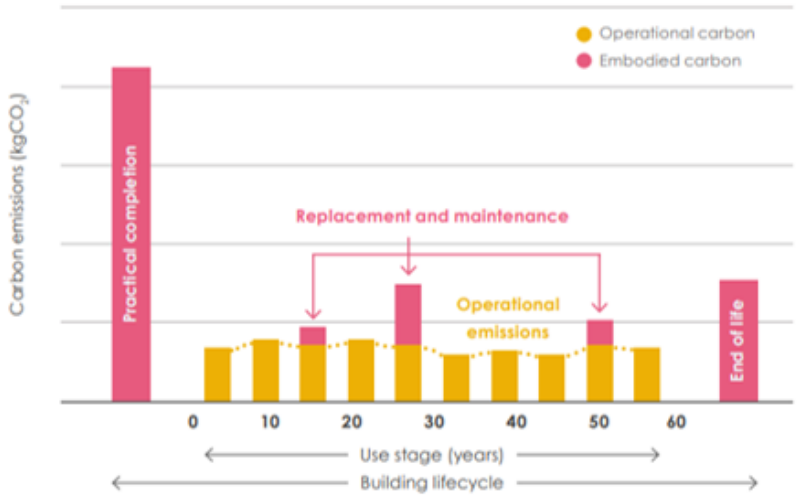
- Approach:
  - Commit to net zero outcomes that support NHSS and National policy
  - Identify an appropriate Operational Energy Target benchmark
  - Adopt a responsible energy hierarchy approach
  - Utilise detailed passive design analysis findings to inform early development
  - Develop accurate operational templates and detailed simulation models
  - Demonstrate a process of optimisation

NHSS Sustainable Design and Construction Guide

Priority theme: Climate Change

Embodied Carbon

- ✓ Whole life carbon approach
- ✓ Embodied carbon to practical completion target
- ✓ Integrated Life Cycle Assessment and Life Cycle Costing analysis
- ✓ Whole life carbon objectives
  - ✓ Water consumption



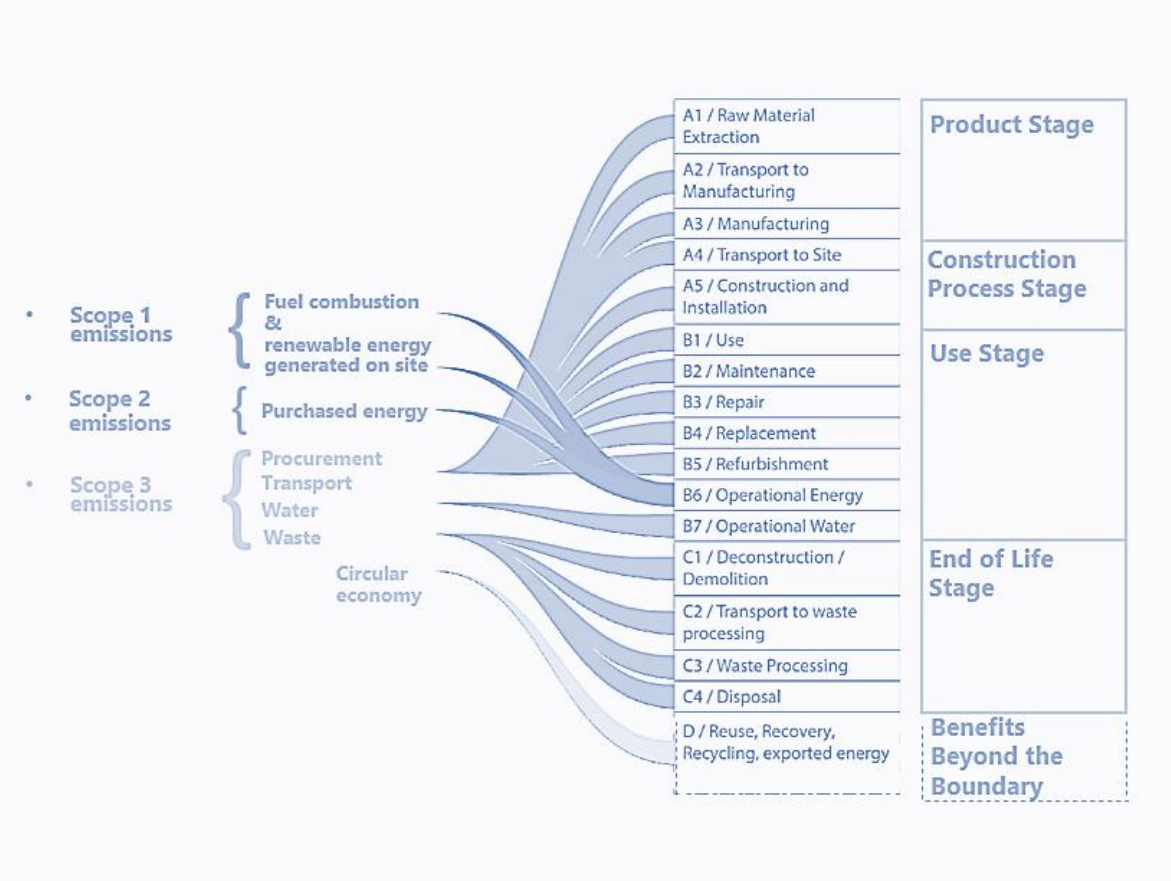
- Approach:
  - Whole life carbon strategy
  - Resource hierarchy approach
  - Embodied carbon target
  - Whole life objectives
    - Water hierarchy – monitoring, discharge and pollution, leak detection
    - Use Stage emissions – eliminate harmful emissions from insulants, paints, refrigerants etc.
  - Life Cycle Assessment baseline
  - LCA and LCC integration, inform options appraisal

NHSS Sustainable Design and Construction Guide

Priority theme: Climate Change

Early stage decision making influences:

- ✓ Construction carbon footprint
- ✓ Operational carbon footprint
- ✓ End of life carbon footprint

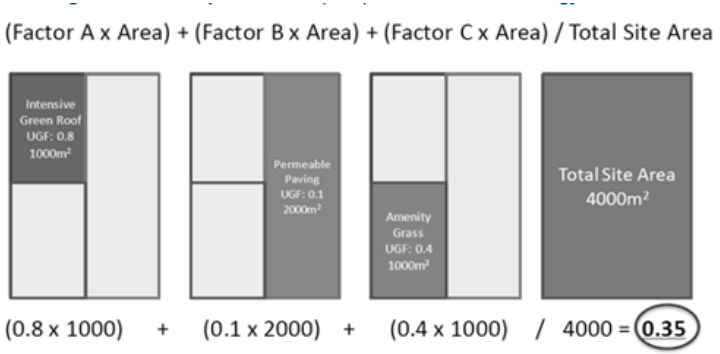


NHSS Sustainable Design and Construction Guide

Priority theme: Climate Change

Environmental Security

- ✓ Integrated, landscape-led approach
- ✓ Green Space Factor
- ✓ Pollution prevention and mitigation
- ✓ Integrating greenspace interventions
- ✓ Protecting and enhancing ecology



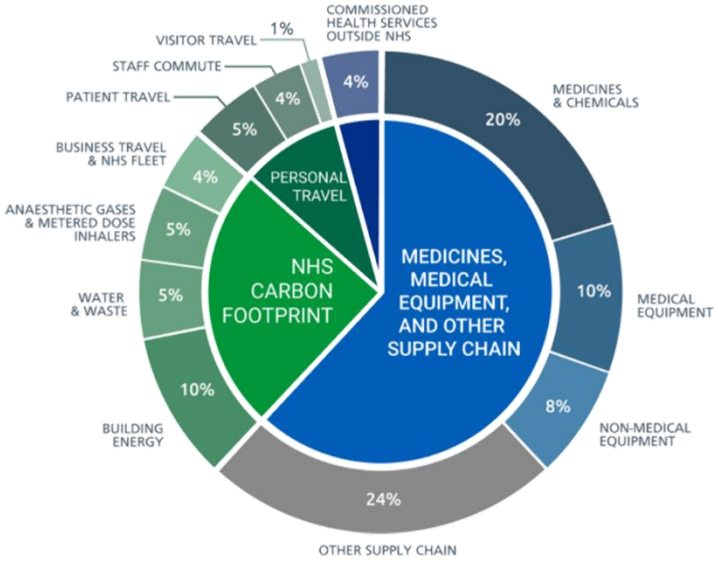
- Approach:
  - Identify environmental security and green space priorities and opportunities
  - Adopt an integrated, landscape-led approach
  - Commit to targeting Green Space Factor
  - Early appraisals to consider risk and opportunity
  - Site optimisation and enhancement strategy
  - Creation of multi-functional space that supports climate and wellbeing

NHSS Sustainable Design and Construction Guide

Priority theme: Climate Change

Active Travel and Sustainable Transport

- ✓ Accessible and sustainable travel options
- ✓ Places for everyone
- ✓ Integrated design approach



- Approach:
  - Prioritise active travel and more sustainable transport options in a safe, friendly and inclusive way
  - Adopt sustainable travel hierarchy strategy
  - Recognising the need for functionality, quality and resilience
  - Early appraisals to consider challenges and opportunities, present and future
  - Site optimisation and enhancement strategy

NHSS Sustainable Design and Construction Guide

Document download:

- Sustainable Design and Construction (SDaC) Guide (SHTN 02-01) | National Services Scotland (nhs.scot)

Thank you

leanne.hannah@armila-sustainability.com

Marie Porteous
Monklands Replacement Project
SDaC

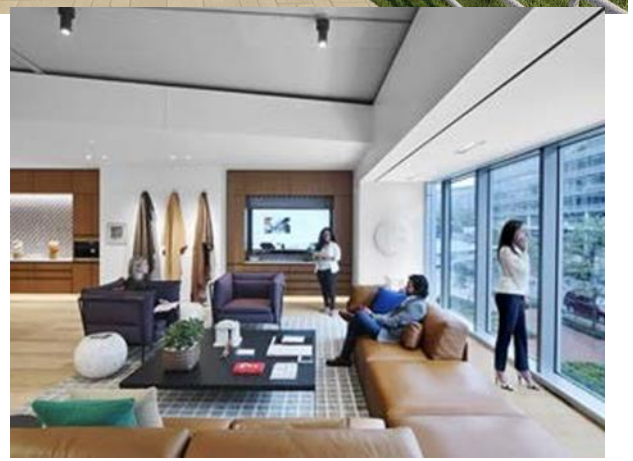
SDAaC Governance

- Soft Landings Group.
- Links to other Corporate Working Groups.
- NHS Scotland Assure NDAP team.
- MEP Design Team.

Potential target score for BREEAM 2018 assessment – 57.2% (Very Good)

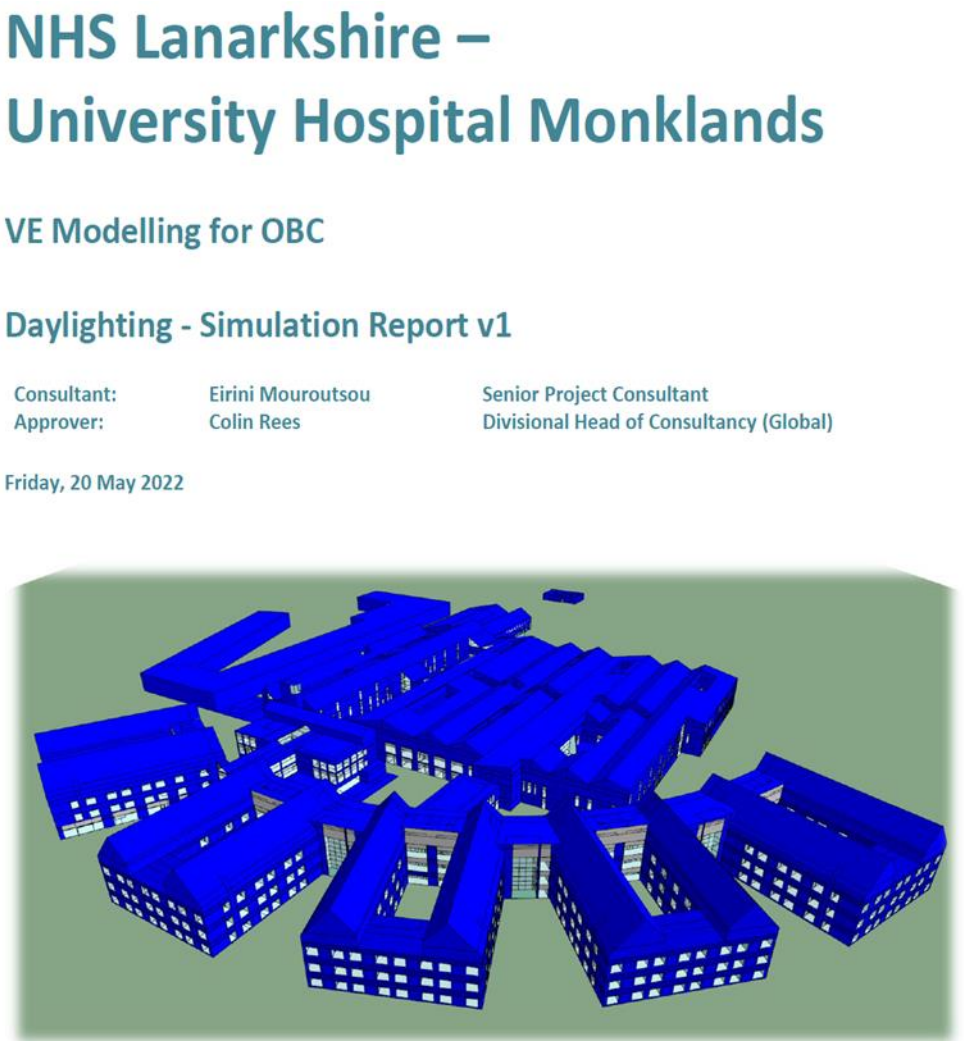
Business Objectives

- Improving person-centered services.
- Improving the safety of patient care.
- Improving clinical effectiveness and enhancing patient experience and clinical outcomes.
- Improving the quality of the physical environment.
- Providing flexible and adaptable facilities across the healthcare system.



Indoor Environmental Quality

- MEP Programme;
  - 53 Workshops over 4 months with Stakeholders across the organisation, AE's, APs, RPA & others.
  - Daylight Modelling & Solar Shading.
  - Energy Modelling.
- TM52 Model.
- TM54 Model.



Modern Methods of Construction

Embodied Carbon

Pre-Cast Concrete Lattice Planks – Including Topping

DfMA Element	PCC Lattice Slabs
Man-Hours Per Unit - DfMA	9.9 Hours
Man-Hours Per Units - Traditional	28.4 Hours
Forecast Man-Hour Saving Per Unit	18.5 Hours (65%)
Number of Units	1,443 No
Total Forecast Man-Hour Saving	26,695 Hours

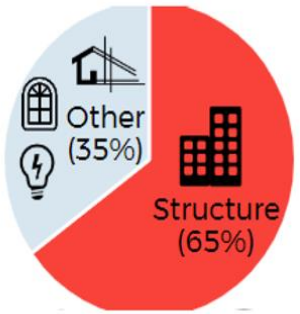
Benchmarking

Embodied Carbon Estimate $kgCO_2e/m^2$	*Alder Hey*	*Dumfries Ward*	*Dumfries Technical Block*	*The Grange*
Substructure	61	99	103	41
Superstructure	196	284	273	229
Total	257	**383**	**376**	270

Non-Domestic

<600 $kgCO_2e/m^2$ LETI 2020 (Total)

<350 $kgCO_2e/m^2$ LETI 2030 (Total)



<390 $kgCO_2e/m^2$ LETI 2020 (Structure)

<228 $kgCO_2e/m^2$ LETI 2030 (Structure)

Options & Build Ups

OPTION 10

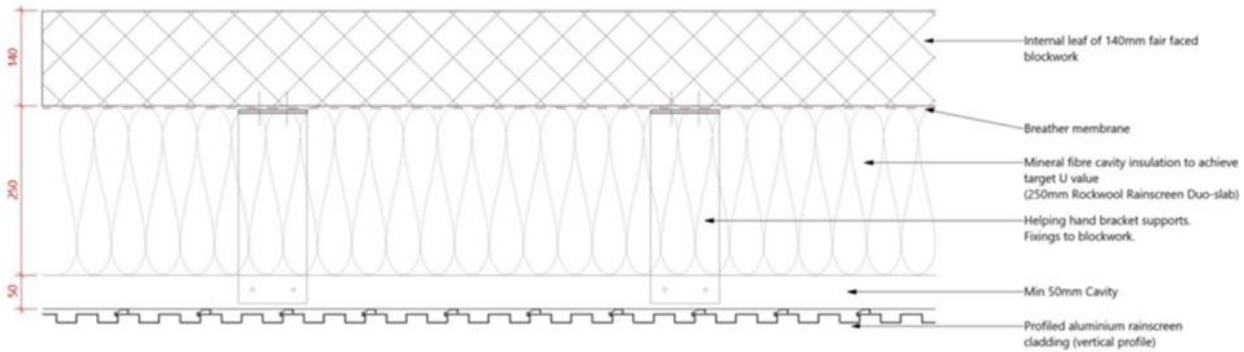
PROFILED ALUMINIUM CLADDING (RAINSCREEN) WITH BLOCKWORK INNER LEAF, ENERGY CENTRE

CO_2 **154 KgCO2e/m2** **HIGH LEVEL BUDGET COST: TBA**

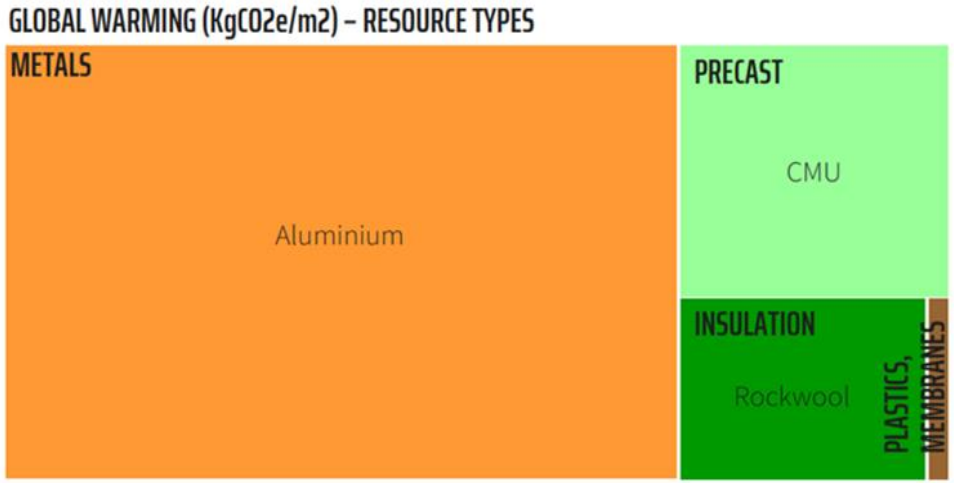
GWP calculation includes for 3mm thick cold formed aluminium sheet. Assumed that sheet will be 2mm thick but allowance made for castellated profile.

Allowance of 2.2kg/m2 aluminium has been made for sub frame (helping hand brackets, rails) but needs to be verified.

Allowance for anodisation of aluminium has been included in calculation (8.3KgCO2e/m2).

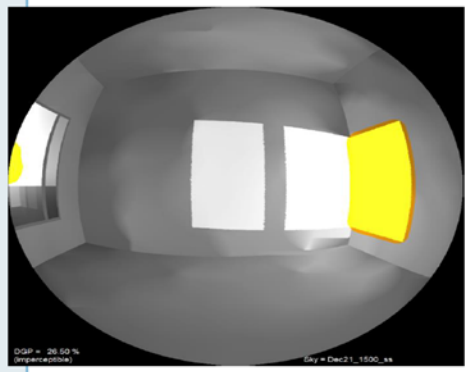


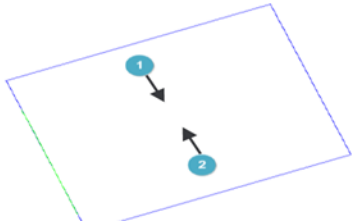
Note: Build-up will only achieve 0.16W/m2K (above target value of 0.15W/m2K) when maximum thickness of 250mm Rockwool Rainscreen Duo-slab is utilised as advised by Rockfon. Requirement for U-value to Energy Centre to be reviewed with Wallace Whittle.



Glare Analysis

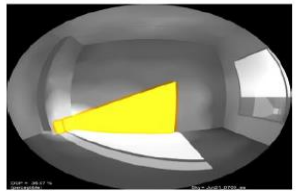
- Room Types 2 and 3, within the courtyards, very unlikely to experience glare.
- The more exposed rooms types 4 and 5, consider refining the patient bed position to help limit glare potential.
- Patient bed position 2 shows less potential of intolerable glare than bed position 1.
- Enclave C5 has a higher glare risk compared to the remainder of Block C, due to its greater exposure to direct sunlight.
- W, SE and NW elevations see higher risk for bed position 1.
- W, S, SW and SE elevations are more sensitive for bed position 2.
- W facade followed by SE experiences the greater potential for hours of glare.
- Glare risk mostly during the second half of the day, especially in room types 4 and 5.
- The majority of glare instances occur around 5pm.
- The selection of suitable positions could result in saving 2-3 hours of potential glare.



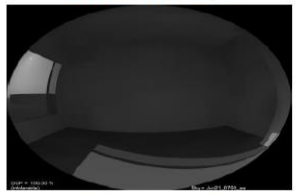


DGP – Observations

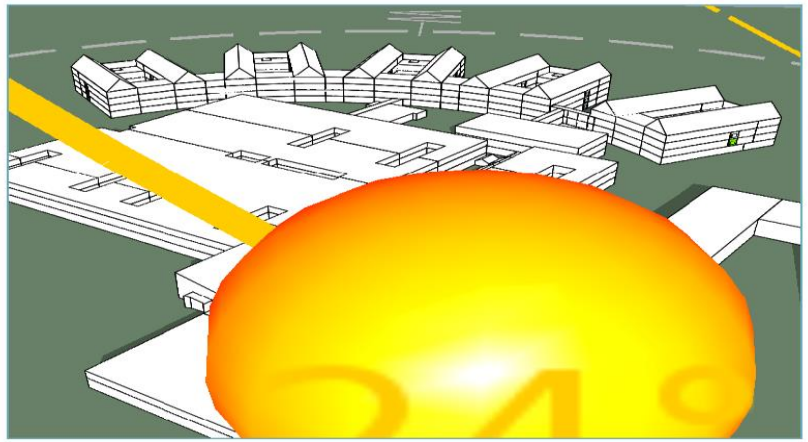
Patient position 1 experiences visual comfort compared to position 2.



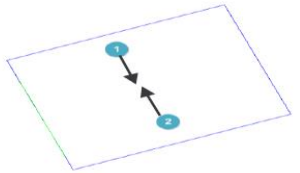
Position 1
DGP=36.07%

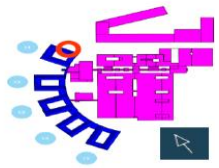


Position 2
DGP=100%



June 21st 15h

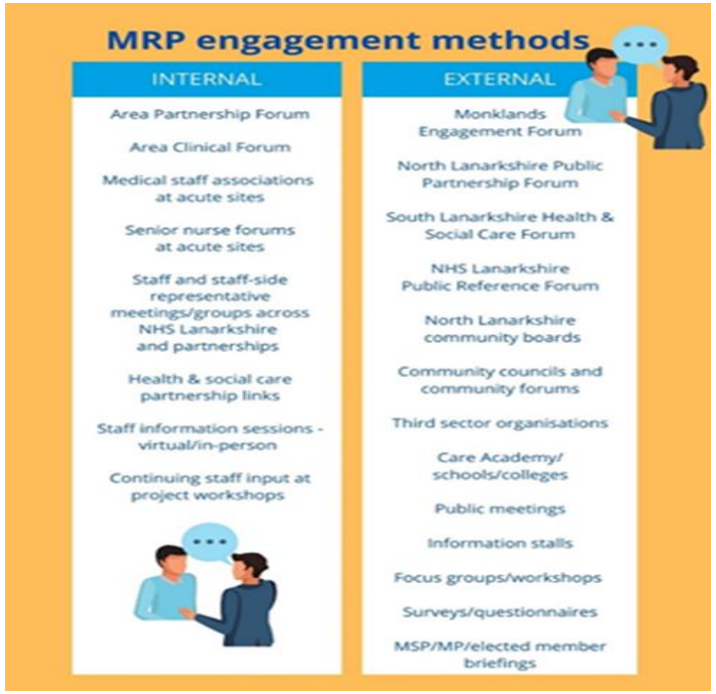




< 35%	Imperceptible
35 - 40%	Perceptible
40 - 45%	Disturbing
> 45%	Intolerable

Summary

- Stakeholder Engagement.
- Whole Team Approach;
  - MEP Programme.
  - Soft Landings.
  - NDAP.
- Review and Update.
- Repeat.



National Treatment Centre - Ayr

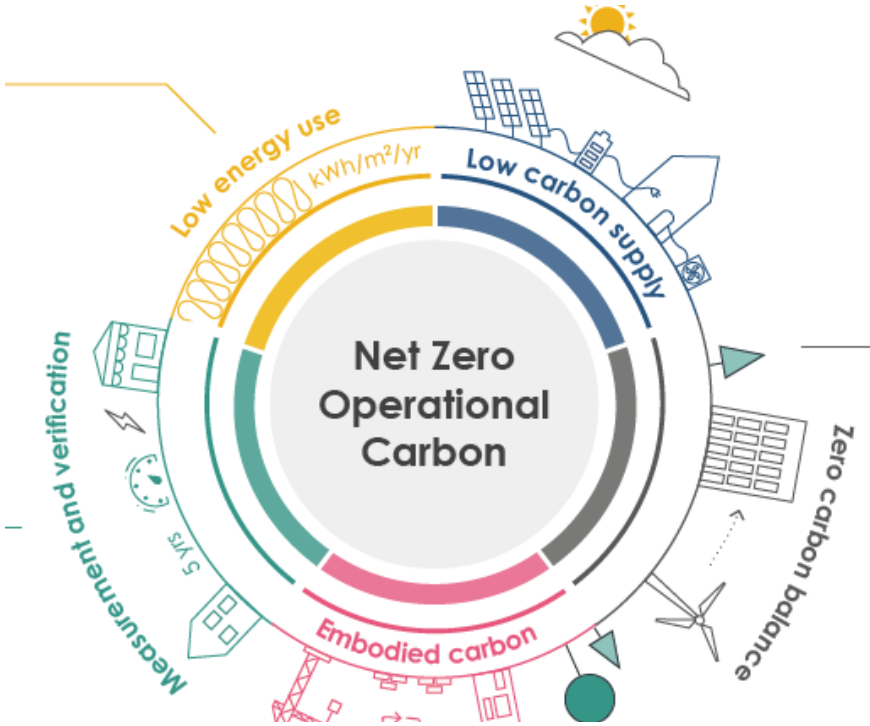
Scottish Health Technical Note 02-01

NHSScotland Sustainable Design and Construction Guide (SDaC)

Themes

- CC1 – Operational Energy
- CC2 – Embodied Carbon
- CE – Circular Design and Construction
- W2 – Indoor Environment Quality
- W1 – Total Wellbeing

CC1



6. The average annual carbon content of the heat supplied (gCO_2/kWh) should be reported.
7. On-site renewable electricity should be maximised.
8. Energy demand response and storage measures should be incorporated and the building annual peak energy demand should be reported.

Zero carbon balance

9. A carbon balance calculation (on an annual basis) should be undertaken and it should be demonstrated that the building achieves a net zero carbon balance.
10. Any energy use not met by on-site renewables should be met by an investment into additional renewable energy capacity off-site OR a minimum 15 year renewable energy power purchase agreement (PPA). A green tariff is not robust enough and does not provide 'additional' renewables.

- Net Zero – Operational Energy (NZ-OE)

UKGBC Framework Definition of NZC – Operational Energy (April 2019): When the amount of carbon emissions associated with the building's operational energy on an annual basis is zero or negative. A net zero carbon building is highly energy efficient and powered from on-site and/or off-site renewable energy sources, with any remaining carbon balance offset

The Standard extends this definition of NZ-OE to prioritise Zero Direct Greenhouse Gas Emissions from Heating (ZEH) within the NZ-OE requirement. (See ZEH definition in this Glossary of Terms.)

a notional bench

140 kWh/m2/y

180 kWh/m2

CC1

CC2

Embodied Carbon

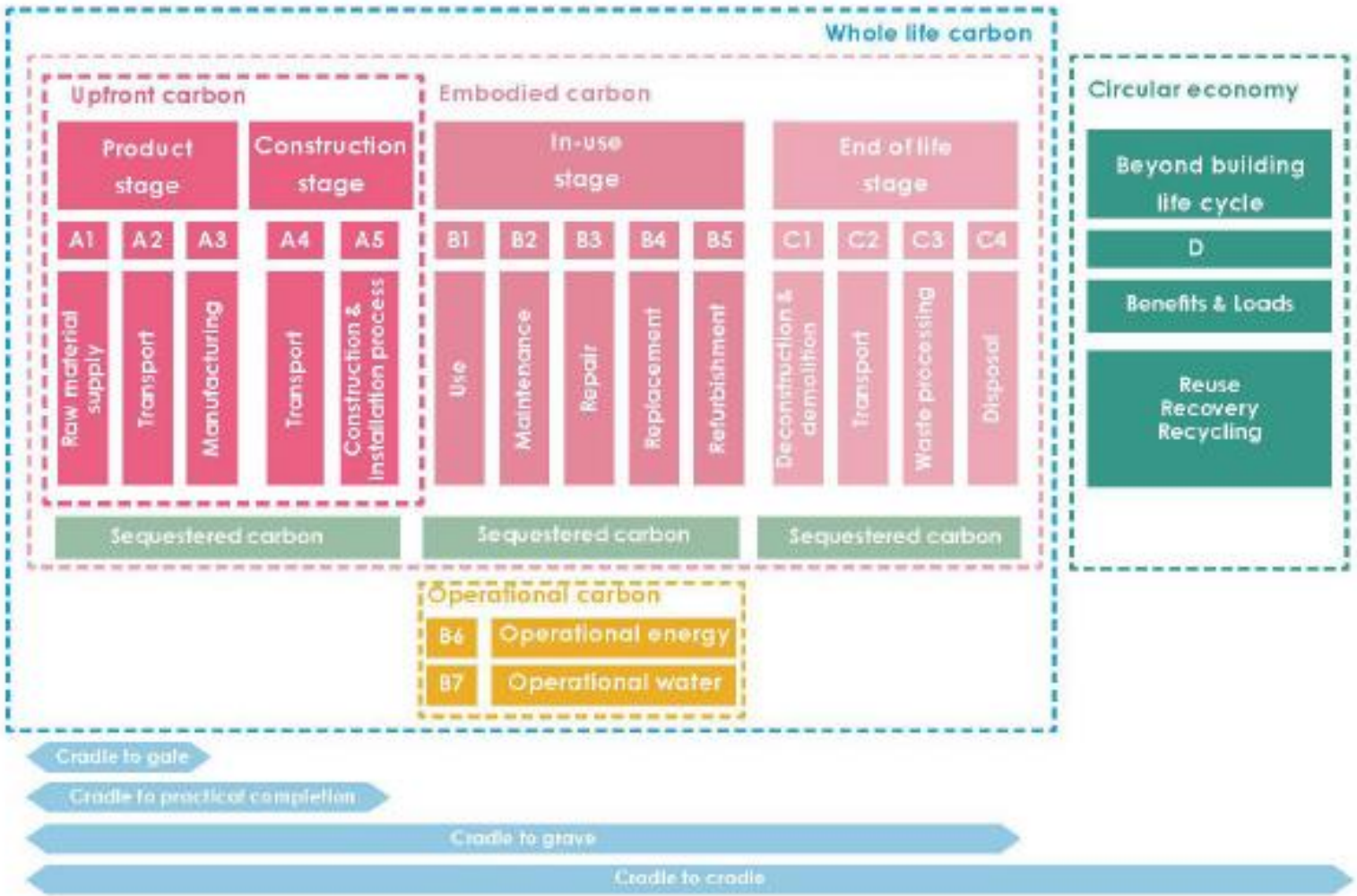
Net Zero Public Sector Building Standard Obj.2
Construction Embodied Carbon =

Product Stage (modules A1 – A3) +

Construction Process (modules A4 + A5)

CC2

Whole Life Carbon = Operational Carbon + Embodied Carbon



CC2

Embodied Carbon (A1 – A5) A1 – A3 – Materials, transport and manufacturing A4 - A5 - Transport and Construction	350kgCO2e/m2 pass to contractor
Operational Carbon (B6 & B7) Operational Emissions (B6) Operational Water (B7)	180kWh/m2/yr
Embodied Carbon (B1 – B5) Maintenance, repair and refrigerants	Reduce as much as possible / Carbon Offset
Embodied Carbon (C1 – C3) End of Life – Demolition, Transport, Waste Processing & disposal	Carbon Offset

CC2

0

=

A1 – A5
(verified upon completion)

+

lly verified)

C1 – C3 – on demolition

CC2

WLCN LETI RIBA Architecture.com

Version ‘A’ - May 2021

Whole Life Carbon - Achieving 'Net Zero Carbon'						WLCN/LETI
	Whole Life Carbon					Assess Separately
Project Stage	**Upfront Carbon (A1-A5)**	**In-Use Embodied Carbon (B1-B5)**	**In-Use Operational Carbon - Energy and Water. (B6-B7)**	**End of Life (C1-C4)**		**Module D**
Concept Design	Prediction based on generic values	Prediction based on generic values	Prediction based on generic values	Prediction based on generic values		Prediction based on generic values
Detailed Design	Prediction based on specific values	Prediction based on specific values	Prediction based on specific values	Prediction based on specific values		Prediction based on specific values
Practical Completion	Calculated on actual values	Prediction updated using as built values	Prediction updated using as built values	Prediction updated using as built values		Prediction updated using as built values
Use Stage		Calculated on actual usage	Based on actual metered consumption	Prediction updated using as built values from B3-B5		Prediction updated using as built values from B3-B5
End of life				Calculated on actual values		Prediction updated using as deconstructed values
Future Projects (A1-A3)						Calculated on actual values
Residual Offsets to achieve 'Net Zero'	At Practical Completion based on third party verified assessment	Annually in use based on third party verified assessment	Renewable energy with annual offsets for residual indirect emissions from energy and water	End of Life based on third party verified assessment		N/A
KEY:						
Net Zero Carbon in design	Designed to be 'Net Zero Carbon', but which does not have actual embodied or operational performance data to allow verification of 'Net Zero Carbon' status					
Net Zero Carbon enabled	Designed to be 'Net Zero Carbon' 'In-Use', but which does not have actual 'In-Use' or 'End of Life' performance data to allow verification of 'Net Zero Carbon' status					
Net Zero Carbon	Verified as 'Net Zero Carbon', using actual measured data and a third party verified assessment. Net Zero 'Upfront Carbon' can be claimed at Practical Completion, and 'Net Zero' 'In-Use' can be claimed annually.					

Material targets:

Timber – use from renewable sources of manufacturing – reclaimed

Concrete – 80% GGBS – addressing local opportunities

Steel – Maximise recycled content to 100% - or AEF processing if virgin material include shipping emissions from EU / abroad – powder coating

Insulation – natural materials addressing low carbon content – target less than 10kgCO2/m2 – identify recycled materials – refer to SEDA non-toxic construction materials guidance https://www.seda.uk.net/design-guides - Toxic chemical reduction & Sustainable Renovation

CE

- **Building services** – F-Gas use to be GWP less than 1 – use TM65 for products where manufacturer data LCA is unavailable
- **Plasterboard** – Compare fibre board and traditional plaster boards and alternative timber and recycled options. Options to be less than 1kGCO2/m2
- **Flooring** – Address circular materials and hard finishes. Most flooring is glued and cannot be reused or recycled so alternatives should be addressed looking at finishes and recyclability – address environmental impacts and VOC's and toxic materials for wellbeing / health impacts
- **Re-use materials** should be stored ready for the build date – Reuse products should take highest priority including any site won materials – preference give to EPD products – Health impacts to take concerns address all NON TOXIC material choices

Toxic Materials

- No formaldehyde board use chipboard resin, materials that off gas formaldehyde, no OBS, glues, furniture, insulation, floor and wall fittings, wall cabinets, MDF board, wood fibre sarking, particle board etc…
- Drastically reduce the use of PVC – PVC free wiring – addressing health, toxicity and carbon impacts – ex EcoPower / EnduroFlex etc…

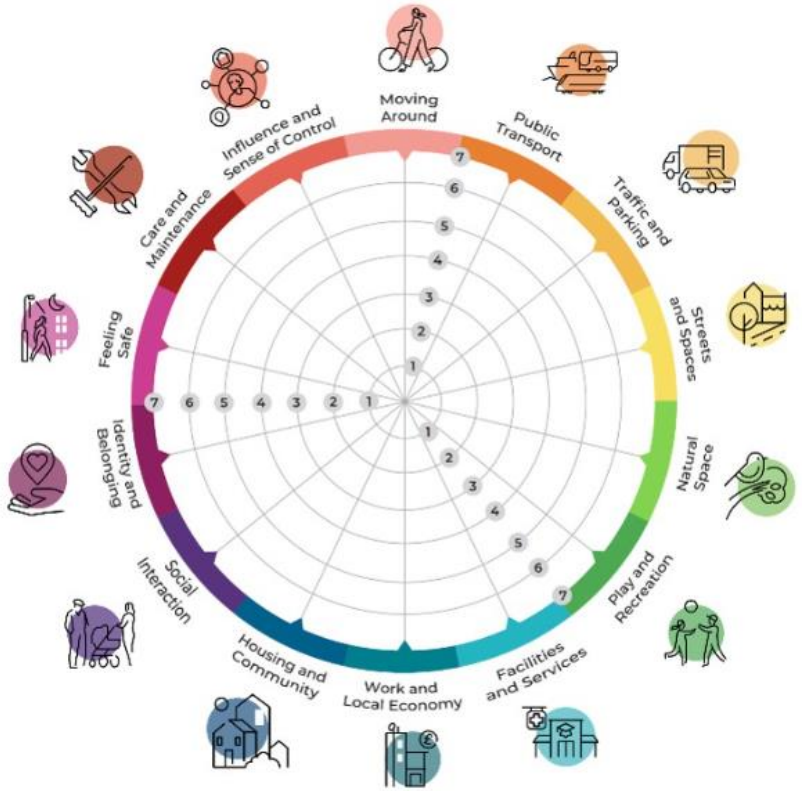
W2

W2

- Products must address recyclability & reusability including recoverability, and evidence of responsible ethical sourcing has taken place.
- Align Life Cycle Cost Analysis and Life Cycle Analysis and account for both cost and carbon impacts
- Future bill of materials plan should be written in respect and repair and replacement quantities of materials
- Plan for reuse, recover and recycle for all materials
- At construction bill of all materials should be in PDF, as excel / BIM digital data can be hard to read in 40 years time (try opening an excel 2000 file now! horrible)

W1

New! - Place Standard with a Climate Lens



What is the Place Standard?

W1

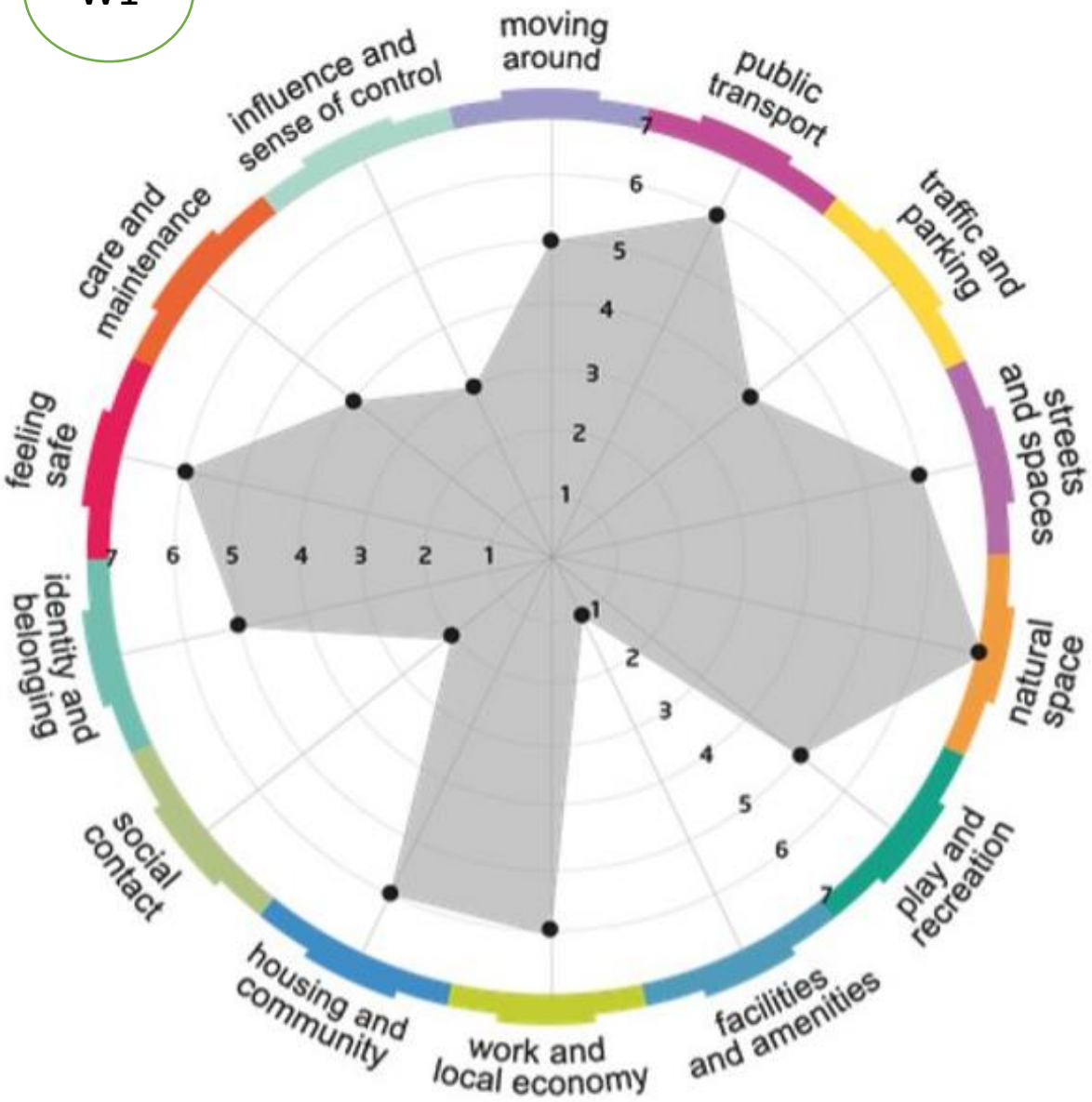
- A tool for structured conversations about a place
- Includes physical & social elements of place
- Understanding assets & areas for improvement
- Aligning developments with our goals and aspirations

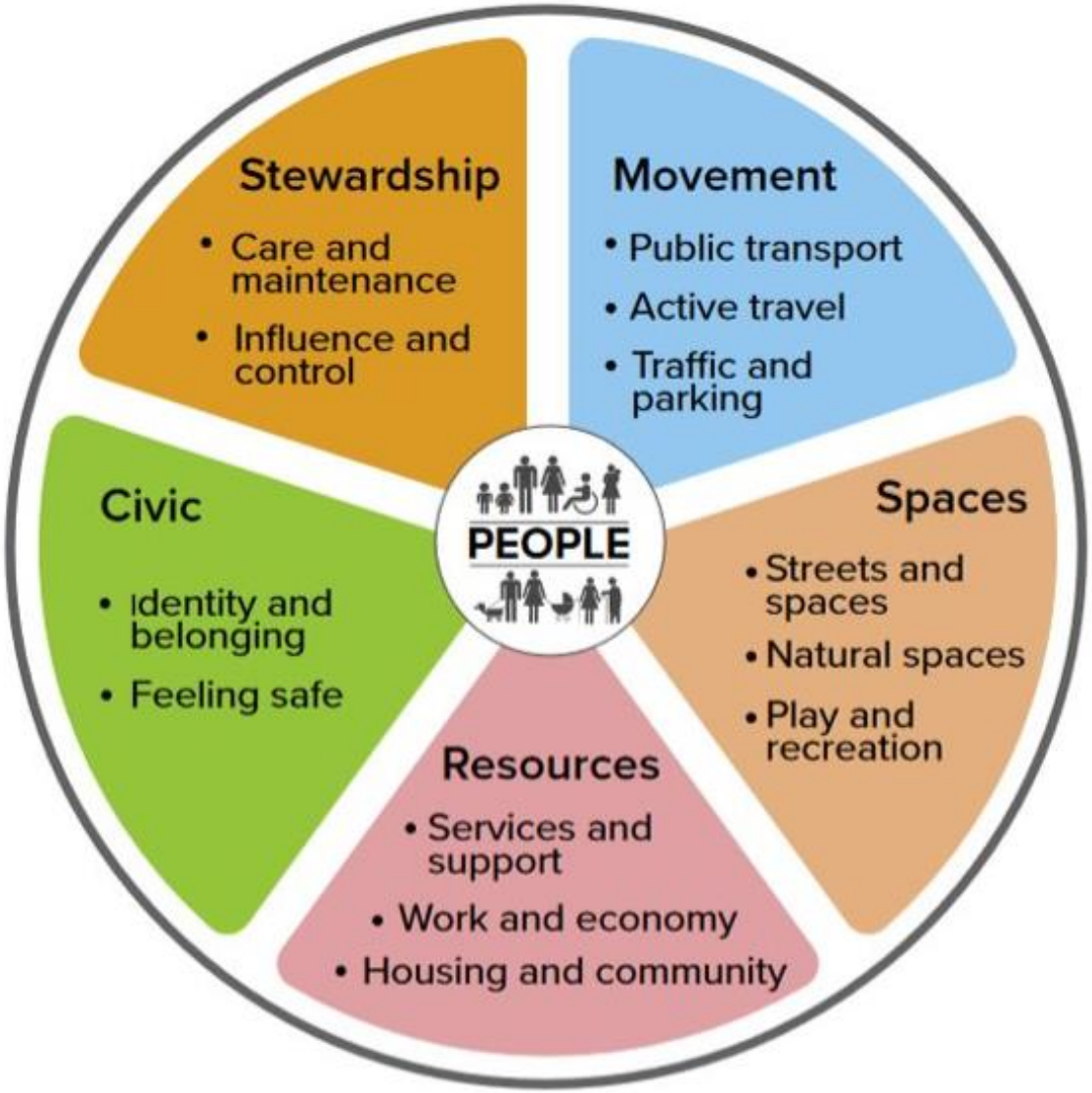
How are we using the Place Standard?

W1

- Place Standard Climate Lens
- Adaptation to healthcare facility & timescales
- Opportunity to repeat process

W1


moving around
public transport
traffic and parking
streets and spaces
natural space
play and recreation
facilities and amenities
work and local economy
housing and community
social contact
identity and belonging
feeling safe
care and maintenance
influence and sense of control
1
2
3
4
5
6
7


Stewardship
• Care and maintenance
• Influence and control
Movement
• Public transport
• Active travel
• Traffic and parking
Civic
• Identity and belonging
• Feeling safe
PEOPLE
Spaces
• Streets and spaces
• Natural spaces
• Play and recreation
Resources
• Services and support
• Work and economy
• Housing and community

Purpose : To gather views from relevant stakeholders about different dimensions of 'place' relating to the proposed NTC development, so that the development can maximise the beneficial impacts for health, local communities, and the environment

- In advance participants were provided with agenda, virtual visit slide pack of maps and pictures, including current surroundings and buildings

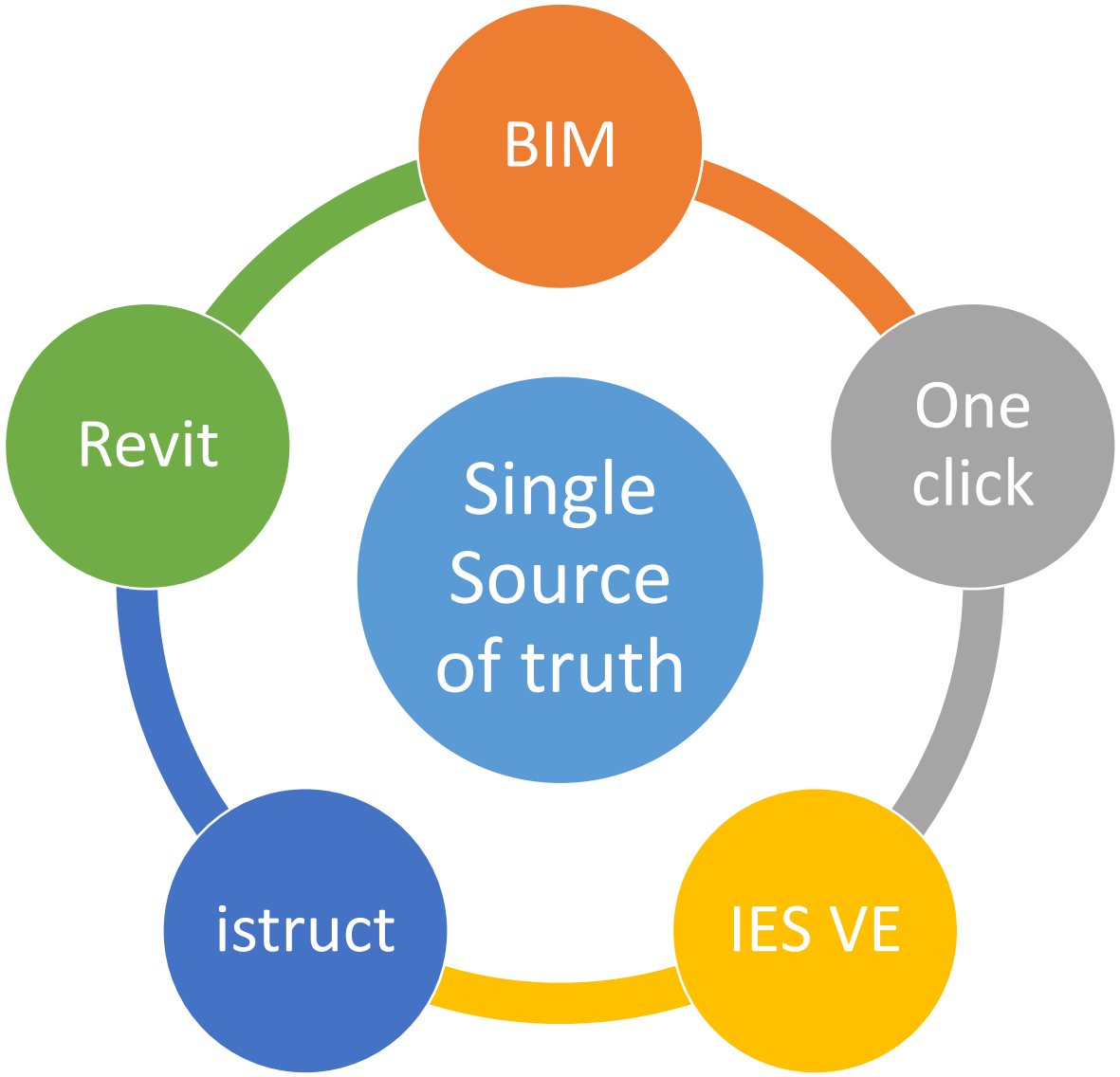
Who: Attendees were made up of NHS (estates, capital, hotel services, allied health professionals, anaesthesia, surgical services, SA HSCP, SA planning colleges, community engagement, South Ayrshire council fleet/sustainability/parks/equality/ teams ; Ayrshire Roads Alliance, NatureScot.

- Scored on how it currently stands to give us a baseline and to identify areas for targeting through the design process – this work will feed into our Design Statement

- Public workshops held end of October planned with wider user groups of the facilities and under represented groups in Ayrshire to complete initial objective 1 response – verified by a 3rd party – SFT?

- Place standard will allow us to be part of the wider master planning of this area working in closer proximity to the council, local builders, planning committee, community partners and social groups encouraging views from a wider audience which will help feed into the planning design stages and set benchmarks for this net zero build.

W1



AUTODESK® REVIT®

gbXML

DXF

Q&A