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KIRKLEES CULTURAL HEART

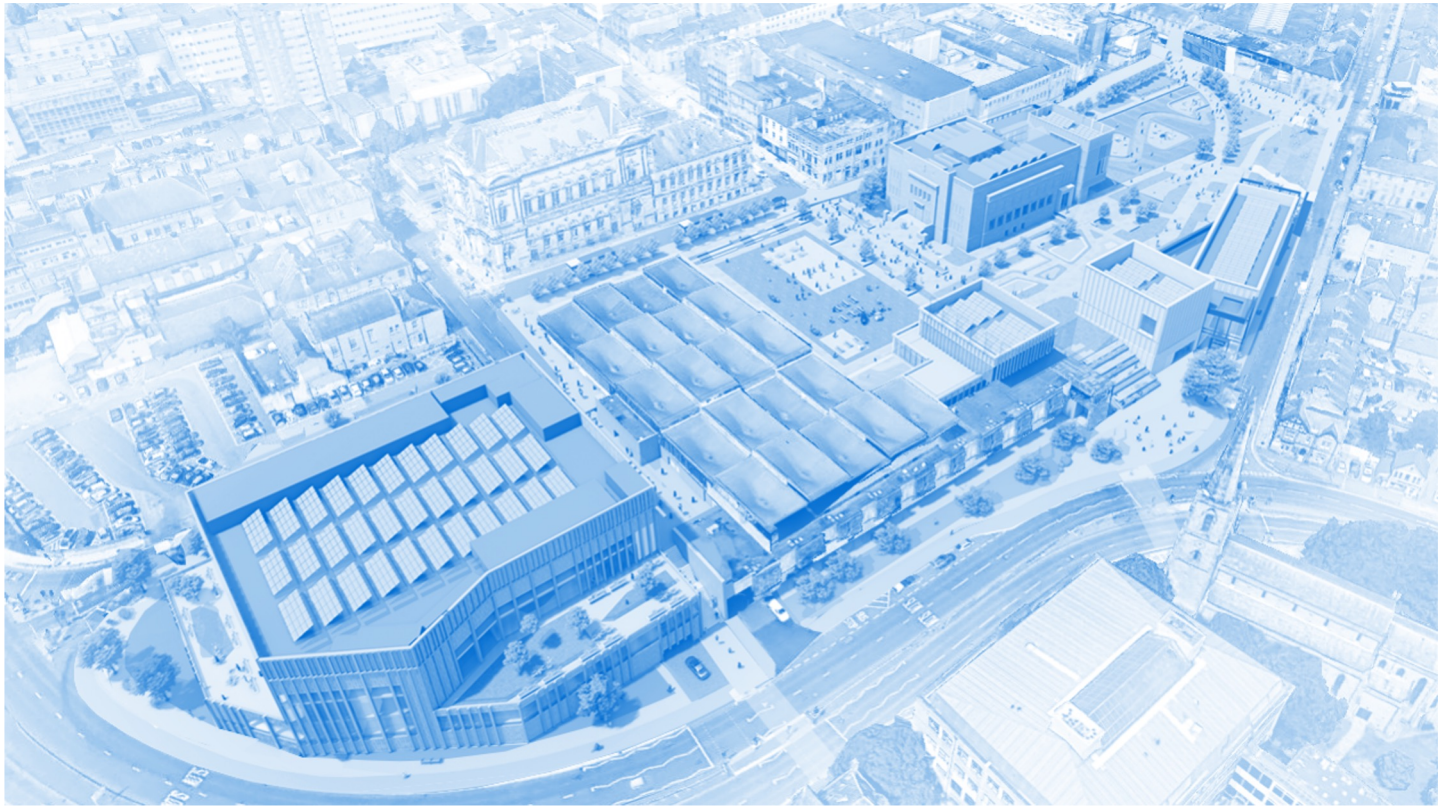
SUSTAINABILITY STATEMENT

AR-5878-01

Etude

Issue date : 30.09.22

KIRKLEES CULTURAL HEART



SUSTAINABILITY STATEMENT

September 2022 | Rev C

Etude

Kirklees Cultural Heart Planning Application

This document is part of full planning application for the the Kirklees Cultural Heart Masterplan application. This will cover the 'Demolition of the existing Piazza shopping centre, part removal of elements of Queensgate Market, and demolition/retention of service tunnels; with redevelopment of the site to form new public realm space (including public park and gardens, play areas, public square/outdoor event space); refurbishment and change of use of existing Queensgate Market Hall into new food hall (Use Class E (b) Sale of food and drink for consumption, mostly, on the premises); refurbishment and extension of existing library and art gallery building to form a new museum (Use Class F.1); change of use of part existing market hall building and extension to form a new public library (Use Class F.1); construction of new indoor event venue incorporating multi-storey car park below (Sui-Generis); erection of new public gallery building (Class F.2); and associated infrastructure on land and buildings at Queensgate Market, Huddersfield Library and Art Gallery, and Piazza (and The Shambles) Shopping Centre, Huddersfield.'

Delivering Kirklees' Net Zero Carbon Vision

It is the vision of Kirklees Council to work towards a climate resilient and net zero carbon development for the borough. This is being delivered through the commitment to cork towards achieving net zero carbon in response to the council declaring a climate emergency.

FCBS : Existing site and proposed development of the Kirklees Cultural Heart

This Sustainability statement

This document has been prepared by Etude on behalf of Kirklees Council and provides a full justification as to why the proposal should be deemed acceptable in terms of Sustainability. It summarises the outcomes of the significant and collective work undertaken by the project team at RIBA stages 1-3 in response to the brief. It covers the following areas:

- How environmental design has shaped the architectural design
- The proposed approach to low carbon heat
- Wider sustainability issues such as flood risk, transport and waste

The Kirklees Cultural Heart presents a fantastic opportunity to regenerate the town centre, to provide a thriving cultural hub that excels in terms of energy and sustainability performance.

As part of the redevelopment the Council are looking at developing the Cultural Heart on the following principles:

- **Retention and reuse** of a significant amount of the gross floor area of the existing property
- **Retention of some of the existing redundant areas** and repurposed for cultural and community uses
- New and existing buildings to be '**Huddersfield Heat Network ready**' via the sizing and location of new and existing Plant Rooms
- Extensive provision for **Electric Vehicle charging points** as part of a Town Centre Parking Strategy
- The development of new and existing buildings will actively **engage in a whole-building approach** to achieving Part L of the Building Regulations compliance, particularly with respect to Regulation 25b and so will be looking to promote **decentralised energy supply systems based on energy from renewable sources particularly with respect to PVs**, both **roof** and **facade mounted.**
- **Exploration of low and zero carbon technologies** and products such as '**Low Carbon Concrete**'
- Setting **bespoke targets and KPIS** to promote Sustainability and track performance against best practice.
- Target **BREEAM Excellent** for all new build and refurbished buildings.

Sustainability Strategy Summary

This page summarises the broad sustainability across the masterplan and individual buildings:

Public realm - The public realm will support the ecological improvements of the scheme in addition to providing resilience to flood risk and changes to our climate. The team are reviewing what the likely health and air quality benefits the soft landscape offer as well as reviewing planting options and the carbon sequestration potential of the scheme. The public realm will also offer a space to users of all abilities and be an inclusive place for all.

Transport - The buildings and public realm will offer best practice facilities for the use of sustainable modes of transport such as bicycles. The site will also offer a new link for pedestrians and cycle users.

Materials and character - The design team have set ambitious embodied carbon targets for the scheme and are undertaking a technical review of what materials and components can be feasibly reused in support of best practice circular economy principles. Timber structures and low carbon cladding materials are being investigated prioritised where feasible permitted as a means to reduce the inherent embodied impact of the scheme.

Museum - The grade two listed building will be retained and refurbished to ensure the building's energy consumption is dramatically reduced relative to current operational use. The heating systems will be replaced in support of low carbon technologies to generate heat and domestic hot water. Brand new and efficient building services will be installed to ensure the internal comfort of occupants is maintained, in addition to ensuring the correct conditions for exhibited pieces and installations.

Food Hall - The food hall will undertake a sympathetic low energy retrofit to ensure that the listed features are upgraded without compromising their heritage importance. The food hall will allow users to enjoy the refurbished space comfortably during all seasons.

Library - The library will undergo a major low energy refurbishment of areas of the existing Queensgate Market with an extension which is sympathetic to the existing features of historical and heritage importance. The design team is working to find the balance between replacement and improvement with the retention of existing elements in line with best practice energy efficiency, embodied carbon and circular economy principles.

Gallery - The new gallery building will look to achieve exemplary levels of energy efficiency and has been designed to be a low embodied carbon building. This has been achieved through the process of structural rationalisation and investigating the use of mass timber structure in appropriate areas.

Venue - the venue will look to be built to high energy efficiency standards and has been designed to reduce energy demand during peak operations and low occupancy when not in use. The venue will also look to deploy a large and efficient PV array to maximise the roof area to generate renewable energy for the building.

MSCP/ Parking - to encourage low carbon modes of transport, 20% of car parking spaces will support electric car charging, with some of these spaces being rapid charging points. The remaining 80% of spaces will have passive provision for future installation of Electric car charging points. This allows for the adoption of new and innovative charging technologies which are emerging and avoids locking in redundant services.

Sustainability Key Performance Indicators | Summary

Etude have been appointed to provide sustainability support to the project team to help shape the sustainability strategy strategy for the proposed redevelopment of Kirklees Cultural Heart in Huddersfield.

As part of this appointment Etude and the project team have worked to distil the team's understanding of the energy and sustainability targets which go far and beyond the regulatory requirement set by local of national government.

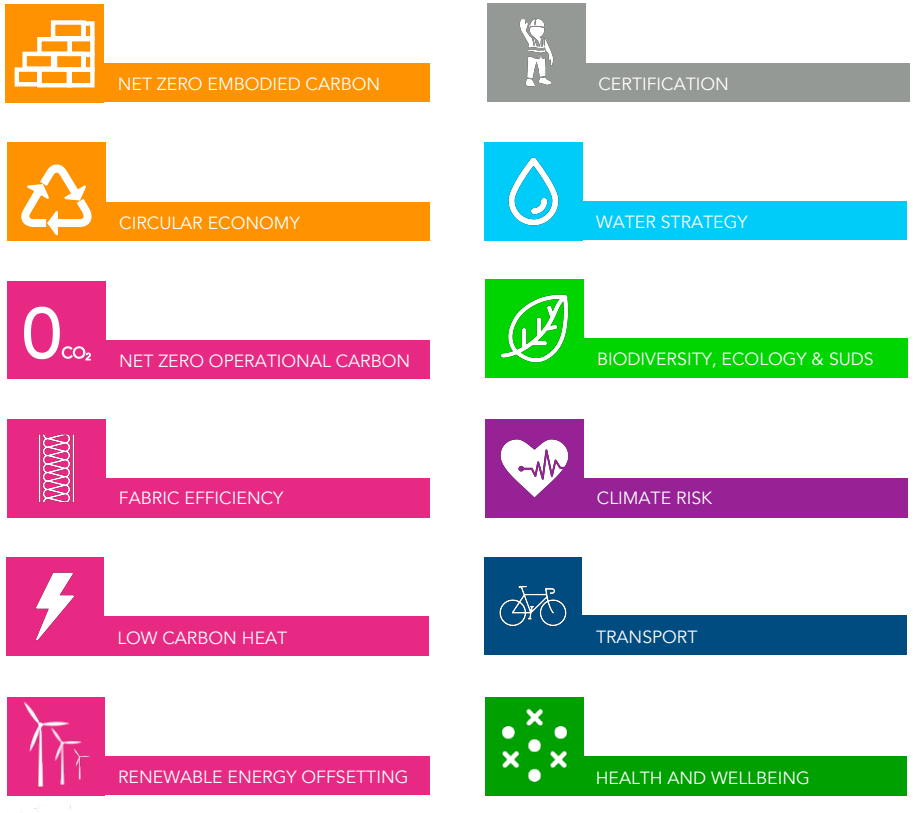
What is covered?

Through RIBA stages 1-3, Etude engaged with the project team and Kirklees Council to set the expectations towards a more progressive and necessary response to mitigating climate change.

Through this process the team looked to addresses the key themes of energy, carbon and sustainability; setting the vision, as well as providing guidance on the approach to be adopted strategically and in terms of delivery.

In response to this the team have proposed a preliminary set of targets and commitments summarised in this report.

These and the KPIs proposed are summarised briefly on the following pages.



Images showing the key sustainability topics - FCBS

KPIs Summary | Circular Economy and Embodied Carbon

CIRCULAR ECONOMY & EMBODIED CARBON

CORE TARGETS	METRIC
Undertake a pre-demo & refurbishment audit	TBC
Target best practice embodied carbon performance	Per Building
Waste diversion from landfill	100%
Construction Waste Management I Refurbishment	≤ 3.5 tonnes / 100m² GIA
Construction Waste Management I New Build	≤ 11.1 tonnes / 100m² GIA
Sustainable and responsibly sourced timber	100%
Responsibly sourced materials - EPDs	50%

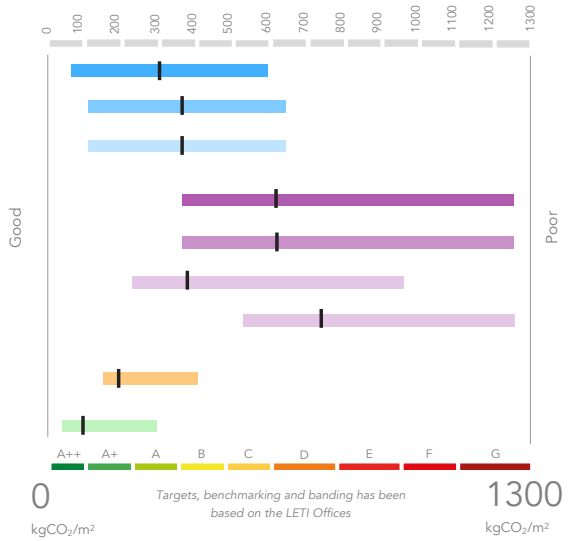
ASPIRATIONS	METRIC
Construction Waste Management I Refurbishment	≤ 0.4 tonnes / 100m² GIA
Construction Waste Management I New Build	≤ 3.2 tonnes / 100m² GIA

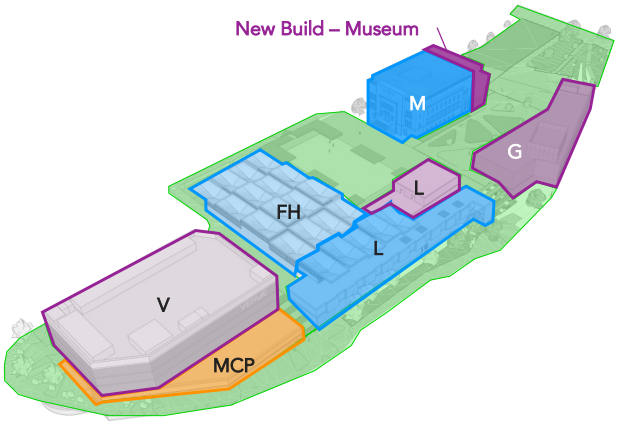
TYPOLOGY & TARGETS

Major Refurbishment – Museum	M	300 $kgCO_2/m^2$
Major Refurbishment – Library	L	350 $kgCO_2/m^2$
Major Refurbishment – Foodhall	FH	350 $kgCO_2/m^2$
New Build – Museum	M	600 $kgCO_2/m^2$
New Build – Gallery	G	600 $kgCO_2/m^2$
New Build – Library	L	350 $kgCO_2/m^2$
New Build – Venue	V	750 $kgCO_2/m^2$
New Build – Conditioned (Car Park)*	MCP	300 $kgCO_2/m^2$
Landscape	L	100 $kgCO_2/m^2$

* MCP target to account for basement and blast mitigation conditions which significantly increases embodied carbon

INDICATIVE RANGE OF PERFROMANCE I A1-A5



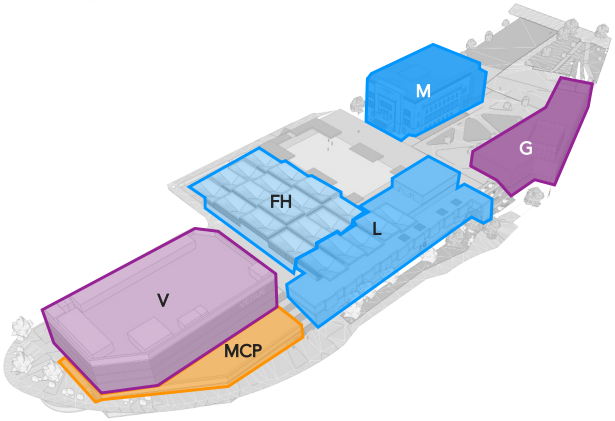


Indicative sketch using the Stage 2 proposals from FCBS showing the different buildings and boundaries

Sustainability Strategy Summary

NET ZERO OPERATIONAL CARBON

CORE TARGETS	METRIC
Space heating & cooling demand	kWh/m²$_{TFA}$/yr
Energy use intensity	kWh/m²$_{GIA}$/yr
Renewable energy	kWh/m²$_{fp}$/yr
No fossil fuels combusted on site	
Carbon content of heating / cooling*	20gCO_2/kWh
Carbon emission offsetting	Tonnes CO_2



Indicative sketch using the Stage 2 proposals from FCBS showing the different buildings and boundaries

TYPOLOGY & TARGETS

Major Refurbishment – Museum*	M	40 kWh/m²yr
Major Refurbishment – Library	L	40 kWh/m²yr
Major Refurbishment – Foodhall**	FH	40 kWh/m²yr
New Build – New Gallery	G	15 kWh/m²yr
New Build – Venue	V	15 kWh/m²yr
New Build – Conditioned (Car Park)	MCP	Not Applicable

* The target is an average for existing and new build

** It is assumed that the foodhall will be assessed based on the entire footprint inclusive of individual units

TYPOLOGY & TARGETS

Major Refurbishment – Museum*	M	60 kWh/m²yr
Major Refurbishment – Library	L	60 kWh/m²yr
Major Refurbishment – Foodhall**	FH	60 kWh/m²yr
New Build – New Gallery	G	55 kWh/m²yr
New Build – Venue	V	55 kWh/m²yr
New Build – Conditioned (Car Park)	MCP	10 kWh/m²yr***

* The target is an average for existing and new build

** It is assumed that the foodhall will be largely an unconditioned space, and the EUI target is for individual units

*** Excludes EV charging

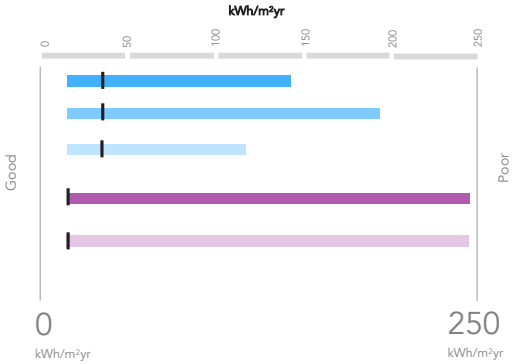
TYPOLOGY & TARGETS

Major Refurbishment – Museum*	M	30 kWh/m²$_{FP}$
Major Refurbishment – Library	L	30 kWh/m²$_{FP}$
Major Refurbishment – Foodhall**	FH	30 kWh/m²$_{FP}$
New Build – New Gallery	G	140 kWh/m²$_{FP}$
New Build – Venue	V	260 kWh/m²$_{FP}$
New Build – Conditioned (Car Park)	MCP	No roof – shared with venue

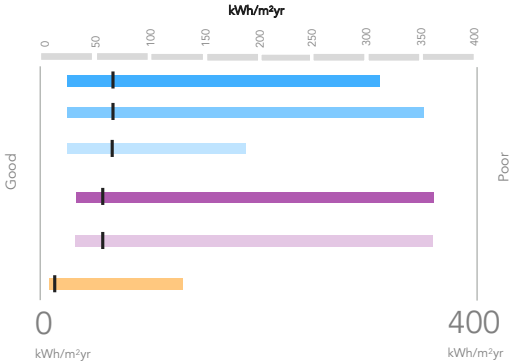
* The target is an average for existing and new build

** It is assumed that the foodhall roof could have PVs deployed on top. If this is not possible, then the target should be discounted.

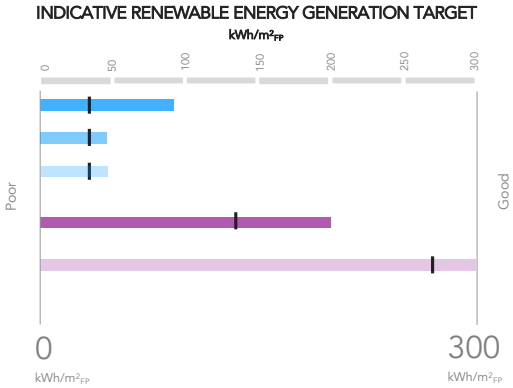
INDICATIVE SPACE HEATING OR COOLING DEMAND TARGET



INDICATIVE ENERGY USE INTENSITY (EUI) TARGET



INDICATIVE RENEWABLE ENERGY GENERATION TARGET



Sustainability Strategy Summary

CERTIFICATION

SCHEME	METRIC
BREEAM New Construction 2018	Excellent
BREEAM Refurb & Fit-out 2014	Excellent
ASPIRATIONS	**METRIC**
BREEAM New Construction 2018	Outstanding
BREEAM Refurb & Fit-out 2014	Outstanding
Passivhaus Certification	
EnerPHit Certification	
Passivhaus Process with Bespoke Targets	

WATER USE & SUSTAINABLE URBAN DRAINAGE

CORE TARGETS	METRIC
Internal water use	13 litres/person/day AECB Standard flowrates
External (landscapes) area water use	No irrigation
Sustainable Urban Drainage	40% Improvement over Greenfield Rates
ASPIRATIONS	**METRIC**
Internal water use	10 litres/person/day

BIODIVERSITY, ECOLOGY & SUDS

CORE TARGETS	METRIC
Protection of existing features of high importance	100%
Biodiversity Net Gain	50% +
Kirklees Council's Biodiversity Action Plan - Planting	100%
Urban Greening Factor	>0.4
Tree canopy cover	10%
ASPIRATIONS	**METRIC**
Building with Nature certification	☑
Carbon Sequestration	Report

TRANSPORT

CORE TARGET	METRICS
Cycle spaces*	1 per 10 people
Electric car charging points	20% Active 80% Passive
Accessibility for all users	100%
ASPIRATIONS	**METRIC**
Electric Bike charging points	Report
Enhanced (larger) bike spaces	Report

* Regular Full Time Employees / Staff

CLIMATE RISK

CORE TARGETS	METRIC
Designing comfortable places – CIBSE TM52	☑
Climate resilient SuDs	40% + improvement on greenfield runoff
Designing for durability and climate change	100%
Extreme weather resilience	Ensure floor levels are more than 600mm above the flood level predicted for a 1:100 year flood event (plus climate change).

HEALTH & WELLBEING

CORE TARGETS	METRICS
An air quality neutral scheme	Improve air quality
No fossil fuels combusted on site	
Daylighting Performance	Varies depending on building type
ASPIRATIONS	**METRIC**
Reduced NO_x & O_3 levels	Report
Plant & Tree planting to improve air quality	Report

1 | Policy and brief

The proposed development of the Kirklees Cultural Heart is summarised below.

Application for 'Demolition of the existing Piazza shopping centre, part removal of elements of Queensgate Market, and demolition/retention of service tunnels; with redevelopment of the site to form new public realm space (including public park and gardens, play areas, public square/outdoor event space); refurbishment and change of use of existing Queensgate Market Hall into new food hall (Use Class E (b) Sale of food and drink for consumption, mostly, on the premises); refurbishment and extension of existing library and art gallery building to form a new museum (Use Class F.1); change of use of part existing market hall building and extension to form a new public library (Use Class F.1); construction of new indoor event venue incorporating multi-storey car park below (Sui-Generis); erection of new public gallery building (Class F.2); and associated infrastructure on land and buildings at Queensgate Market, Huddersfield Library and Art Gallery, and Piazza (and The Shambles) Shopping Centre, Huddersfield.'

Images showing the location and renders of the proposed development - FCBS

Building Regulations

Updates have been published to Part L of the building regulations (conservation of fuel and power) as well as Part F (ventilation) and will came into force in July 2022. A new Part O (overheating) has also been published to mitigate the risk of overheating in new homes. All will apply to buildings proposed in the Kirklees Cultural Heart Masterplan.

The Future Home Standard

Part L is expected to be updated again in 2025 with the introduction of the Future Homes Standard, which is intended to support the UK Government's objectives of achieving Net Zero Carbon by 2050.

Kirklees and the Climate Emergency

It is essential that the proposed development responds to Kirklees Council's climate emergency declaration, as shown on this page.

Part L 2021 and the Future Homes Standard have informed design decisions

Kirklees COUNCIL

In 2019 Kirklees Council declared a Climate Emergency

"We declared a climate emergency in 2019 because we all must take urgent action to improve and protect our environment.

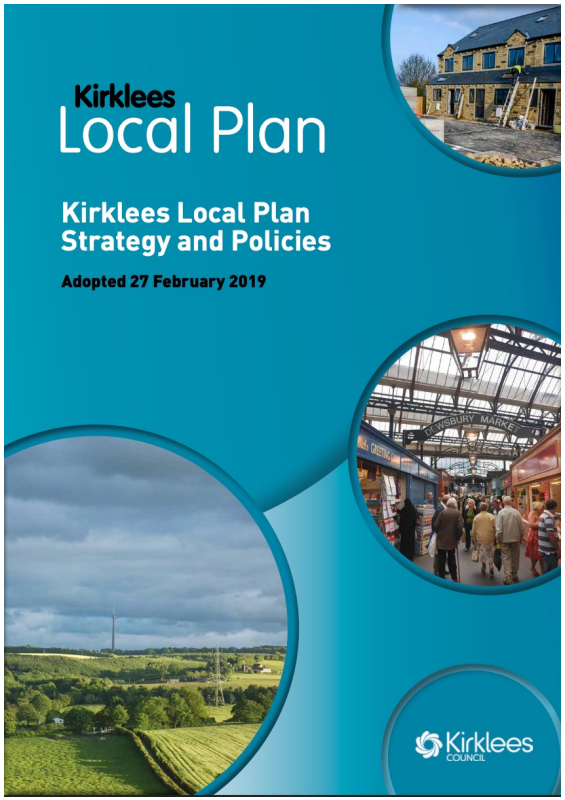
Greenhouse gases such as carbon dioxide trap heat, helping to warm the globe. The amount of carbon emissions are now causing an overall warming of the planet with corresponding devastating impacts starting to be felt.

Cases of extreme weather such as heat waves and rainfall are having consequences already in Kirklees with issues such as moorland fires and flooding in particular affecting the region."

The Kirklees Local Plan is the statutory development plan and its purpose is to set out the policies necessary to achieve the strategy and how much new development there should be in the district and where it will go.

In summary the Local Plan contains:

- a vision and strategic objectives for the development of Kirklees up to 2031;
- a spatial strategy setting out how development will be accommodated across the district reflecting the distinctiveness of different parts of the district;
- objectively assessed development needs particularly for housing and employment specifying the number of new homes and jobs to be provided during the plan period;
- clear policies to guide decisions on planning applications; site allocations showing land to be developed for housing, employment, retail, minerals and waste and other uses, identified on a Policies Map;
- designations showing land to be protected from development and land subject to other policies in the plan;
- infrastructure provision to support the delivery of the proposed development;
- an indication of how the policies will be delivered and implemented; and
- a monitoring framework setting out the performance measures that will show how successfully the plan's objectives and proposals are being delivered over time.



One of the main objectives is to improve the environment in Kirklees and tackle climate change which are mainly being dealt with in:

Chapter 2 Achieving sustainable development

Chapter 6 Delivering growth and sustainable development

Chapter 10 Transport

Chapter 11 Design

Chapter 12 Climate Change

Chapter 13 Natural Environment

Chapter 16 Waste

Chapter 18 Environmental Protection

Achieving sustainable development

When considering development proposals, the council will take a positive approach that reflects the presumption in favour of sustainable development contained in the National Planning Policy Framework. The council will always work pro-actively with applicants jointly to find solutions which mean that proposals can be approved wherever possible, and to secure development that improves the economic, social and environmental conditions in the area.

Proposals that accord with the policies in the Kirklees Local Plan (and, where relevant, with policies in neighbourhood plans) will be approved without delay, unless material considerations indicate otherwise.

Where there are no policies relevant to the proposal or relevant policies are out of date at the time of making the decision then the council will grant permission unless material considerations indicate otherwise – taking into account whether:

- any adverse impacts of granting permission would significantly and demonstrably outweigh the benefits, when assessed against the policies in the National Planning Policy Framework taken as a whole;
- or specific policies in that Framework indicate that development should be restricted.

Delivering growth and sustainable development

This section covers the following requirements applicable to sustainability

Improve transport links and sustainable travel

Support a pattern of development which helps facilitate the use of sustainable modes of transport by focusing most new development in the main urban areas where there is easier access to the core road and bus network.

Proper consideration of infrastructure opportunities and constraints relating to land allocations particularly where crucial infrastructure is needed to deliver growth.

Focus on mixed use sites in the plan where land use mix can be more flexible, viable and allow for more sustainable development and place shaping, particularly in or on the edge of town centre locations

Protect and improve green infrastructure

Retaining, where justified, important open spaces within urban areas where these meet identified local needs by allocating land for urban and local green space purposes. Identification and enhancement of strategic green infrastructure networks across the district and connecting with adjoining areas; and

Identification of the core walking and cycling network, which includes existing greenways and river/canal corridors

Promote development that helps to reduce, adapt and mitigate climate change

Allocating land for new development in locations and ways which reduce greenhouse gas emissions particularly by identifying urban extensions which have the scale and capacity to benefit from low carbon and/or decentralised energy solutions. Avoiding allocating land where possible in the areas at highest risk of flooding. Avoiding the best and most versatile agricultural land where possible

Promote the re-use of existing buildings and the use of brownfield land to meet development needs and support the regeneration of areas

Allocating land for the delivery of new homes and jobs on brownfield land, whilst recognising that a brownfield only approach will not meet the district's housing and employment land requirements alone, meaning that greenfield sites and land also need to play a role in meeting these needs

Facilitate the sustainable use and management of minerals and waste

Adopting a waste management hierarchy and allocating land for the expansion of the strategic waste facility in Huddersfield, to manage waste sustainably and by safeguarding existing waste facilities across the district.

To deliver the vision, objectives and strategy, land has been allocated to meet the development needs of the district in the following order of priority:

- encouraging previously developed land and buildings within settlements
- suitable greenfield sites within settlements (unless essential for urban green space/local green space or other over-riding constraints
- sustainable extensions to settlements
- sites detached or remote from settlements (where these are previously developed or where exceptional and/or very special circumstances can be demonstrated as appropriate)

Efficient and effective use of land and buildings

To ensure the best use of land and buildings, proposals:

- should encourage the efficient use of previously developed land in sustainable locations provided that it is not of high environmental value;
- should encourage the reuse or adaptation of vacant or underused properties;
- should give priority to despoiled, degraded, derelict and contaminated land provided that it is not of high environmental value;
- will allow for access to adjoining undeveloped land so it may subsequently be developed.

Sustainable travel

New development will be located in accordance with the spatial development strategy to ensure the need to travel is reduced and that essential travel needs can be met by forms of sustainable transport other than the private car. The council will support development proposals that can be served by alternative modes of transport such as public transport, cycling and walking and in the case of new residential development is located close to local facilities or incorporates opportunities for day to day activities on site and will accept that variations in opportunity for this will vary between larger and smaller settlements in the area. The council will support demand management measures which discourage single occupancy car travel within new development and encourage the use of low emission vehicles to improve areas with low levels of air quality. Proposals should include measures to encourage the use of sustainable travel options, including public transport, the promotion of personal journey planning, walking, cycling, car sharing, electronic communication and home working.

Travel plans will normally be required for all major planning applications in accordance with current guidance and should set targets and monitoring arrangements to ensure sustainable travel patterns are maintained. Travel plans should include agreed and defined outcomes related to a package of specified measures to be implemented including an approach to lower carbon emissions where applicable. The requirement of a travel plan will also be considered on case by case basis where the proposed development falls below the major application category where it has the potential to generate significant transport movements and/or has insufficient off-street parking within the vicinity of a stressed part of the highway network

Proposals for new development shall be designed to encourage sustainable modes of travel and demonstrate how links have been utilised to encourage connectivity. Proposals will be required to facilitate the needs of the following user hierarchy:

a. Pedestrians
b. cyclists
c. public transport
d. private vehicles

Core walking and cycling network

The core walking and cycling network as shown on the Policies Map will provide an integrated system of cycle routes, public footpaths and bridleways that provide opportunity for alternative sustainable means of travel throughout the district and provide efficient links to urban centres and sites allocated for development in the Local Plan.

The core cycling and walking network will be safeguarded and extended to provide opportunities to reduce the number of car journeys and to link settlements, employment sites and transport hubs. The safeguarding of the network will also provide further opportunities for leisure uses, cycling, walking and riding in the countryside by linking to existing bridleways and national trails where appropriate.

Disused railway lines and waterways throughout the district shall be protected from other forms of development to safeguard their potential to be reinstated to their former use for commercial or leisure purposes or to extend the cycling or footpath networks.

Proposals that may prejudice the function, continuity or implementation of the core walking and cycling network will not be permitted. Existing public rights of way that form part of the core walking and cycling network or elsewhere will be protected and enhanced.

Proposals shall seek to integrate into existing and proposed cycling and walking routes as identified in the core walking and cycling network by providing connecting links where appropriate; and regard shall also be had to linking to Strategic Green Infrastructure networks as identified on the Policies Map.

Where there is an identified need, extensions or enhancements to the existing network can be secured through scheme design, planning conditions and planning obligations if this does not prejudice the overall viability of the development.

Design

Good design should be at the core of all proposals in the district and should be considered at the outset of the development process, ensuring that design forms part of pre-application consultation of a proposal. Development briefs, design codes and masterplans should be used to secure high quality, green, accessible, inclusive and safe design, where applicable. Where appropriate and in agreement with the developer schemes will be submitted for design review.

Proposals should promote good design by ensuring:

a) the form, scale, layout and details of all development respects and enhances the character of the townscape, heritage assets and landscape;

b) they provide a high standard of amenity for future and neighbouring occupiers; including maintaining appropriate distances between buildings and the creation of development-free buffer zones between housing and employment uses incorporating means of screening where necessary;

c) extensions are subservient to the original building, are in keeping with the existing buildings in terms of scale, materials and details and minimise impact on residential amenity of future and neighbouring occupiers;

d) d. high levels of sustainability, to a degree proportionate to the proposal, through:

- The re-use and adaptation of existing buildings, where practicable;
- design that promotes behavioural change, promoting walkable neighbourhoods and making walking and cycling more attractive;
- considering the use of innovative construction materials and techniques, including reclaimed and recycled materials;

Design (continued)

- where practicable, minimising resource use in the building by orientating buildings to utilise passive solar design. This includes encouraging the incorporation of vegetation and tree planting to assist heating and cooling and considering the use of renewable energy;
- providing charging points to encourage the use of electric and low emission vehicles;
- incorporating adequate facilities to allow occupiers to separate and store waste for recycling and recovery that are well designed and visually unobtrusive and allows for the convenient collection of waste;
- designing buildings that are resilient and resistant to flood risk, where such buildings are acceptable in accordance with flood risk policies and through incorporation of multi-functional green infrastructure where appropriate;
- designing places that are adaptable and able to respond to change, with consideration given to accommodating services and infrastructure, access to high quality public transport facilities and offer flexibility to meet changing requirements of the resident / user.

e) the risk of crime is minimised by enhanced security, and the promotion of well-defined routes, overlooked streets and places, high levels of activity, and well-designed security features;

f) the needs of a range of different users are met, including disabled people, older people and families with small children to create accessible and inclusive places;

g) any new open space is accessible, safe, overlooked and strategically located within the site and well integrated into wider green infrastructure networks;

h) development contributes towards enhancement of the natural environment, supports biodiversity and connects to and enhances ecological networks and green infrastructure;

i) the retention of valuable or important trees and where appropriate the planting of new trees and other landscaping to maximise visual amenity and environmental benefits; and

j) the provision of public art where appropriate.

Climate Change

Renewable and low carbon energy

Renewable and low carbon energy proposals (excluding wind) will be supported and planning permission granted where the following criteria are met:

a) the proposal would not have an unacceptable impact on landscape character and visual appearance of the local area, including the urban environment;

b) the proposal would not have either individually or cumulatively an unacceptable impact on protected species, designated sites of importance for biodiversity or heritage assets;

c) the statutory protection of any area would not be compromised by the development;

d) any noise, odour, traffic or other impact of development is mitigated so as not to cause unacceptable detriment to local amenity;

e) any significant adverse effects of the proposal are mitigated by wider environmental, social and economic benefits.

Where the above criteria are met, the council encourages dialogue with local community groups promoting community renewable and low carbon energy schemes. The creation of district heat networks is encouraged across Kirklees. Heat networks can be developed at different scales and all new developments should consider their potential. Proposals requiring a master plan should explore the potential of developing a heat network, or connecting to an existing network.

Proposals for development which require a Sequential Test in accordance with national planning guidance will need to demonstrate that development has been directed to areas at the lowest probability of flooding, following a sequential risk based approach. The whole Kirklees district should be the starting point for the sequential test with applicants required to provide justification where a smaller area of search is proposed. If following application of the sequential test, there are no reasonably available sites which could accommodate the development in zones with a lower probability of flooding, it should also be demonstrated that a sequential approach has been applied within sites. This is to ensure that highly vulnerable and more vulnerable uses are directed towards the areas of lowest flood risk within the site. Proposals will also need to demonstrate that the exception test is passed, where applicable, as set out in national planning policy.

Proposals within flood zone 3ai will be assessed in accordance with national policies relating to flood zone 3a but with all of the following additional restrictions:

a) no new highly vulnerable or more vulnerable uses will be permitted;

b) less vulnerable uses may only be permitted provided that the sequential test has been passed and;
i. where extensions are linked operationally to an existing business or,
ii. where redevelopment of a site provides buildings with the same or a smaller footprint;

c) all proposals will be expected to include flood mitigation measures such as compensatory storage which should be identified and considered through a site specific Flood Risk Assessment;

d) development will not be permitted on any part of the site identified through a site specific Flood Risk Assessment as performing a functional floodplain role. Proposals must be supported by an appropriate site specific Flood Risk Assessment in line with national planning policy. This must take account of all sources of flooding set out in the Strategic Flood Risk Assessment and demonstrate that the proposal will be safe throughout the lifetime of the development (taking account of climate change). The proposal must also not increase flood risk elsewhere and where possible should reduce flood risk. Mitigation measures, where necessary, should be proposed. Proposals involving building over existing culverts or the culverting or canalisation of water courses will not be permitted unless it can be demonstrated to be in the interests of public safety or to provide essential infrastructure and that there will be no detrimental effect on flood risk and biodiversity. Where feasible, development proposals should incorporate re-opening of culverts, modification of canalised water courses and consideration of mitigation measures to achieve a more natural and maintainable state. Proposals for natural management such as targeted vegetation planting in upper catchments and along river banks will be supported in appropriate locations where consistent with national and local plan policies and relevant water catchment management plans to reduce flood risk and improve water quality.

Drainage

The presumption is that Sustainable Drainage Systems (SuDS) will be used to assist in achieving the following on each site:

a) for proposals on greenfield sites, typical greenfield run-off rates should not be exceeded;

b) for proposals on brownfield sites there should be a minimum 30% reduction in surface water run-off where previous positive surface water connections from the site can be proven. New connections will be subject to at least greenfield restrictions;

c) No negative impact on local water quality and improvements in water quality where practicable;

d) Consider whether proposed open spaces and green infrastructure within sites can contribute to the sustainable drainage of the site.

Local conditions including the existence of critical drainage areas may require a lower run-off rate to be agreed to reflect volume control, local surface water risks, water course capacity and flood risk further downstream.

There will be a general presumption against pumping surface water. It must also be demonstrated that the surface water management solution is designed to meet requirements over the lifetime of the development including evidence that management and maintenance arrangements have been secured to cover that period. This includes ensuring proposals to store water meet national standards and latest best practice.

Flow paths accommodating water from outside the site or due to an exceedance event should be designed to avoid buildings and curtilages.

Development will only be permitted if it can be demonstrated that the water supply and waste water infrastructure required is available or can be co-ordinated to meet the demand generated by the new development.

Biodiversity & geodiversity

The council will seek to protect and enhance the biodiversity and geodiversity of Kirklees, including the range of international, national and locally designated wildlife and geological sites, Habitats and Species of Principal Importance and the Kirklees Wildlife Habitat Network.

Development proposals will be required to:-

i. result in no significant loss or harm to biodiversity in Kirklees through avoidance, adequate mitigation or, as a last resort, compensatory measures secured through the establishment of a legally binding agreement;

ii. minimise impact on biodiversity and provide net biodiversity gains through good design by incorporating biodiversity enhancements and habitat creation where opportunities exist;

iii. safeguard and enhance the function and connectivity of the Kirklees Wildlife Habitat Network at a local and wider landscape-scale unless the loss of the site and its functional role within the network can be fully maintained or compensated for in the long term;

iv. establish additional ecological links to the Kirklees Wildlife Habitat Network where opportunities exist; and

v. incorporate biodiversity enhancement measures to reflect the priority habitats and species identified for the relevant Kirklees Biodiversity Opportunity Zone.

Strategic Green Infrastructure Network

Within the Strategic Green Infrastructure Network identified on the Policies Map, priority will be given to safeguarding and enhancing green infrastructure networks, green infrastructure assets and the range of functions they provide.

Development proposals within and adjacent to the Strategic Green Infrastructure Network should ensure:-

i. the function and connectivity of green infrastructure networks and assets are retained or replaced;

ii. new or enhanced green infrastructure is designed and integrated into the development scheme where appropriate, including natural greenspace, woodland and street trees;

iii. the scheme integrates into existing and proposed cycling, bridleway and walking routes, particularly the Core Walking and Cycling Network, by providing new connecting links where opportunities exist;

iv. the protection and enhancement of biodiversity and ecological links, particularly within and connecting to the Kirklees Wildlife Habitat Network.

The council will support proposals for the creation of new or enhanced green infrastructure provided these do not conflict with other Local Plan policies.

Trees

The Council will not grant planning permission for developments which directly or indirectly threaten trees or woodlands of significant amenity.

Proposals should normally retain any valuable or important trees where they make a contribution to public amenity, the distinctiveness of a specific location or contribute to the environment, including the Wildlife Habitat Network and green infrastructure networks.

Proposals will need to comply with relevant national standards regarding the protection of trees in relation to design, demolition and construction. Where tree loss is deemed to be acceptable, developers will be required to submit a detailed mitigation scheme.

Waste

Waste management hierarchy

The council will encourage and support the minimisation of waste production, and support the re-use and recovery of waste materials including, for example, recycling, composting and Energy from Waste recovery.

Proposals for facilities to manage waste within the district will be considered based upon the following principles:

a) seeking to move the management of all waste streams up the waste hierarchy of prevention, re-use, recycling, recovery, disposal;

b) promoting the opportunities for on-site management of waste where it arises;

c) promoting the use of waste as a resource, particularly encouraging co-location of developments that can use each other's waste materials;

d) working towards achieving the objectives and targets for recycling/recovery for waste as set out in the Waste Framework Directive;

e) supporting opportunities to locate complementary facilities, such as waste disposal points and treatment facilities, in close proximity to each other.

Environmental Protection

Protection and improvement of local air quality

Development will be expected to demonstrate that it is not likely to result, directly or indirectly, in an increase in air pollution which would have an unacceptable impact on the natural and built environment or to people.

Proposals that have the potential to increase local air pollution either individually or cumulatively must be accompanied by evidence to show that the impact of the development has been assessed in accordance with the relevant guidance. Development which has the potential to cause levels of local air pollution to increase must incorporate sustainable mitigation measures that reduce the level of this impact. If sustainable measures cannot be introduced the development will not be permitted.

Where the development introduces new receptors into Air Quality Management Areas or Areas of Concern or near other areas of relatively poor air quality, for example near roads or junctions, the development must incorporate sustainable mitigation measures that protect the new receptors from unacceptable levels of air pollution. Where sustainable mitigation measures cannot be introduced which prevent receptors from being exposed to unsafe levels of air pollution, development will not be permitted.

Protection and improvement of environmental quality

Proposals which have the potential to increase pollution from noise, vibration, light, dust, odour, shadow flicker, chemicals and other forms of pollution or to increase pollution to soil or where environmentally sensitive development would be subject to significant levels of pollution, must be accompanied by evidence to show that the impacts have been evaluated and measures have been incorporated to prevent or reduce the pollution, so as to ensure it does not reduce the quality of life and well-being of people to an unacceptable level or have unacceptable impacts on the environment.

Such developments which cannot incorporate suitable and sustainable mitigation measures which reduce pollution levels to an acceptable level to protect the quality of life and well-being of people or protect the environment will not be permitted.

Where possible, all new development should improve the existing environment.

2 | Energy & Net Zero Carbon

Aligning to a 1.5°C pathway | Intergovernmental Panel on Climate Change

International Context

There is overwhelming scientific consensus that climate change is happening. The Intergovernmental Panel on Climate Change (IPCC AR6) sixth assessment reports are sobering reading. The report Impacts, Adaptation and Vulnerability" released in February 2022, is a "dire warning about the consequences of inaction," said Hoesung Lee, Chair of the IPCC. It concludes that . "Any further delay in concerted global action will miss a brief and rapidly closing window to secure a liveable future."

In 2018, the Intergovernmental Panel on Climate Change published a special report on the effects of global warming above 1.5°C. The report found that warming above this level brought unacceptable increases in the risk of:

- irreversible tipping points in ice sheet stability
- irreversible tipping points in permafrost thaw
- species loss
- ecosystem transformation, including near total loss of the world's coral reefs
- vector borne disease
- water stress
- extreme weather events

The Paris Agreement (2015)

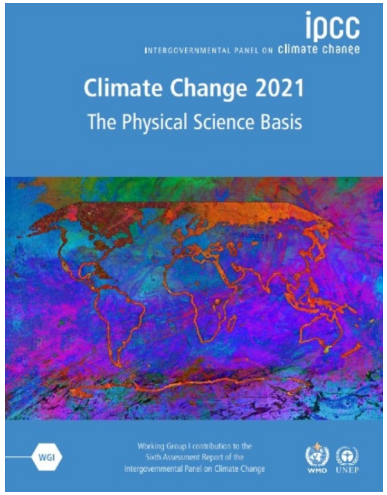
The Paris Agreement (2015) is a legally binding international treaty on climate change. 196 countries, including the UK, signed up to the agreement whose goals are to:

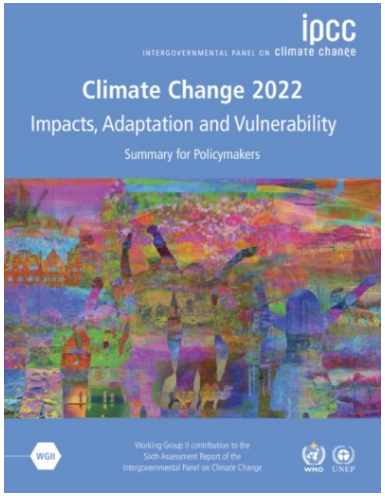
i) Limit global warming to 1.5-2 °C

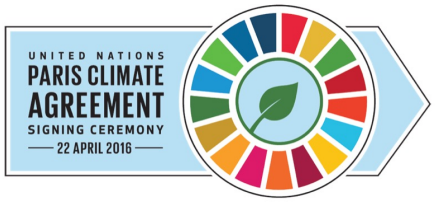
ii) reach global peaking of greenhouse gas emissions as soon as possible and to achieve a climate neutral world by mid-century.

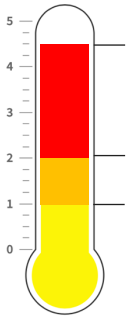
iii) Enhance resilience and adaptation to climate impacts

iv) Align financial flows in the world with these objectives.









4-5ºC the temperature rise we are likely to see if we continue on a **business as usual** path

1.5-2ºC The maximum temperature rise above pre-industrial levels the IPCC recommends.

1ºC The global temperature rise already created

Aligning to a 1.5°C pathway | Carbon Budgets

Cumulative carbon is more important than a zero carbon target date

Cumulative carbon is directly proportional to global temperature rises. Informed by the latest climate science, the IPCC has developed global carbon budgets for limiting global temperature rises to 1.5-2C.

We will exceed our carbon budget in 7 years unless action is taken

Tyndall Carbon Budget Reports derive carbon budgets for each UK local authority from the IPCC's global carbon budget. They are powerful in their simplicity, since they are directly related to actual CO_2 missions from energy (representing 80% of the UK's greenhouse gas emissions). A local authority can monitor their own local CO_2 emissions from energy (using BEIS datasets) and plan to reduce them in line with the recommended trajectory.

In summary, the report recommends:

- Kirklees stays within a maximum cumulative CO_2 emissions budget of 11.9 million tonnes ($MtCO_2$) for the period 2020-2100.
- If emissions continue at 2017 levels, the entire carbon budget for the area would be used within 7 years (from 2020), i.e. by 2027.
- Emissions cuts must average -13.3% per year to deliver a Paris aligned carbon budget.
- Reach net zero no later than 2041, at which point 5% of the budget remains.
- Meeting the budget must not rely on carbon offsets.

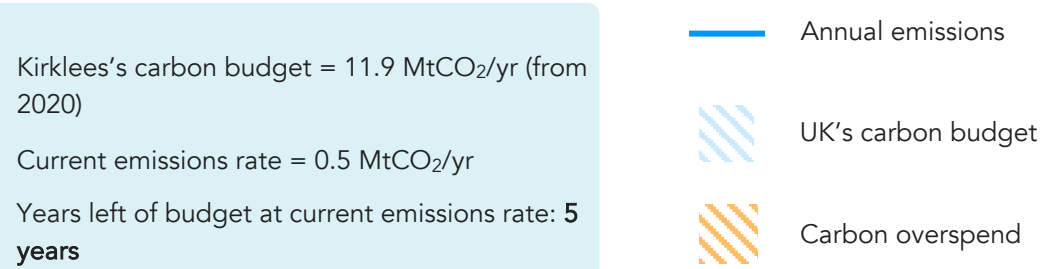
A zero carbon target date is not enough

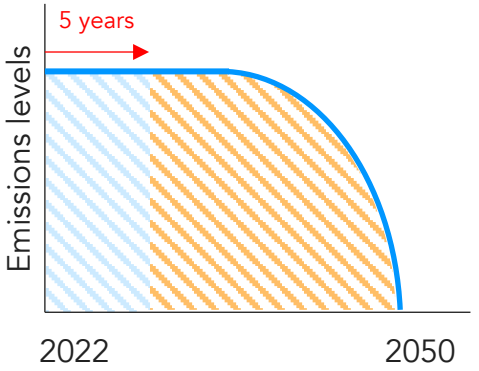
The UK government's zero carbon by 2050 target is not enough without also taking a carbon budgets approach. The two graphs on the right illustrate different emissions trajectories – both of which get to zero carbon by 2050. However, trajectory A emits three times as much carbon as trajectory B, and would put us on a path to much higher global temperature rises than the target 1.5-2 C.

Kirklees's carbon budget = 11.9 $MtCO_2$/yr (from 2020)

Current emissions rate = 0.5 $MtCO_2$/yr

Years left of budget at current emissions rate: **5 years**

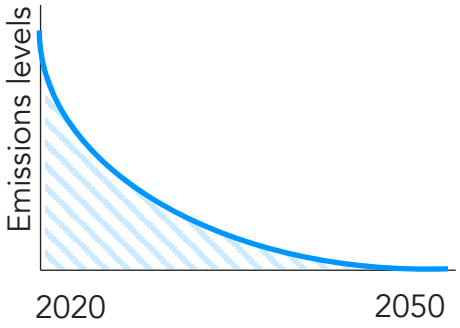




Trajectory type **A**

This trajectory continues at current emissions rates until the 2030s at which point it drops off steeply.

It is zero carbon by 2050 but the carbon budget is far exceeded.



Trajectory type B

This trajectory sees a 13.3% reduction in emissions year on year. Cumulative emissions stays within the carbon budget.

Other trajectories are possible – but it's imperative that we do not overspend on carbon, otherwise we will not be on a Paris compliant trajectory.

How do we get there? | Recommendations of existing bodies

The Climate Change Committee's recommendations

The Climate Change Committee is an independent body appointed to advise the government on how to achieve its climate change target of being net zero carbon by 2050 (legislated by the Climate Change Act). Their 2019 report "Net Zero: The UK's contribution to stopping global warming" provides an in-depth analysis of the actions required across different sectors: buildings; industry; power; transport; aviation & shipping; agriculture & land-use; waste; fluorinated gases and greenhouse gas removals. These are summarised on the right.

Emissions from industry, commerce, freight, air travel and land-use and agriculture emissions are shown to be difficult to abate. This makes it imperative that housing, light transport and waste sectors achieve maximum possible reductions.

The National Grid

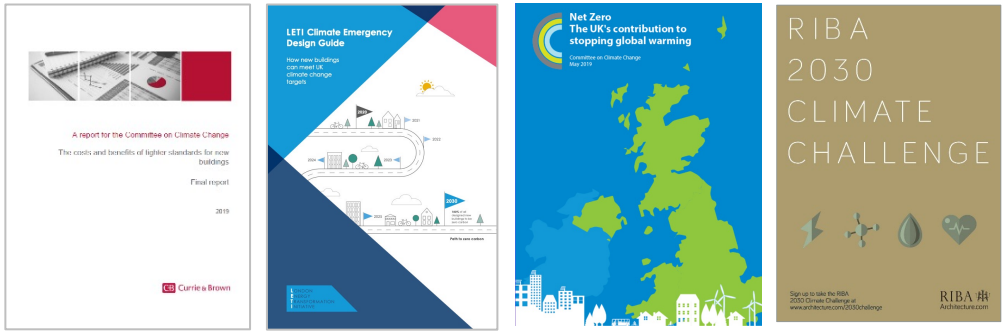
The National Grid in its Future Energy Scenarios 2021, predicts that:

- Demand for electricity will roughly double by 2050.
- Around 20% of that electricity will need to be generated at the local level through solar photovoltaics and onshore wind.
- Total energy demand from all homes will need to reduce by 68% from 2020 levels despite increases in the number of homes.

LETI

The London Energy Transformation Initiative (LETI) undertook research culminating in the Climate Emergency Design Guide, which outlines the Key Performance Indicators (KPIs) of new buildings to ensure our emissions reductions targets are met. In summary,

- New buildings must be designed to be net zero carbon.
- New buildings must be extremely energy efficient
- New buildings must be heated by low-carbon heat – e.g. heat pumps. There should be no gas boilers installed in new buildings.



Guidance on the need for net zero carbon buildings and total energy use targets has been published by the Climate Change Committee, UKGBC, the RIBA and LETI

Key actions required for meeting carbon reduction targets, from the Climate Change Committee on

- Fully decarbonise electricity by 2035 while meeting a 50% increase in demand
- All new homes are zero carbon by 2025 at the latest
- Ultra-efficient new homes and non-domestic buildings
- Low carbon heat to all but the most difficult to treat buildings.
- Ambitious programme of retrofit of existing buildings.
- Complete electrification of small vehicles (100% of new sales by 2030).
- Large reduction in waste, zero biodegradable waste to landfill by 2025, zero all waste to landfill by 2040.
- Significant afforestation and restoration of land, including peatland.
- Greenhouse gas removals will likely be required to achieve net zero carbon (but theses are untested and unproven technologies).

Defining Net Zero Carbon

In order to achieve Net Zero, it is crucial that all buildings become part of the solution as soon as possible instead of adding to the problem. In order to do this, and from now on, new and existing buildings need to use energy much more efficiently and be powered by renewable energy sources. Emphasis must also be placed on reducing their embodied carbon during construction and their long term environmental impact, including demolition and re-use.

It is clear that current regulatory requirements such as Part L, and planning policy and are not yet sufficient to align with the emission's reductions necessary in the building sector, as evidenced by the Climate Change Committee. The key requirements applicable to the Kirklees Project are:

- Build ultra-efficient new non-domestic buildings
- Low carbon heat to all but the most difficult to treat buildings.
- Ambitious programme of retrofit of existing buildings.
- Large reduction in waste, zero biodegradable waste to landfill by 2025, zero all waste to landfill by 2040.

A growing evidence base have led to an industry definition

A significant amount of work has been undertaken over the last 3 years to define and articulate the requirements of a "new build" Net Zero Carbon building. This includes the work undertaken and published by the Climate Change Committee, the Royal Institute of British Architects (RIBA), the Chartered Institute of Building Services (CIBSE), the UK Green Building Council (UKGBC), the Better Buildings Partnership (BBP), the Passivhaus Trust, the Good Homes Alliance (GHA) and the London Energy Transformation Initiative (LETI).

Guidance on buildings to help them meet our climate change targets has been published by the the CCC, the RIBA, the UKGBC and LETI. Net Zero Carbon buildings will create many other co-benefits, including lower energy costs, improved health and comfort and reduced pollution, particularly in terms of local air quality.

Defining a Net Zero Carbon Kirklees Cultural Heart

Applying a NZC definition to the Kirklees Cultural Heart

It should be recognised that the consensus of a definition and set of targets associated with NZC buildings has been formed around "typical" typologies such as residential, office, school and retail developments. Additionally, the focus of efforts has primarily been on agreeing a definition for new buildings.

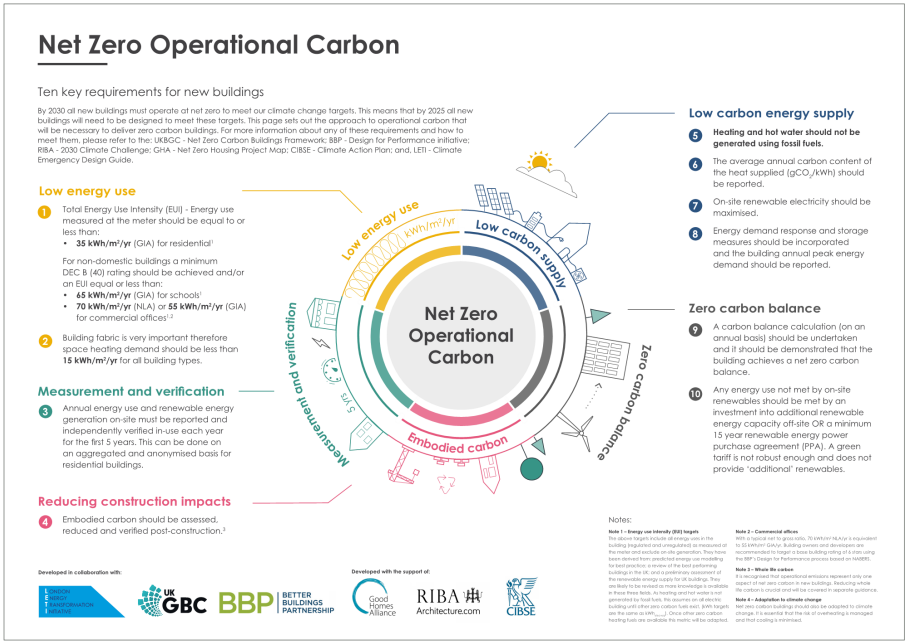
There is emerging evidence and a collective industry response to helping shape a NZC definition and set of targets for refurbished buildings, however the focus has largely been on the retrofit residential and commercial sectors.

Considering this, there is no agreed governmental or industry consensus on a set of targets which can easily or clearly define "A Net Zero Carbon Kirklees Cultural Heart".

This creates a risk that in the absence of a clear definition of Net Zero Carbon, or a set of targets, that the Kirklees Cultural Heart will not align achieve the levels of carbon reduction or energy performance necessary to align to the UK's climate budget.

What constitutes a net zero carbon building?

In response to the Stage 1 brief of working towards achieving a Net Zero Carbon Kirklees Cultural Heart, Etude have worked with Kirklees Cultural Heart team from Kirklees Council and the project team, namely FCBS, ARUP and Reform Landscape to propose a set targets which can be robustly defined to align to the intent of the Net Zero Carbon Definition developed by LETI, in collaboration with UKGBC and BBP, and supported by the Good Homes Alliance, RIBA and CIBSE.



Ten key requirements for a Net Zero Operation Carbon - A summary
Developed by LETI in collaboration with UKGBC and BBP, and supported by the Good Homes Alliance, RIBA and CIBSE.

Different criteria form the definition
We have learnt over the last 15 years that delivering high quality energy efficient and low carbon buildings requires us to address several aspects. The definition is not a one-dimensional target, hence why the delivery of Net Zero carbon buildings relies on meeting requirements in different areas.

Defining a Net Zero Carbon Kirklees Cultural Heart

Net Zero carbon buildings in operation are supported by four core principles: energy efficiency, low carbon heat, renewable energy and embodied carbon.

1 - Energy efficiency

Buildings use energy for heating, cooling, hot water, ventilation, lighting, cooking and appliances. The efficient use of energy reduces running costs and carbon emissions. It also reduces a building's impact on the wider energy supply network, which is also an important consideration.

2 - Low carbon heating

Low carbon sources of heat are an essential feature of Net Zero carbon buildings. All buildings should be built or refurbished with a low carbon heating system and must not connect to the gas network.

3 - Renewable energy generation

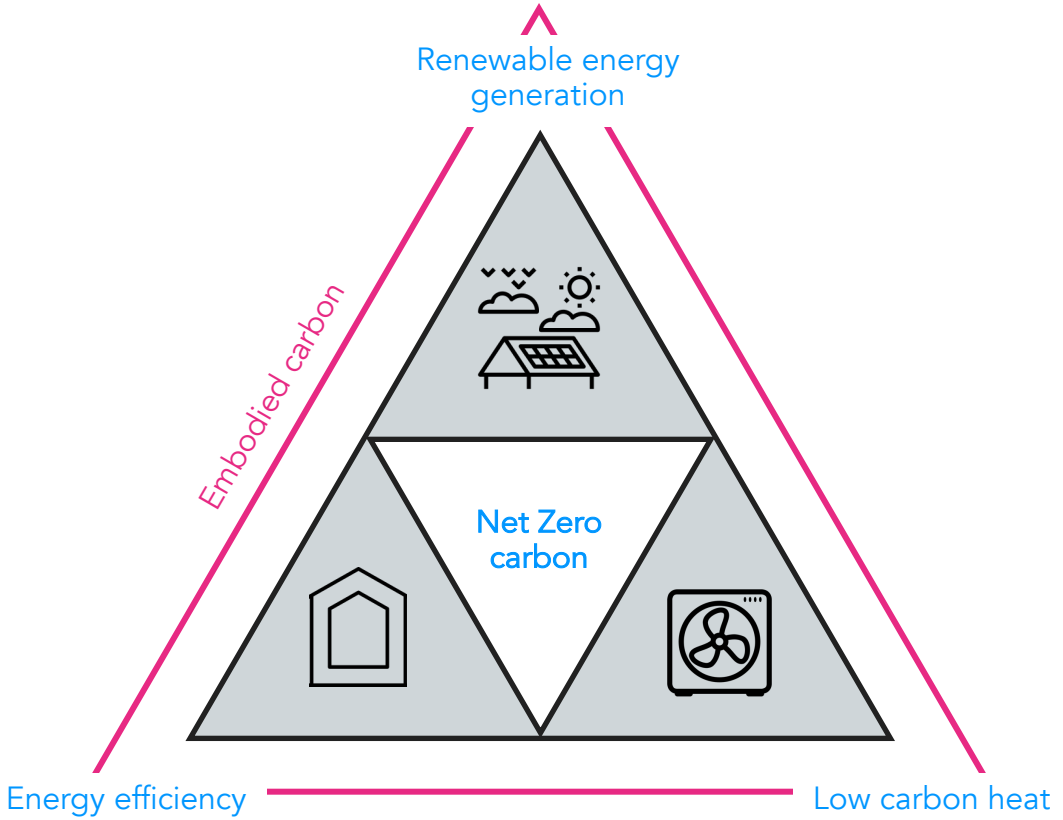
In new buildings, renewable energy generation should be at least equal to the energy use of the building on an annual basis for it to qualify as Net Zero carbon in operation. This can be achieved through the use of solar photovoltaic (PV) panels.

4 - Embodied carbon

Operational carbon is only part of the story. Net Zero buildings should also minimise embodied carbon in materials.

Inter-relationships

The core components of a zero carbon building are all interrelated, and all three impact each other. They also affect a building's impact on the local electricity grid, and smart electrical systems play an important role too.



The four core principles of a "net zero" building: energy efficiency, low carbon heat, renewable energy generation and embodied carbon.

Net Zero Design | Modelling building performance

Using building regulations methodology alone is risky

There is a well known performance gap between predicted energy use from building regulations compliant models (SBEM for non-domestic buildings) and real life performance. The models created for Part L assessments were designed as a compliance tool rather than a design tool. But often they are the only energy model completed for a building and designers will use them to make important decisions.

Additionally planning policy often refers to energy performance in the context of Part L, making planning targets which are seemingly ambitious, fall short of the expectation.

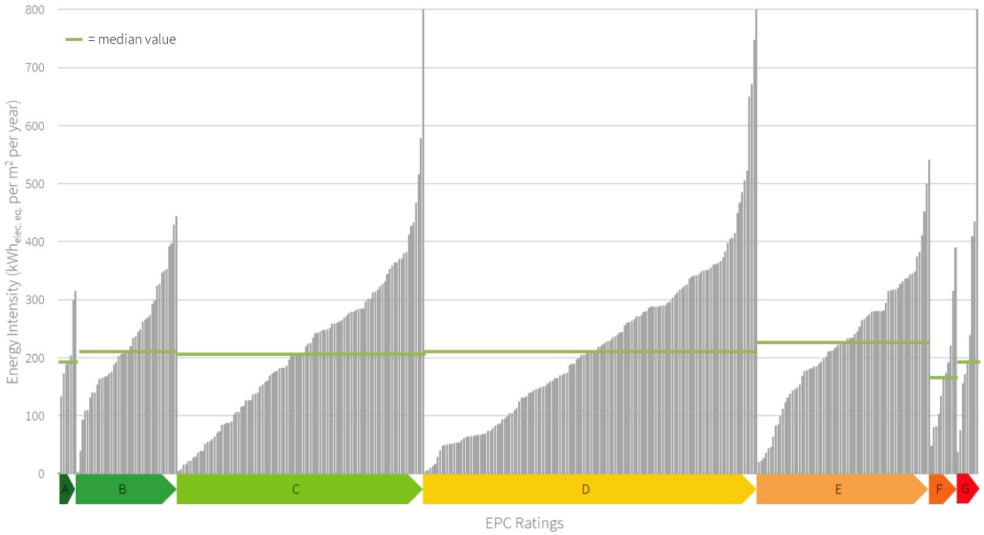
There are however modelling methodologies that have been shown to better represent real life building performance, choosing these methods will significantly help a building meet the Net Zero KPIs proposed for the Kirklees Cultural Heart.

Modelling for Net Zero carbon performance

Best practice energy modelling requires design teams to be more inquisitive and comprehensive. Fundamentally models must include:

- Coverage of all energy uses in a building.
- Variables that represent reality for the building (internal heat gains, building location etc) and are fully justified by the modeller.
- Detailed modelling of complex systems (centralised HVAC for example) which significantly contribute to the EUI.
- Stress testing to understand how performance will vary if the building is used in a different way.
- Honesty about how the model has been built to allow others to interact, interrogate and use the models to improve performance in-use.

There are two main modelling methodologies that have been demonstrated to produce estimates that match real life performance: the Passivhaus Planning Package (PHPP) and CIBSE TM54.



There is substantial and well-proven gap between the modelling methods used to create EPCs (and demonstrate compliance with the Building Regulations) and actual building EUIs. PHPP and CIBSE TM54 represent better options for modelling in order to meet Net Zero standards.

The Better Buildings Partnership (BBP), a collaboration of London's leading commercial property owners and allied organisations, produced the Real Estate Energy Benchmark (REEB) 2019 energy snapshot (2020). The key conclusion from this report shown in the chart above is that, across a sample of 400 large offices, there is a little to no correlation between EPC scores and actual energy performance (as defined by energy intensity). When EPC scores were compared against actual associated carbon emissions in the same buildings, again there was little to no correlation. Whilst this looked specifically offices, this trend can be assumed typical against all non-domestic building sectors.

It is clear that EPCs focus on 'design intent' or theoretical energy efficiency. The evidences suggests demonstrates that there is little to no correlation between the EPC of a non-domestic building and its actual energy use.

Part L performance | Compliance with planning policy

This page demonstrates that the development would meet the minimum requirements of Part L. Arup have been appointed to undertake an assessment against Part L of the building regulations and a summary of their analysis is provided below. Arup have confirmed they have carried out compliance modelling, incorporating the mechanical, electrical, and public health servicing strategies at the current stage of design in line with Building Regulation (Part L - Conservation of fuel and power). This analysis has focused on the following areas of compliance:

- Criterion 1 – Achieving the TER: The calculated CO_2 emissions from the building (BER) must not exceed those of the notional building (TER).
- Criterion 2 – Limits on design: The fabric parameters for new build elements must not exceed those as outlined in Part L
- Criterion 3 – Limits on heat gains in summer: The solar gains in all spaces must be no greater than would occur through a reference glazing system.
- Criterion 4 – Building performance: The building should be constructed so that performance is consistent with the calculated BER.
- Criterion 5 – Operation: The owner of the building should be provided with information about the building services and the maintenance requirements so that the building can be operated so as to use no more fuel or power than is reasonable.

Summary of Part L Analysis

Venue

TARGET EMISSIONS RATE (TER)	BUILDING EMISSIONS RATE (BER)	PERCENTAGE IMPROVEMENT	ASSESSED AREA (M^2)	TOTAL EMISSIONS (TONNE)
17.2	14.8	14.0	9041[1]	133.8

Library

TARGET EMISSIONS RATE (TER)	BUILDING EMISSIONS RATE (BER)	PERCENTAGE IMPROVEMENT	ASSESSED AREA (M^2)	TOTAL EMISSIONS (TONNE)
27.6	19	31.2	5274[1]	100.2

Food Hall

TARGET EMISSIONS RATE (TER)	BUILDING EMISSIONS RATE (BER)	PERCENTAGE IMPROVEMENT	ASSESSED AREA (M^2)	TOTAL EMISSIONS (TONNE)
14.5	10.5	27.6	3206[1]	33.7

Art Gallery

TARGET EMISSIONS RATE (TER)	BUILDING EMISSIONS RATE (BER)	PERCENTAGE IMPROVEMENT	ASSESSED AREA (M^2)	TOTAL EMISSIONS (TONNE)
34.5	25	27.5%	2683[1]	67.1

Museum

TARGET EMISSIONS RATE (TER)	BUILDING EMISSIONS RATE (BER)	PERCENTAGE IMPROVEMENT	ASSESSED AREA (M^2)	TOTAL EMISSIONS (TONNE)
29.8	21.5	27.9%	5386[1]	115.8

Transition between Part L 2013 and 2021

The newest version of Approved Document L took effect on 15 June 2022 for use in England.

At the time the Part L assessment was undertaken for the Kirklees Cultural Heart project, compliance modelling software was in the process of being updated to reflect the changes to approved document L.

Due to this, the current analysis has been undertaken using the previous iteration of compliance modelling software and will be subject to change following the full release / update of software.

It is intended for the Part L assessments to be undertaken as per the updated building regulations.

3 | Low Carbon Heat

Making an objective choice

There is a wide range of heating systems which could be used at the Kirklees Cultural Heart. They vary in terms of **energy source** (e.g. gas and/or electricity), **scale** (e.g. district, site-wide, building by building or individual dwelling), **space implications**, **billing arrangements** for the residents and for communal systems by the **temperature of the distribution system** (e.g. 70°C or 50°C or ambient temperature).

Deciding on the heating system best suited for the project is a very important decision. Not only will it have a significant impact on construction costs: it will impact the masterplan and building' carbon emissions, the building's energy bills, and the maintenance and replacement costs for the foreseeable future.

We do not share the view that any choice can be made now and changed in the near future: given the significant costs and disruption associated with a change of heating system, we believe that it is very likely that the system being installed will still be the same in 20 years' time, hence why it is important to make the right decision using objective parameters.

It is also very important to note that the context of low carbon means of generating heat have changed dramatically in recent times given the context of the decarbonisation of the electricity grid.

15-20
kWh/m²/yr

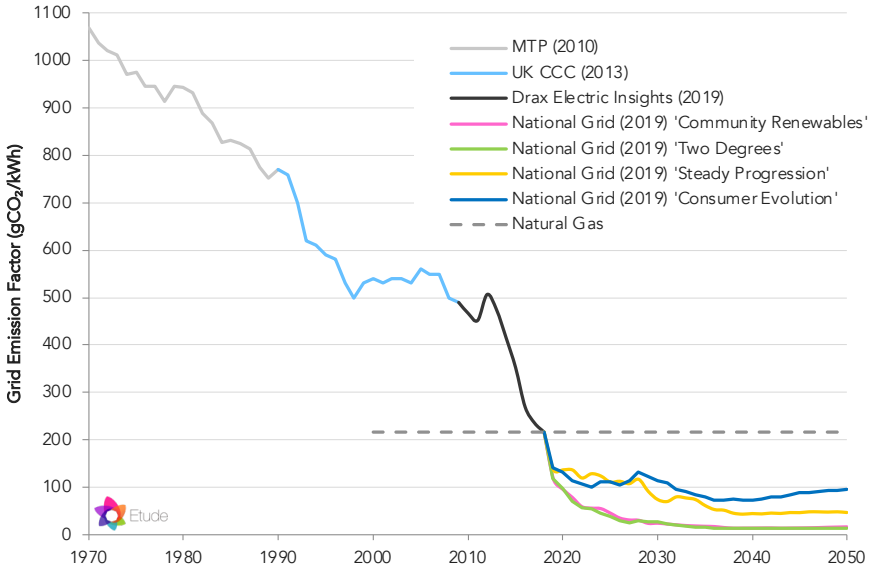
The UK housing: Fit for the future? report *published by the Committee on Climate Change in 2019 recommends ultra-low levels of energy use and a space heating demand of less than 15-20 kWh/m²/yr*

The costs and benefits of tighter standards for new buildings *report, produced by Currie & Brown and AECOM for the Committee on Climate Change's UK housing: Fit for the future? report*

The decarbonisation of the grid

Electricity used to have a very high carbon content: more than 1,000 gCO_2/kWh in the early 1970's. It has become steadily 'greener' since, although it reached a plateau of approximately 500 gCO_2/kWh during the 2000's. At that time, heating systems using gas were seen as more environmentally friendly options.

This has now changed completely: with the de-commissioning of coal-fired power stations and the rise of renewable energy (particularly wind and solar), the annual average carbon content of electricity is now around 100-150 gCO_2/kWh and predicted to reduce more in the next decade (see adjacent graph).

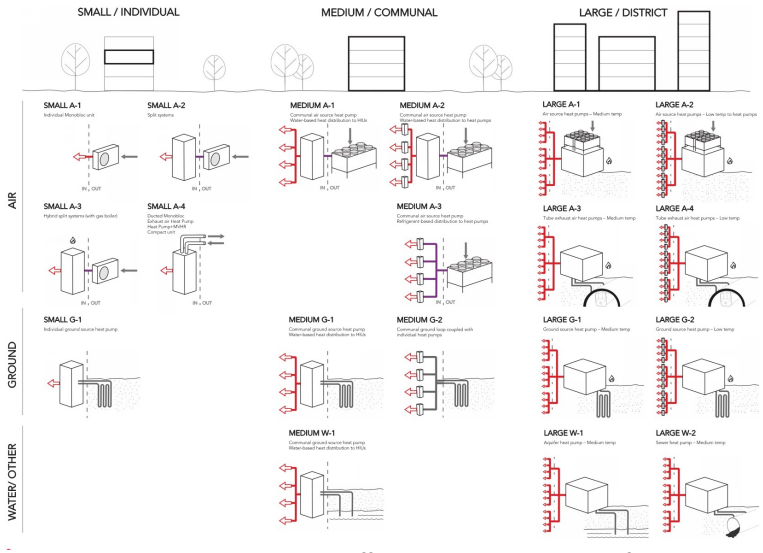


The carbon content of electricity has fallen in the last few years and will continue to decrease. The carbon content of gas is not forecasted to change significantly.

Low Carbon Heating Appraisal

To ensure that the heating system and energy strategy selected for the masterplan was correct and well considered, Etude in collaboration with Arup and AECOM undertook a detailed and evidence-based summary of several heating systems options to advise Kirklees Council of the different pros and cons of various systems.

Heating for the site will be provided by all electric heating system, with heat generated from air source heat pumps.



Heat pumps are available in many different types and scales, from individual systems to large scale heat pumps (© Etude for the Greater London Authority)

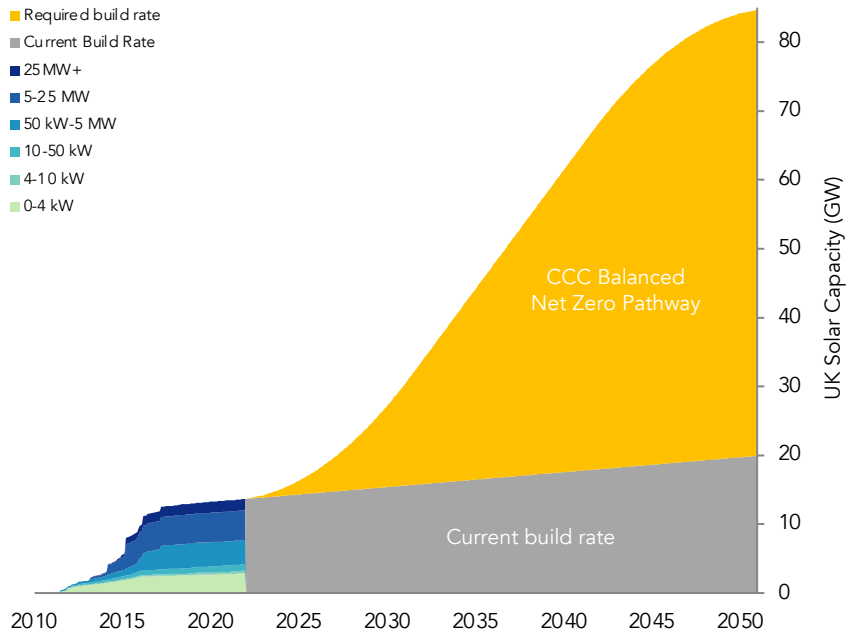
4 | Renewable Energy

Summary

Roof space suitable for solar PV is an asset and a key part in meeting Net Zero and reducing the UK carbon emissions. Rooftop mounted solar PV is a major renewable energy source that can offer cheap low carbon electricity.

The use of solar technology in UK needs to accelerate significantly to achieve a zero emission electricity supply as shown on the graph. Installing panels on buildings and in urban areas can significantly reduce pressures on greenfield sites. This frees up land for other uses and avoids the unfavourable distance that's likely to occur between greenfield sites and where electricity is used.

Roof design, service layout and the type of solar technology used have a big impact on the amount of solar electricity that is generated on a building. We have explored an initial maximised PV layout to demonstrate the optimal generation potential of the current roof plan of the development. It is anticipated that some of the roof space will need to accommodate plants, services and lift over-runs thereby reducing the area available to the solar PV panels. Therefore it is important to engage in discussion within the design team aimed to find balance.



The graph above shows the current deployment of solar PV in the UK, and the increase in capacity necessary to meet the UK's projected Net Zero Carbon targets in line with the Climate Change Committee balanced pathway.

UK solar deployment must significantly accelerate to achieve a zero emission electricity supply. Placing solar panels on buildings and in urban areas relieves pressure on greenfield sites. This frees up land for food production, carbon sequestration and habitat restoration. Graph based on data from BEIS, current build rates are conservative relative to other industry data.

Quantifying solar performance

This page shows the difference between PV options and demonstrates how the energy generated per square meter of building footprint area as the metric to compare the performance of different approaches to uses solar PV. This metric allows a fair comparison between buildings, irrespective of their height.

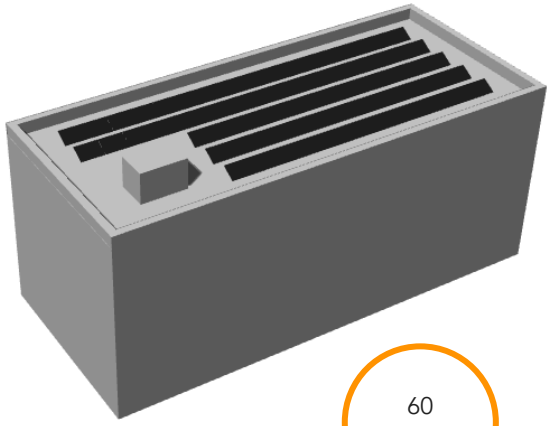
The images below show how different layouts of solar panels typically affect how much energy can be generated per square meter of building footprint.

METRIC

kWh/m^2_{FP}

Energy generated per m2 of the building footprint

South facing - 30 degrees

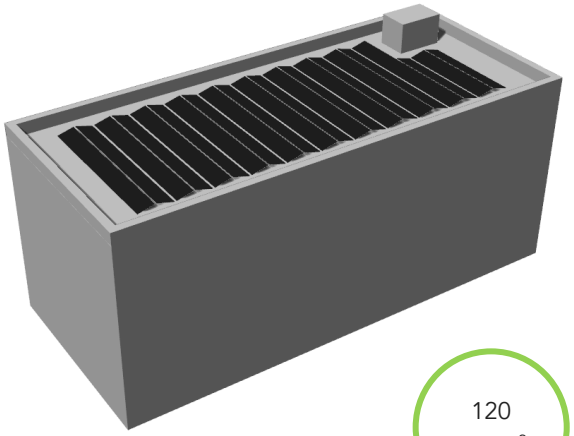


60 kWh/m^2_{fp}

Specific energy generation

***Standard practice** – inefficient layout and panels proposed*

Concertina East / West facing

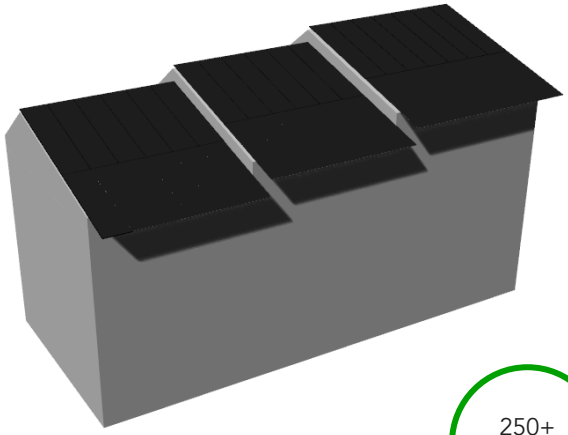


120 kWh/m^2_{fp}

Specific energy generation

***Good practice** – Reduced inter-row shading, better density but lower generation per panel*

Monopitch arrangement

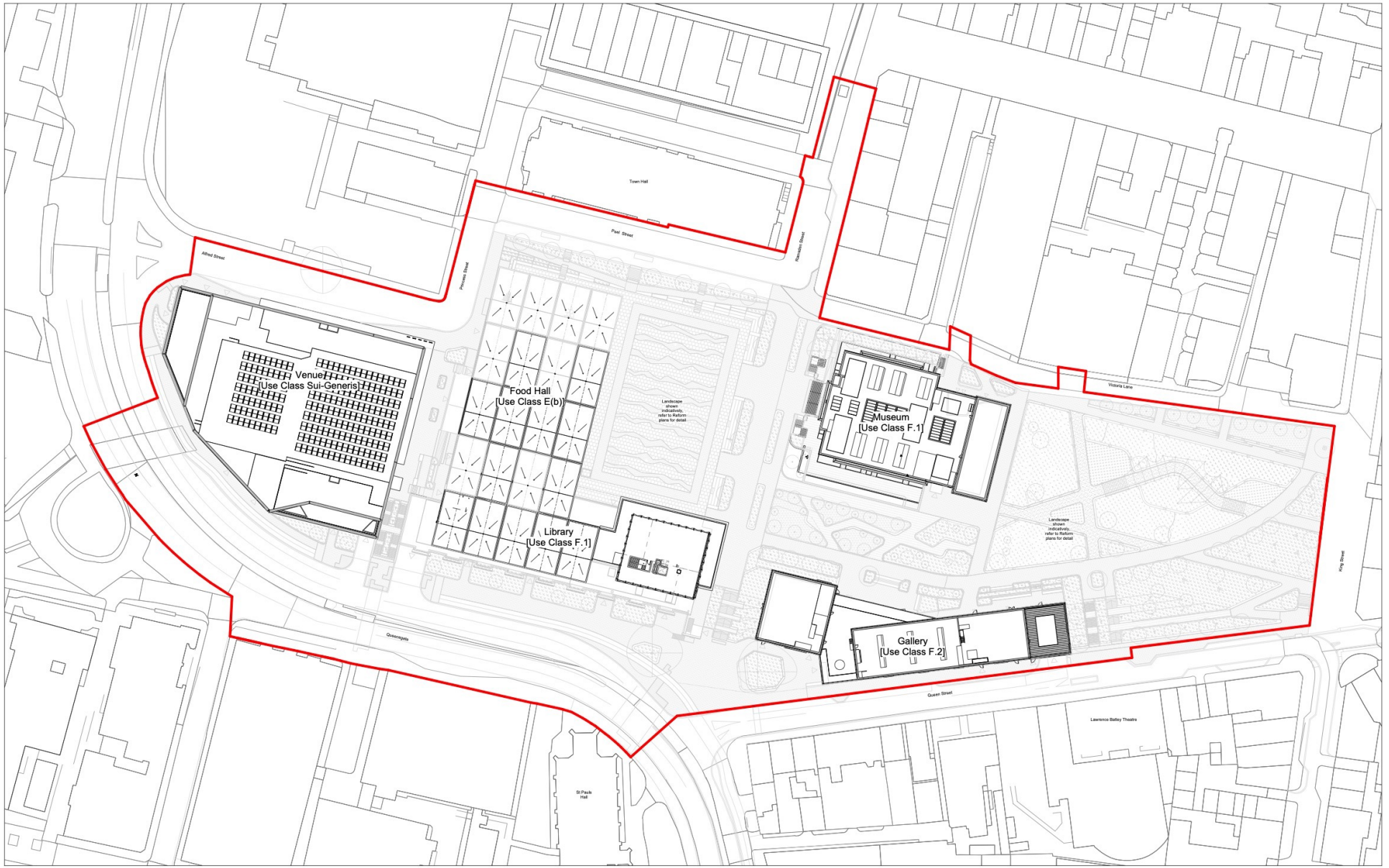


250+ kWh/m^2_{fp}

Specific energy generation

Maximising PV potential at KCH

Roof plan for the masterplan showing the allocation of PV panels



5 | Sustainability

Sustainability targets beyond energy and carbon

Beyond energy and carbon, the team has sought to achieve very good levels of sustainability A summary of the key themes have been presented on this page.

Throughout the project's design development, the team worked to ensure that the requirements and targets were embedded within the decision making and design.

The site was also evaluated to review the opportunities for material retention and re-use in line with circular economy principles.

Additionally the landscape and SuDs strategy was developed in tandem to ensure that the inherent benefits were aligned and integrated into the design proposals.

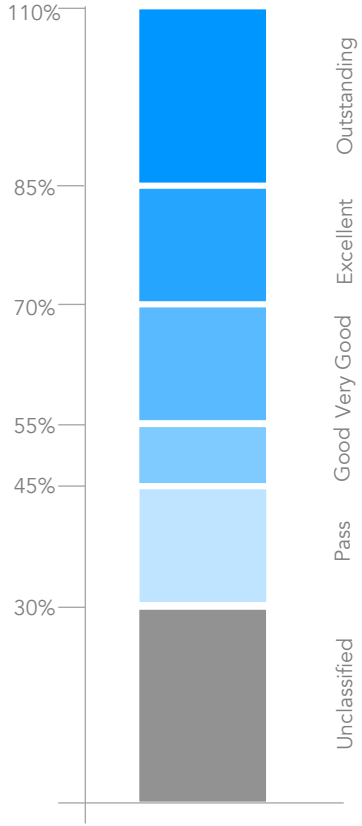
Summary | BREEAM

Requirements

In response to Kirklees Council planning policy it is anticipated that all buildings will undertake a BREEAM assessment with the aspiration of "Excellent" being achieved.

Application of BREEAM to Kirklees

With the scheme being a mixed use non-domestic masterplan, there will be several non-domestic elements of the development proposed which will need to be assessed using BREEAM.



BREEAM New Construction (NC UK 2018)

BREEAM Refurbishment (RFO 2014)

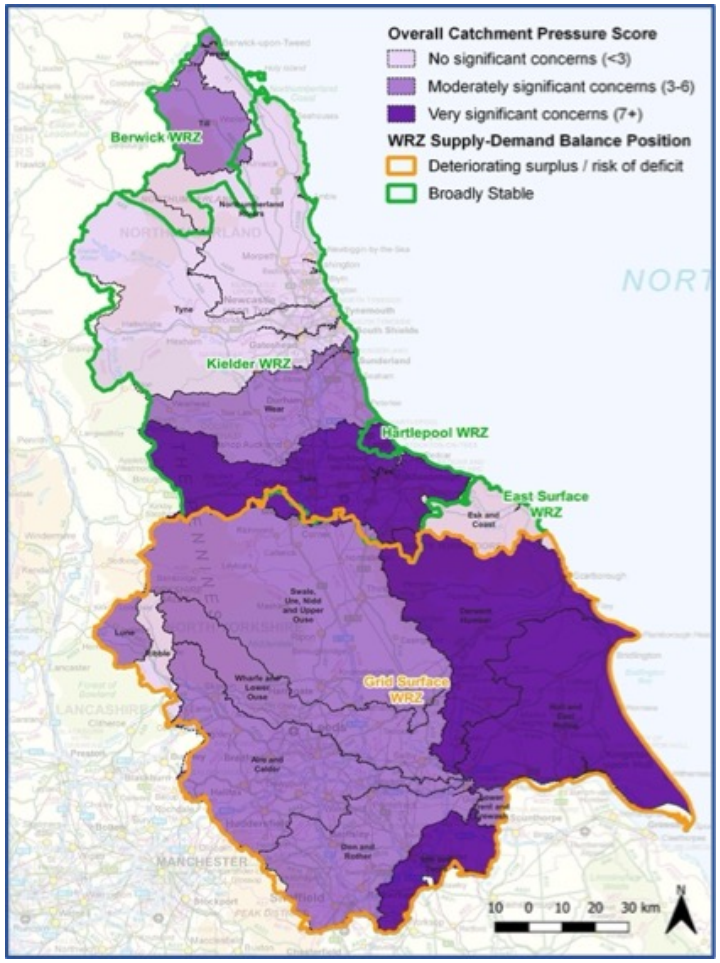
Site view of Kirklees Cultural Heart masterplan showing the proposed development areas (source: FCBS)

Context

Our fresh water resources are coming under increasing pressure. On review of the current position on water use in the Kirklees areas (Aire and Calder catchment), Water Resources North suggest there are currently no significant concerns. When looking forward however, given the impacts of climate change and increased use, it is suggested there are moderately significant concerns associated with water catchments deteriorating and catchments are at an increased risk of deficit.

Considering this, Water Resources North suggest measures to reduce water use in the Aire and Calder catchment. Practically at a building or project level, measures such as demand reduction for reducing leakage and customer use are suggested by Water Resources North as strategies to reduce water use pressure.

Given this context, it is proposed to set potable water use targets for the buildings and landscape on the Kirklees Cultural Heart to align with the recommendations of Water Resources North.



The Water Resources Position Statement (2021) from Water Resources North confirms there is a deteriorating surplus and risk of deficit to Kirklees Council District and wider Water catchment area.

Sustainability | Water consumption

Given the need for reduced water use for the project, a review of industry best practice guidelines and targets have been reviewed as means of ensuring best practice is achieved.

RIBA 2030 Climate Challenge Targets

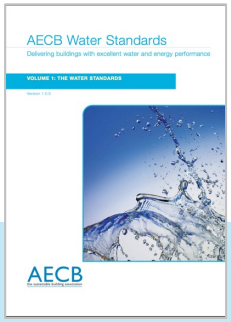
The RIBA 2030 Climate Challenge sets targets for residential and non-residential buildings.

For non-domestic buildings, target the RIBA 2030 Climate Challenge target for water consumption of < 13 l/p/day. This is a suitable target to use as it aligns to good practice, and can be achieved without the need for rainwater or greywater recycling systems.

Adopting AECB water standards

The AECB water standard defines good and best practice in water and energy performance in buildings.

For ultra-low energy efficient buildings the energy required to heat hot water can exceed the energy required for space heating. For these reasons, the AECB Water Standards prioritise hot water savings and are a suitable standard to target.



Appliance / Fitting	AECB Good Practice Fittings Standard
Showers	6 to 8 l/min measured at installation. Mixer to have separate control of flow and temperature although this can be achieved with a single lever with 2 degrees of freedom (lift to increase flow, rotate to alter temperature). All mixers to have clear indication of hot and cold, and with hot tap or lever position to the left where relevant.
Basin taps	4 to 6 l/min measured at installation (per pillar tap or per mixer outlet). All mixers to have clear indication of hot and cold with hot tap or lever position to the left.
Kitchen sink taps	6 to 8 l/min measured at installation. All mixers to have clear indication of hot and cold with hot tap or lever position to the left.
WCs	≤ 6 l full flush when flushed with the water supply connected. All domestic installations to be dual flush. All valve-flush (as opposed to siphon mechanism). WCs to be fitted with an easily accessible, quarter turn isolating valve with a hand-operated lever. Where a valve-flush WC is installed, the Home User Guide must include information on testing for leaks and subsequent repair.
Baths (where applicable)	≤ 180 litres measured to the centre line of overflow without allowing for the displacement of a person. Note that some product catalogues subtract the volume of an average bather. A shower must also be available. If this is over the bath then it must be suitable for stand-up showering with a suitable screen or curtain.

AECB Water Standards - Delivering buildings with excellent water and energy performance.

Refer to the full AECB Water Standard documents Volume 1 and Volume 2 for more information.

Sustainability | Water consumption

Climate change is bringing a higher incidence of prolonged, heavy rainfall and with it increased risk of flooding across all areas - both from rivers and overwhelmed surface water drainage systems. In the future this will increase. It is necessary to plan for flood events in the design of all buildings and their environments.

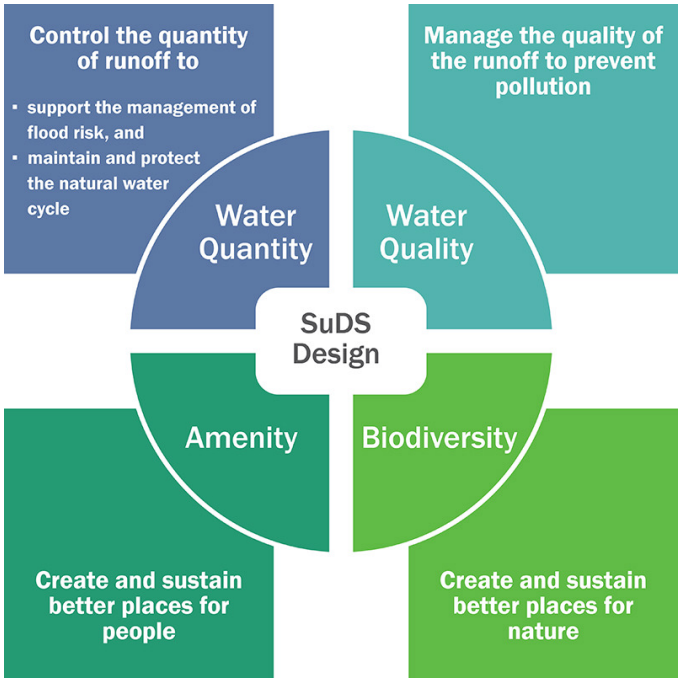
Sustainable Urban Drainage

Sustainable Urban Drainage systems help to manage surface water run-off at source through absorbing water, retaining it and releasing it slowly through evaporation or controlled release to sewers or watercourses.

- SuDs should be designed in from the beginning of the project.
- Store water – through rainwater harvesting, green roofs, permeable paving, bioretention systems (e.g. rain gardens), trees, ponds and soakaways.
- Increase infiltration – through creating permeable surfaces.
- Intercept rainfall - Vegetation, especially tree leaves, intercept rainfall so it doesn't reach the ground.

Greenfield Run-Off Rates

As per the Stage 1 Energy and Sustainability suggested KPIs by T&T, it is recommended the Kirklees site should reduce run-off rates more than the minimum regulatory requirements. The recommendation is to target run-off rates that are a 40% on greenfield run-off rates.



SuDS can deliver multiple benefits

CIRIA's SuDS manual is structured around "Four Pillars" of SUDs design. SUDs should be designed and implemented to achieve co-benefits of improving water quality, providing amenity for people and habitat for biodiversity.

Flood risk and Drainage

In support of the planning application, Arup undertook a Level 2 Flood Risk Assessment (FRA), on behalf of Kirklees Council to support a planning application for the development of Kirklees Cultural Heart, a new vibrant cultural hub of leisure, arts and music. The proposals will see the library and market buildings retained for new uses and the Piazza Shopping Centre demolished to make way for a new town park.

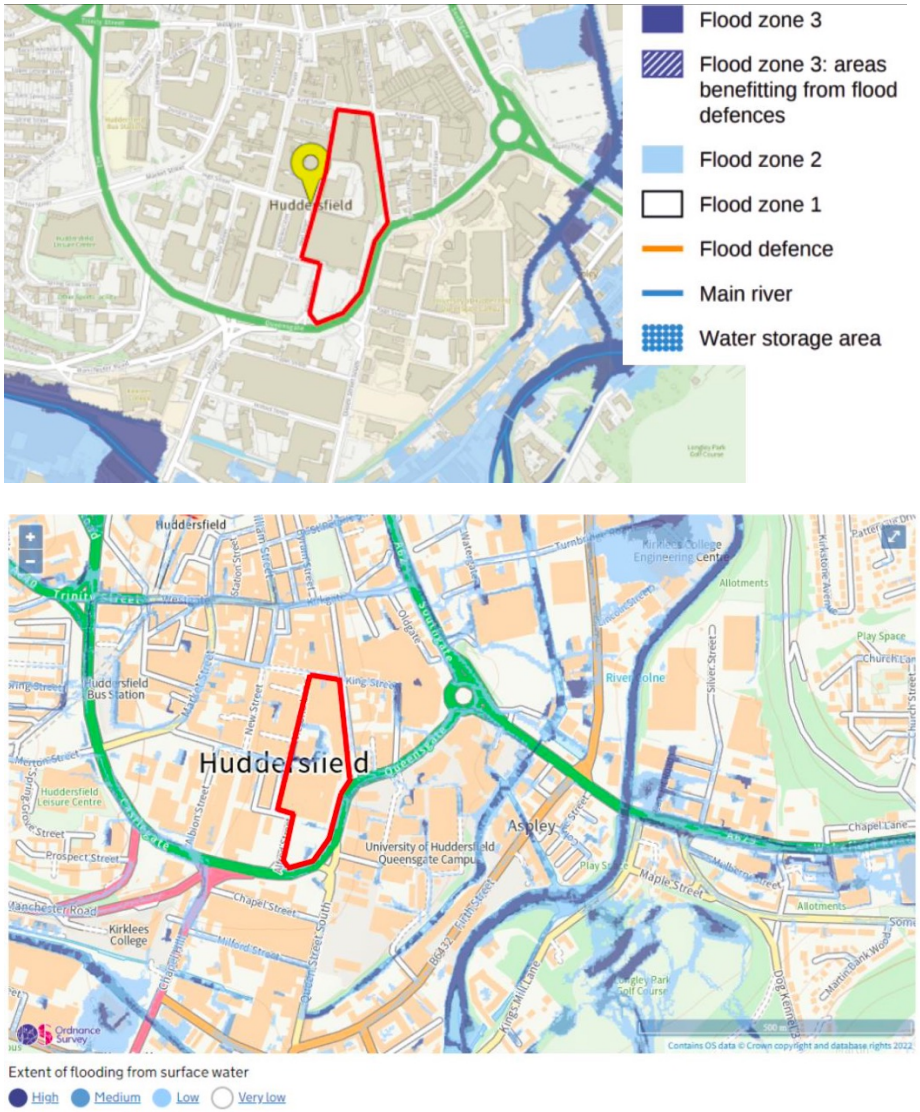
This FRA has been prepared in line with the National Planning Policy Framework (NPPF) updated in July 2021 and associated guidance. It has been prepared using existing available information. The scope of this assessment has comprised:

- Gathering existing information pertaining to flood risk to the site
- Identification of potential sources and mechanisms of flooding
- Assessment of flood risk to the development, and potential off-site impacts of the proposals
- Identification of measures for mitigation and management, where appropriate, to reduce flood risk to acceptable levels.

The site is identified in Flood Zone 1. Areas in Flood Zone 1 are subject to less than 0.1% annual probability of fluvial flooding. There is a surface water flooding risk present on the site. The lower-level areas outside of the existing Library and Piazza Shopping Centre are the main areas highlighted to have a 'high' risk of surface water flooding. High risk is defined as an area that has a chance of flooding of greater than 3.3% each year.

In a major storm rainfall event, following failure of the drainage infrastructure, this area is likely to pond due to the existing site topography. The Lead Local Flood Authority, Kirklees Council, do not have records of flooding at the site.

Full details can be seen in the Flood Risk Assessment and Drainage Strategy issued in support of the planning application.



Environment Agency – Fluvial/Tidal Flood Risk Map and Surface Water Flooding. (source: EA flood warning information)

A Transport Assessment has been produced by Arup who have been commissioned by Kirklees Council in connection with the proposed development of the Kirklees Cultural Heart. Full details of the transport strategy is described in the Arup Transport Assessment and supporting draft Travel Plan.

A short summary of the key outcomes are summarised on this page.

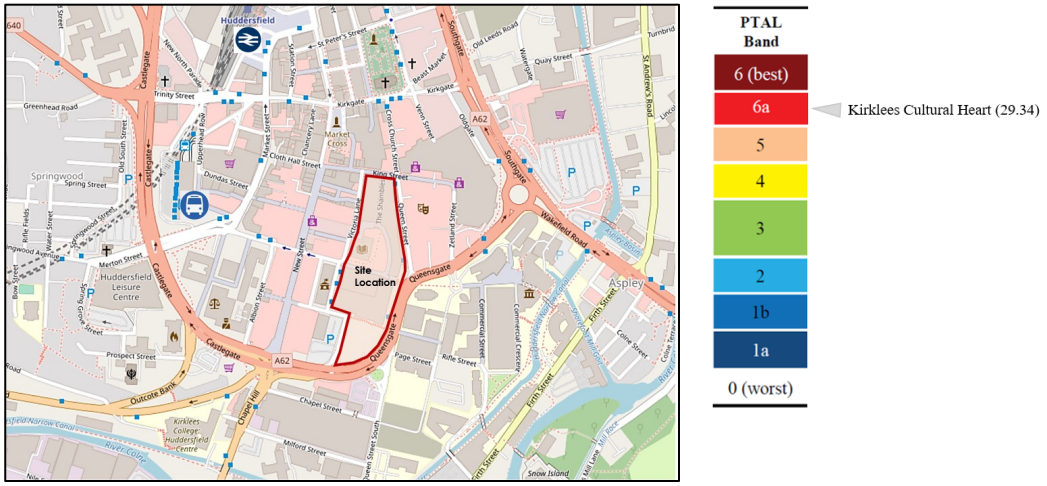
Accessibility to public transport

To demonstrate the public transport accessibility of the site, a Public Transport Accessibility Level (PTAL) score has been calculated for the site area. This is based on the BREEAM UK methodology and considers the distance to public transport nodes (bus stops, bus station, rail station) and frequency of services available. An Accessibility Index score of 29.34 is achieved for the Kirklees Cultural Heart scheme which represents a very high level of access to public transport services as illustrated on this page.

Cycle storage and infrastructure

The Proposed Development will provide secure and covered staff parking within each individual building with provision of 1 space per 10 staff and include shower, changing facilities and lockers.

Long stay secure and cycle parking for up to 140 cycles will be provided for visitors. Additional secure cycle lockers located to the rear of the Museum will provide parking for 7 cycles. In addition, a total of 51 Sheffield stands will provide short stay cycle parking for 104 cycles at seven locations around the site including near each building and within the public realm. 5% of cycle parking spaces will accommodate larger or adapted cycles.



Site location with local transport noted and PTAL rating for the site - Arup

Conclusions

The transport assessment demonstrates that the proposed KCH scheme can be accommodated on the local transport network. The scheme proposals enhance pedestrian and cycle connectivity and connect with existing sustainable travel modes including good access to bus and rail services. New car parking is proposed that can accommodate the majority of the KCH scheme parking demand with additional car parking capacity available in the town centre. The highway assessment demonstrates that the forecast vehicle trips can be accommodated on the local highway network.

The Transport Assessment identifies some elements where further detail is required and which could be secured through appropriate planning conditions. This includes development of an Events Management Plan. A Construction Environmental Management Plan will also need to be developed further prior to construction.

Overall, based on the analysis presented in the Transport Assessment submitted for planning, it is considered that the transport impacts of the proposed Development can be satisfactorily accommodated on the transport network.

An operational waste management plan has been produced by Arup who have been commissioned by Kirklees Council in connection with the proposed development of the Kirklees Cultural Heart.

In line with the environmental aspirations of the Kirklees Cultural Heart (KCH) Development (the proposed development), the waste plan details the construction Site Waste Management Plan (SWMP) and operational waste strategy for the project.

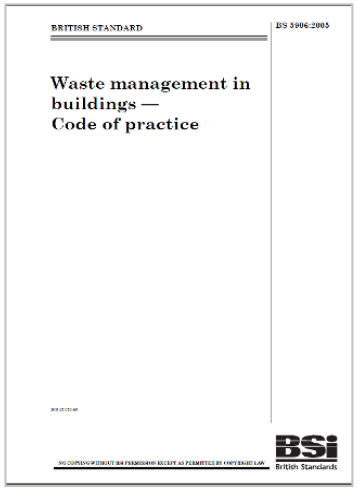
The waste strategy advocates the use of more recycled materials and mainstream products with higher recycled content to promote a circular economy. The UK is striving to move towards a circular economy where resources are in use as long as possible to maximise value, minimise waste and promote resource efficiency.

This commercial recycling and waste strategy demonstrates how waste and recyclables will be stored, transferred and collected at the proposed development. The strategy has been developed to comply with the recycling and waste requirements of Kirklees Council, as set out in their guidance document. It also demonstrates how the proposed development will satisfy the Building Regulations.

Compliance with this waste strategy will ensure there are sufficient waste storage areas across the proposed development to segregate waste and recyclables, appropriate commercial waste storage areas and suitable access for refuse collection vehicles (RCVs).

The commercial waste storage areas in the proposed development meet the necessary waste requirements. This includes sufficient space to enable the segregation of recyclable materials to limit the quantity of waste sent for disposal. There will be separate and clearly marked recycling and general waste bins.

Full details will be provided in the Kirklees Cultural Heart Waste Strategy.



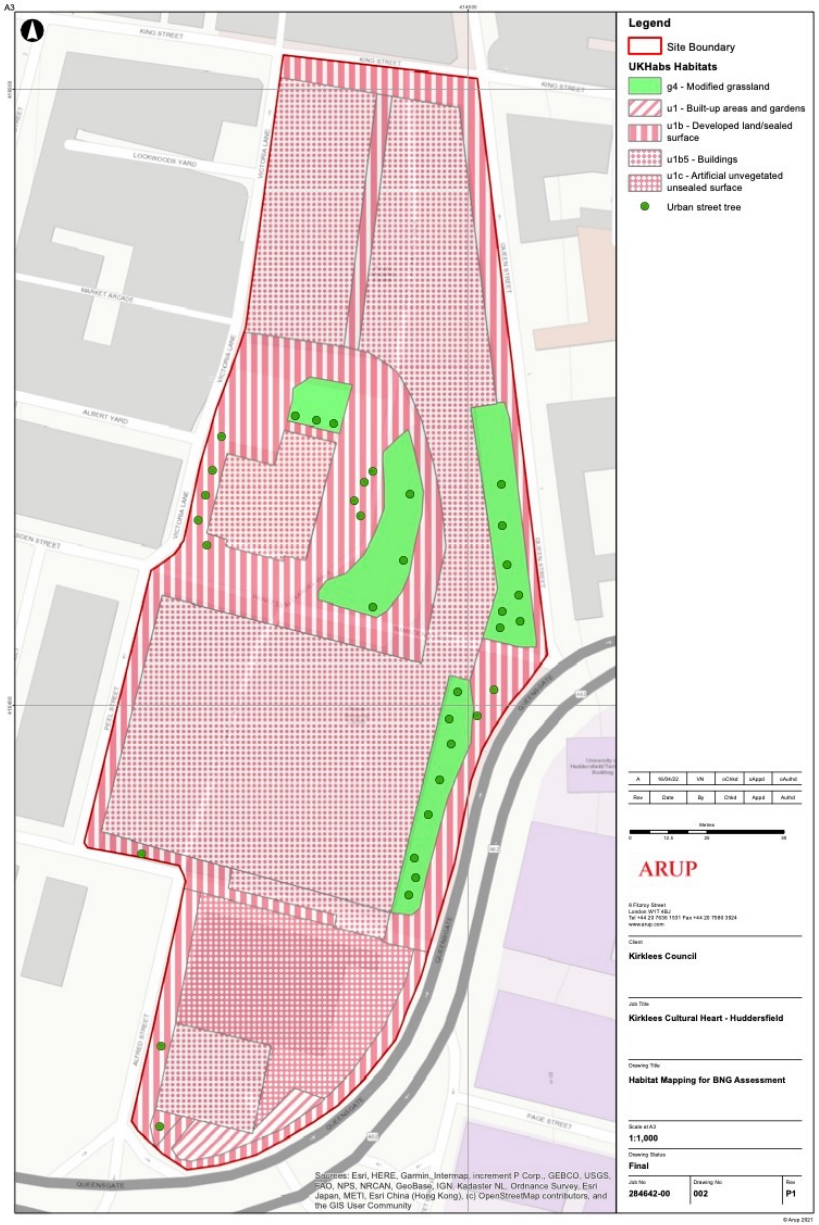
BS 5906:2005

Approved document H6 of the building regulations (2010)

Arup were appointed as the specially qualified ecologist to support the project, to evaluate the baseline conditions, and to provide input into promoting biodiversity for the site.

A survey was conducted in January 2022 by a suitably experienced ecologist. The surveyor assessed the habitats on site, identifying changes from the previous PEA where applicable. Habitats were mapped according to the UK Habitats Classification system to provide compatibility with the Biodiversity Net Gain metric.

As part of the survey, the potential for the site to support any legally protected or notable faunal species was also assessed. Detailed faunal surveys were not undertaken at this stage; rather the potential for the site to support each species or species group was assessed based on the known range of each species or species group, and the suitability of the habitats within the site. Field signs or sightings of such species were recorded as observed.



Habitat condition information was collected for relevant (i.e. semi-natural) habitats, in order to inform a subsequent BNG baseline assessment. This included small areas of amenity grassland and scattered urban trees. Condition assessments were completed using the condition assessment protocol detailed in the Defra Biodiversity Metric 3.0 technical supplement. Areas of developed land including buildings, roads and other sealed surfaces do not require condition assessment to be undertaken.

The initial iteration of the BNG metric was based on an early draft of the landscape proposals produced by Re-form Landscape Architecture. This assessment demonstrated an uplift of 1.07 Habitat Units, equivalent to 46.13%. Whilst this is a positive outcome, it did not quite meet the target of 50%.

Arup Ecologists subsequently held a meeting with the landscape team to discuss options that could improve the site outcomes for biodiversity, including increased tree planting, and provision of a species-diverse wildflower grassland mix in place of some areas of mowed lawn.

Following these meetings, improvements to the landscape proposals were incorporated and a BNG metric is now showing a 55.68% uplift based on the pre-existing site conditions.

On-site baseline	*Habitat units*	2.32
	Hedgerow units	0.00
	River units	0.00
On-site post-intervention (Including habitat retention, creation & enhancement)	*Habitat units*	3.61
	Hedgerow units	0.00
	River units	0.00
On-site net % change (Including habitat retention, creation & enhancement)	*Habitat units*	55.68%
	Hedgerow units	0.00%
	River units	0.00%

Summary of BNG score – Arup and Re-Form landscape

An air quality assessment has been produced by Arup who have been commissioned by Kirklees Council in connection with the proposed development of the Kirklees Cultural Heart.

On review of this report, it is states that the Kirklees Council Air Quality Action Plan provides a summary of the current air quality in the borough and sets out the actions to improve it between 2019 and 2024. The Air Quality Action Plan outlines the Council's plan to effectively use local levers to tackle air quality issues. The Air Quality Action Plan is organised around 11 broad topics of alternatives to private vehicle use; environmental permits; freight and delivery management; policy guidance and development control; promoting low emission plants; promoting low emission transport; promoting travel alternative; public information; transport planning and infrastructure; traffic management; and vehicle fleet efficiency.

Conclusions and Mitigation

A review of current legislation, planning policy and a baseline assessment describing the current air quality conditions in the vicinity of the Site were also carried out. The Site does not contradict policy or legislation relating to air quality. Current monitoring undertaken by Kirklees Council (KC) shows that there are a number of roadside locations where the NO_2 annual mean objective (40µg/m^3) was exceeded in 2019. The Site is located in Kirklees AQMA 9 declared due to exceedances of the NO_2 annual mean objective (40µg/m^3).

No information on construction traffic was available at the time of writing. Impacts from construction traffic will be assessed following the latest IAQM guidance, once available.

The relevant air quality objectives for NO_2, PM_{10} and $PM_{2.5}$ are predicted to be met at all existing and proposed human receptors. The impact of operational traffic as a result of the Site is predicted to be negligible at all human receptors. The effect of the Site on local air quality is therefore not significant.

Kirklees Cultural Heart
DOC Name
Doc Number