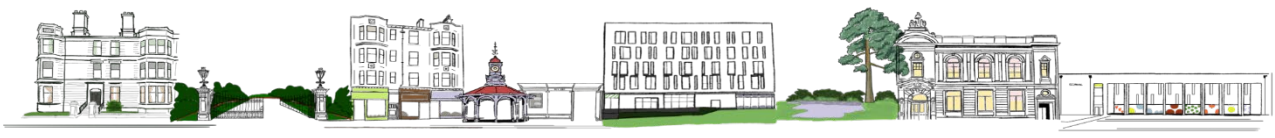
Glasgow City Council

City Development Plan 2

Evidence Report

Net Zero, Mitigation, Adaptation and City Development Plan 2

March 2024



A route map to producing City Development Plan 2 in a way that will reduce, minimise, or avoid Greenhouse Gas Emissions and adapt to a changing climate.

1. Purpose of City Development Plan 2 and this report

The purpose of City Development Plan 2 (CDP2) is to set out how land is to be used or developed in Glasgow. The Plan will be an equally important tool for communities and landowners, including the Council, that will shape the city's development into the late 2020s and beyond.

The purpose of this report is to scope and set a route map for producing CDP2 so that its policies and land allocations will reduce, minimise, or avoid greenhouse gas emissions, as directed by National Planning Framework 4 (NPF4).

Mitigation and adaptation to climate change is and will be a complex process. As such, this document is intended to scope what is required of CDP2 by setting out the steps/additional studies required to the produce the proposed plan. The Development Plan team is producing an evidence report in preparation of the proposed plan. This report will enhance other evidence report documents by bringing together all relevant strategies and policies that relate to climate change and net zero emissions relating to Glasgow/Scotland.

The following information required by the Scottish Government are in enclosed in this report:

- Existing sources of and the scale of greenhouse gas emissions, including local sources.
- Likelihood and severity of climate risks to the area, both currently and in the future.
- Effect of climate change on different geographies and populations in Glasgow in order to understand unevenly felt effects, relationship with inequalities and potential for CDP2 to decrease or increase vulnerability.
- Available information on expected emissions linked to proposals with planning permission that are yet to be constructed. *

**It has not been a requirement of the planning consents process to request information on the expected emissions from proposals that have yet to be constructed and the Scottish Government has not identified a standard methodology that should be used to do this. As such, this information is not currently available.*

In scoping what is required, the report will also establish where CDP2 is limited in reducing emissions and adapting to climate change. This recognises that whilst CDP2 will play a leading role in future land use decision-making, there are many areas where planning is limited in respect of intervention. This serves as a reminder that other Council services and strategies, the Scottish and UK Government, and the private sector will equally need to act to achieve the stated goals set in legislation.

2. Land use planning and climate change

Land use planning in Britain has, by tradition, been concerned with the shape and function of space for the benefit of society. The planning system is administered locally through three key functions:

- **Development planning** – setting out how places should change in the future through strategies and policies via producing the local development plan.
- **Development Management** – making balanced decisions on planning applications which must be guided by the local development plan.
- **Enforcement** – ensuring that development is carried out correctly and taking appropriate action where it has not been.

The Planning (Scotland) Act 2019 states that the purpose of planning is to manage land in the public interest.[1] The public interest, in this instance, is defined as anything which contributes to 'sustainable development' or achieves the National Outcomes.[2]

The recent elevation of climate change as a key policy issue for land use planning sits within a broader historical context. Environmental concerns have underpinned the land use planning system since its origin in the late 19th century. Land use plays a fundamental role in determining the extent of greenhouse gas emissions both directly from development and indirectly through the location and form of development (induced emissions).[3] Since 2009, it has been a legal requirement for development plans to include greenhouse gas emissions policies. NPF4 sets further expectations on local development plans to aid in tackling the climate emergency and nature crisis through the local development plan's spatial strategy and policies.

NPF4 Policy 2: Climate Mitigation and Adaptation

NPF4 now forms part of the statutory development plan. As such, the policies enclosed within NPF4 are relevant for decisions on planning applications and will form the basis of City Development Plan 2 via the spatial strategy and any subsequent policy development beyond what NPF4 specifies. NPF4 specifies that all 33 policies are relevant for Policy 1: Tackling the Climate Emergency and Nature Crises and Policy 2: Climate Mitigation and Adaptation but singles out a range of specific policies that will work towards reducing greenhouse gas emissions which are covered in greater detail in in section 5.[4]

NPF4 also sets out the following role for the planning system and requirement of Local Development Plans in Policy 2 Climate mitigation and adaptation:

[1] Planning (Scotland) Act 2019
[2] National Outcomes
[3] The Urban Dimensions of Climate Change
[4] NPF4 page 8

- **NPF4 Policy Intent:** To encourage, promote and facilitate development that minimises emissions and adapts to the current and future impacts of climate change.

- **NPF4 Policy Outcomes:** Emissions from development are minimised; and our places are more resilient to climate change impacts.

NPF4 Local Development Plan Requirement: The LDP spatial strategy should be designed to reduce, minimise, or avoid greenhouse gas emissions, in line with city policy and legislated targets. The six spatial principles* should form the basis of the spatial strategy, helping to guide development to, and create sustainable locations. The strategy should be informed by an understanding of the impacts of the proposals on greenhouse gas emissions. LDPs should support adaptation to the current and future impacts of climate change by taking into account climate risks, guiding development away from vulnerable areas, and enabling places to adapt to those risks.

**Just transition, conserving and recycling assets, local living, compact urban growth, rebalanced development, rural revitalisation.*

Forthcoming documents will provide further information on the role of planning in climate mitigation and adaptation:

1. The Scottish Government are bringing forward a draft of the next Climate Change Plan by November 2023 (delayed) which will set clear asks for all of the main actors on delivering climate policy. In addition, we are working closely with COSLA and Local Authorities on the development of a framework to accelerate and coordinate joint action in support of this agenda.

2. Climate Change Planning Guidance (expected 2025) - NPF4 'Policy 2' – 'climate mitigation and adaptation' seeks to encourage, promote, and facilitate development that minimises emissions and adapts to the current and future impacts of climate change. The guidance is intended to aid the integration of climate considerations into development proposals, with the aim of avoiding maladaptation, reducing emissions, and enhancing resilience to climate risks. Of particular interest in the preparation of this guidance are:
    - methods and tools for responding to the climate challenge; and
    - qualitative and quantitative approaches that may help measure the extent or effectiveness of mitigation and adaptation actions that are applied to development design and construction/ operation.

3. Greenhouse Gas Emissions in Scotland and Glasgow

Scotland's Greenhouse Gas Emissions

Scotland's aggregate Greenhouse Gas Emissions (GHG) are measured as MtCO2e which stands for *Mega Tonnes of CO_2 Equivalent*. 1 mega tonne is 1 million tonnes. As of 2021, Scotland's total greenhouse gas emissions stood at 41.6 MtCO2e, or 41.6 million tonnes of CO_2e. This represents a 49.2% reduction from the 1990 total of 81.9 MtCO2e. The Scottish Government have published a sector-based greenhouse gas emission reduction plan from 2018-2032 with decarbonisation pathways for each sector[5]. The plan would see emissions fall by approximately 50% by 2030 and 56% by 2032. It should be noted that a 2.4% increase in emissions was recorded in 2021, against the 39.5 mtCO2e expected of the report. The report also expects that negative emissions technologies would not come into operation before 2029.

Glasgow's Greenhouse Gas Emissions

Glasgow City Council's Greenhouse Gas Emissions have been calculated by the UK Government[6]. The database measures greenhouse gas emissions as kilo tonnes of CO_2e (kt CO_2e).

The two highest emitting categories in Glasgow are domestic energy and transport. Using the 2021 figure, they are at approximate parity of 773.6 kt CO_2e (773,600 tonnes) and 761.4 kt CO_2e (761,400 tonnes), respectively. Each category represents ~28% of Glasgow's total GHG of 2,710.2 kt CO_2e in 2021, (see figure 3). This is 2.7 mtCO_2e of Scotland's 41.6 mtCO_2e total. The city's per capita emissions have decreased from 8.9 tCO_2e (tonnes of CO_2) in 2005 to 4.3 tCO_2e in 2021. If Glasgow's emissions are to fall over the same period as that of the aforementioned emissions reduction plan for Scotland, emissions would need to fall to 1.1 mtCO_2e in Glasgow by 2030. Over the same period the city's population has grown from 569,200 in 2005 to 635,100 residents in 2021.

[5] Scottish Government Climate Change Plan Third Report Proposals-Policies 2018-2032

[6] UK Local Authority and Regional Greenhouse Gas Emissions National Statistics 2005 - 2021

As Figure 1 illustrates the relative size of each sector's emissions in Glasgow and Scotland's total. Generally, each category is proportionately similar except in the area of Agriculture, LULUCF[7] and Industry which are markedly smaller in Glasgow than the rest of Scotland. This is intuitive, considering Glasgow's urban character and the legacy of deindustrialisation.

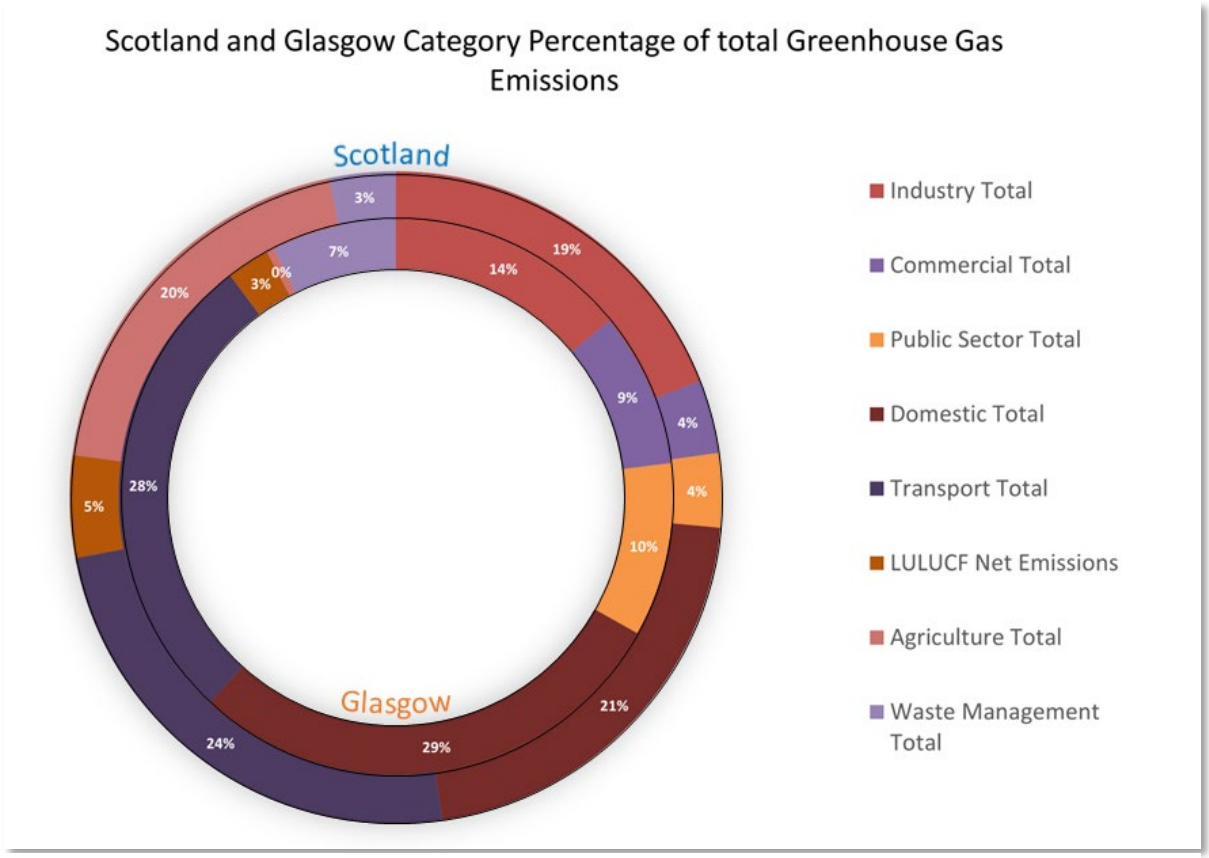
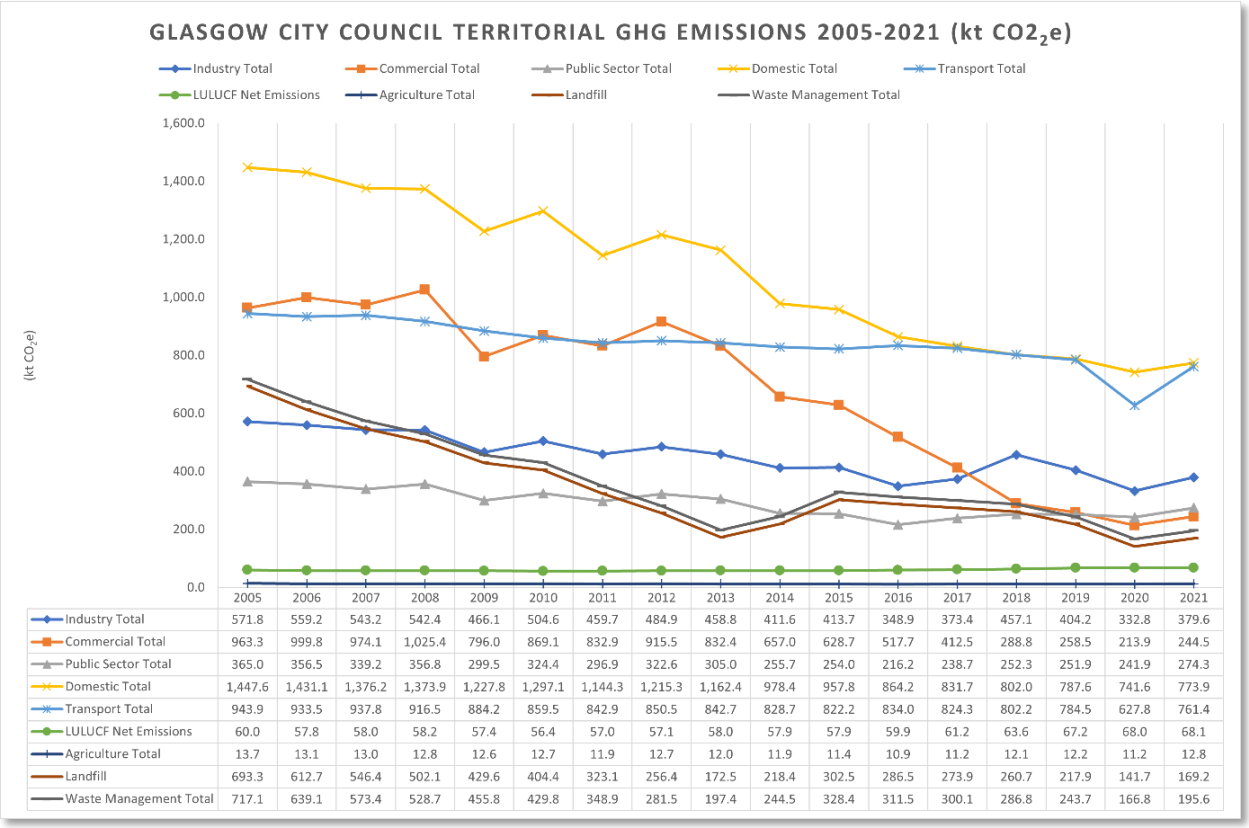


FIGURE 1

[7] The LULUCF sector covers emissions and removals of greenhouse gases resulting from direct human- induced Land Use, Land-Use Change and Forestry activities.



	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
Industry Total	571.8	559.2	543.2	542.4	466.1	504.6	459.7	484.9	458.8	411.6	413.7	348.9	373.4	457.1	404.2	332.8	379.6
Commercial Total	963.3	999.8	974.1	1,025.4	796.0	869.1	832.9	915.5	832.4	657.0	628.7	517.7	412.5	288.8	258.5	213.9	244.5
Public Sector Total	365.0	356.5	339.2	356.8	299.5	324.4	296.9	322.6	305.0	255.7	254.0	216.2	238.7	252.3	251.9	241.9	274.3
Domestic Total	1,447.6	1,431.1	1,376.2	1,373.9	1,227.8	1,297.1	1,144.3	1,215.3	1,162.4	978.4	957.8	864.2	831.7	802.0	787.6	741.6	773.9
Transport Total	943.9	933.5	937.8	916.5	884.2	859.5	842.9	850.5	842.7	828.7	822.2	834.0	824.3	802.2	784.5	627.8	761.4
LULUCF Net Emissions	60.0	57.8	58.0	58.2	57.4	56.4	57.0	57.1	58.0	57.9	57.9	59.9	61.2	63.6	67.2	68.0	68.1
Agriculture Total	13.7	13.1	13.0	12.8	12.6	12.7	11.9	12.7	12.0	11.9	11.4	10.9	11.2	12.1	12.2	11.2	12.8
Landfill	693.3	612.7	546.4	502.1	429.6	404.4	323.1	256.4	172.5	218.4	302.5	286.5	273.9	260.7	217.9	141.7	169.2
Waste Management Total	717.1	639.1	573.4	528.7	455.8	429.8	348.9	281.5	197.4	244.5	328.4	311.5	300.1	286.8	243.7	166.8	195.6

FIGURE 2

Glasgow City Council's Net Zero target

The recently approved Glasgow City Council **Carbon Management Plan 3** sets out the remaining reductions required to achieve the 2030 net zero target. Broadly the plan states the following areas of focus to meet the target:

- Buildings
- Other Energy (consumed by Council assets outside the estate, e.g., street lighting)
- Fleet
- Waste
- Business Travel
- Procurement
- Staff Engagement
- Energy Generation
- Offsetting

Additionally, the Net Zero Route map, in development, will evaluate various technical and economic scenarios and advise on the most appropriate and expedient route to Net Zero Carbon emissions, develop a protocol for prioritisation of actions to focus available resource where it will make most impact in delivery of the Climate Plan.'

CDP2 will need to support the Council's above-stated decarbonisation aims as well as play a strategic role in facilitating decarbonisation across the city's economy. It must be stressed that the land use planning system is not the only regulatory tool that can be deployed by the Council in this pursuit. CDP2 can shape policy around issues where planning permission is required but otherwise will need to conform to plans/policies from the relevant authorities.

The Council has set a net zero target for 2030 for its estate whilst the Scottish Government have set a net zero target of 2045 for its estate and the country as a whole. CDP2 is scheduled to be adopted in 2027/28 making it most relevant for the 2045 net zero goal considering the long lead in times and incremental change in the built environment. CDP2 will be most successful in directing/facilitating where adaptation in the built environment is required in order to make Glasgow a more resilient city over the coming decades and by shaping the future development of the city through the spatial strategy. Section 3 focuses on the key climate risks in Glasgow while section 4 focuses on what NPF4 requires of CDP2 and how spatial planning and planning policy can respond to the net zero challenge.

4. Key Climate Risks for Glasgow

The Met Office's projected changes to the UK and Scottish climate suggest an increased likelihood of warmer and wetter winters on average, with hotter and drier summers, and more frequent and intense extreme weather events.[8] The forecast impacts of these changes include greater threats from localised flooding, and heat stress, together with increased pressure on the habitats of plants and animals. A fuller breakdown of the climate risks for Glasgow is provided below:

Flooding, Sea level rise, and Increased precipitation

According to the World Health Organisation's Health and Climate Change Urban Profile[9], it is projected that precipitation in the Clyde River basin will increase by 42% between October to March by 2050 if global emissions remain high. Sea level rise is also expected to rise between 1.5m to 2.5m over the next 120 years, increasing the risk that areas presently experiencing occasional flooding from coastal storms or tidal surges will become intertidal or permanently underwater.[10] Presently 45,200 homes businesses and services are considered at risk for flooding (mainly surface water) in Glasgow, which is projected to increase to 57,000 by 2080, a 26% increase. Additionally, there will be increased likelihood of wet downbursts during storms. The population is considered more vulnerable to these changes based on having the highest number of people with mental health disorders in Scotland.

Heat, Drought, Urban heat island effect, and Air quality degradation

Scotland's warmest years on record have all occurred in the past 25 years. It is expected that many parts of the city will be affected by the urban heat island effect. Heatwaves typically affect the most vulnerable in society such as older and younger people. They can also exacerbate existing illnesses such as Chronic Obstructive Pulmonary Disease (COPD) and heart disease which are two of the leading causes of premature death in Glasgow. Air quality has been improving in the city although some areas continue to fail to meet the Nitrogen Dioxide (NO_2) annual mean objective to protect human health.

Health and Social Inequality

The UN report states that "Climate change is a threat multiplier to existing inequalities" which in turn affects the city's adaptative capacity. Glasgow's existing socio-spatial inequalities are well understood and frequently studied.[11] 29% of the city's population, roughly 184,000 residents, live in the most deprived deciles in Scotland. The gap in

[8] Met office climate change projections over land 2020-2099
[9] WHO: Health and climate change urban profiles 2022 focus on Glasgow
[10] Climate Exchange report considering the scoping and adaptation pathways for tidal flooding on the River Clyde
[11] See Glasgow Centre for Population Health's latest publication looking at the past 20 years of change in the city.

life expectancy between the least and most deprived areas of the city is 15 years for males and 12 years for females. Premature mortality for all ages was 12% higher than in English equivalent cities with similar demographic and historic profiles. With respect to air quality, there were 354 deaths attributable to air pollution in adults aged 25 or older, twice the number of any other Scottish City.

In respect of avoiding unintentionally increasing climate related vulnerabilities, a multi-pronged approach that addresses existing inequalities and mitigation and adaptation to climate change will be required to ensure that those that already experience heightened vulnerabilities are not further impacted. There are spatial implications to that approach which in the round are already covered in the current City Development Plan's compact urban model of growth. The issue therefore will rest on the level of adaptation to the changing climate, chiefly as they relate to flooding and increased average temperatures and extreme events in both cases.

5. Decarbonisation Policy Topics

This section is divided between the various net zero policy areas that CDP2 will need to address in either the spatial strategy or through policy. It draws on emissions data and key issues for Glasgow set out above (i.e., how can the following policy areas reduce, minimise or avoid greenhouse gas emissions). Existing Council policies and projects have been identified that specify supportive or deliverable actions for the next development plan with requirements for CDP2 stated where relevant.

5.1. Buildings

NPF4 does not have a specific buildings policy as by their purpose, most policies contained within NPF4 will have an influence on buildings. As noted in section 2, buildings, whether through their design, use, construction, or demolition, are significant greenhouse gas emitters and the decarbonisation of proposed and existing buildings will be required to achieve net zero.

Construction accounts for about 50% of all waste in Scotland—the equivalent of 7.4 million tonnes of waste every year—and represents the largest source of waste in Scotland. Globally, it is generally acknowledged that the built environment is responsible for 38% of emissions. Of this, a quarter of the emissions can be attributed to manufacturing of the building materials such as steel, glass, and cement. Much of the rest is from the use phase of buildings.

The Circular Economy, Enabling the Transition Towards Net Zero Report identifies 3 clear opportunities to decrease the material and carbon footprint of construction as a means of reducing overall emissions from the built environment- the adoption of circular design principles that minimise waste, the optimisation of buildings for energy efficiency and for energy usage and the incorporation of materials and components that are regenerative or re-used.

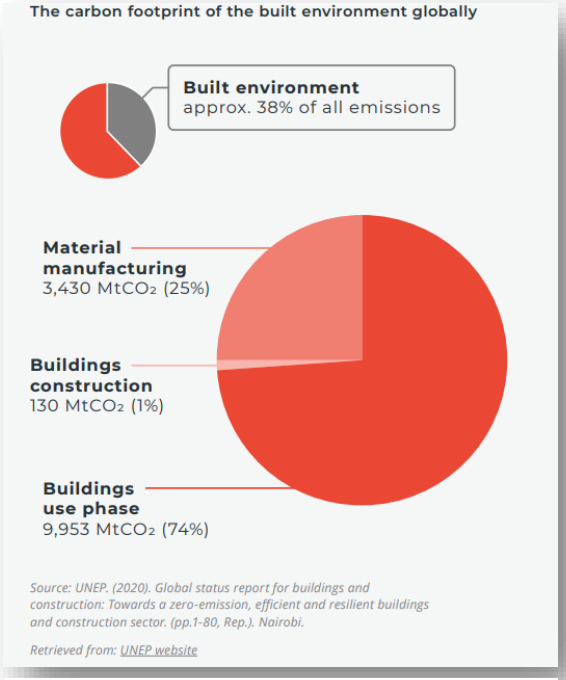


FIGURE 3

Significant progress has been made in defining what 'net zero' means for buildings in the UK, however, there is still no single, agreed methodology. The UK Net Zero Carbon Buildings Standard, which is currently under-development, will enable industry to robustly prove their built assets are net zero carbon and in line with national climate targets.

The approach will be applicable to both existing and new buildings (e.g., Homes, Offices, Education, Industry, Retail, Hotels, Healthcare etc.). To start, the focus will be on the most common building typologies, especially those for which industry stakeholders have already robust performance data available to inform the setting of performance targets. The Standard will not apply to infrastructure.

The Scottish Government is committed to all buildings achieving net zero emissions by 2045 and over 2023 has been investigating how to deliver a Scottish equivalent to Passivhaus standards to be incorporated into the building regulations for new domestic and non-domestic buildings to ensure that all new housing is built to Passivhaus (or an agreed Scottish equivalent) within the next 5 years. A Social Housing Net Zero Standard (SHNZS) is also under development by the Scottish Government.

NPF4 National Development: Circular Economy Materials Management Facilities (Scotland wide) states: "This national development supports the development of facilities required to achieve a circular economy. This sector will provide a range of business, skills, and employment opportunities as part of a just transition to a net zero economy. The range and scale of facilities required to manage secondary materials and their circulation back into the economy is not yet clear. However, sites and facilities will be needed to retain the resource value of materials so that we can maximise the use of materials in the economy and minimise the use of virgin materials to reduce greenhouse gas emissions. This is particularly significant for the construction and demolition industries and decommissioning industry. Careful assessment of specific proposals will be required to ensure they provide sustainable low carbon solutions, include appropriate controls, manage any emissions, and mitigate localised impacts including on neighbouring communities and the wider environment."

It is expected that the Scottish Government will also be closely following the industry led development of the UK Net Zero Carbon Buildings Standard. It is important that there is a single industry agreed methodology for net zero in buildings to ensure as widespread a use as possible in order to lower greenhouse gas emissions from buildings. Ultimately, it would be best if the Standard was integrated into the Scottish Building Standards Technical Handbook which regulates the detailed design, material components and heating and cooling choices that influence the overall carbon emissions of a building.

Existing Buildings

Greenhouse gas emissions from existing buildings come largely from the type of system installed to heat or cool the building and from occupier behaviour; whether they have energy efficient appliances and how they use them and/or any technology within the building. For existing buildings, maximising their utilisation, improving their energy efficiency, encouraging a switch to clean heat (zero direct emissions heating and cooling systems for space and hot water), and preventing their demolition through adaptive reuse, circular refurbishment and retrofitting should be prioritised.

In retrofitting, improving the fabric energy efficiency measures reduces the amount of energy required to heat or cool a building, thereby minimising the operational greenhouse gas emissions from a building.

The Scottish House Condition Survey: Local Authority Analysis 2017-2019 published 23 February 2021 has been used as a reference document due to the collection of the 2021 SHCS statistics being impacted by Covid-19, however, an update has just been released Scottish House Condition Survey: 2022 Key Findings - gov.scot (www.gov.scot) on 29 February 2024. The SHCS reports that, 41% of homes in Glasgow were built before 1945 accounting for around 119,000 homes. Of this, pre-1919 homes account for 25% of the City's housing. The Local Housing Strategy reports that there are 7,700 pre-1919 tenement buildings within the city, accounting for about 68,000 flats and 9,200 pre-1919 villas/self-contained homes.

The Local Authority Analysis reports that 35% of Glasgow homes fail the Scottish Housing Quality Standard accounting for 104,000 homes. The issue of substandard housing impacts the tenures of homes differently. 46% of private rental homes (24,000), 39% of owner occupied homes (54,000), and 25% of social rented homes (25,000) fail the Scottish Housing Quality Standard making the issue much more significant in the market sector where almost half of all private rented homes fail and where over double the number of owner occupied homes than social rent homes fail the standard. The Scottish Housing Regulator Reports for 2022/23 dispute these figures, stating that 87% of social rented homes meet the Standard that year and by the following year, 95% will meet the Standard. The difference in values is due to the houses not having completed all of the safety certificate checks in relation to the new regulations around the installation of smoke alarms and therefore that the failure rate does not reflect poor build/requirement for structural repair. There are significant disrepair issues in the private sector which are major barriers to reducing emissions via retrofit.

The survey offers more detail of specific aspects of the failure including identifying that around 57,000 homes in Glasgow fail due to the Scottish Housing Quality Standard "Energy Efficient" criterion. This accounts for 19% of all homes in Glasgow. However, the survey also reports that 56% of homes, accounting for 165,000 homes in Glasgow, have an 'high' Energy Efficiency according to The Government's Standard Assessment Procedure for Energy Rating of Dwellings known as "SAP2012" or EPC Band A to C: 51% of

private rented homes (27,000), 48% of owner occupied homes (68,000) and 70% of social rented homes (70,000) – again highlighting that social rented homes appear to be much more energy efficient even at the higher end.

The “performance gap” – the difference between the SAP modelled and actual energy performance is known to be an issue meaning there are more homes that require energy efficiency measures than data suggests. Energy Savings Trust Home Analytics data suggests 82% of homes have gas heating systems, and there are a high proportion of homes in the less energy efficient bands EPC D-G that are “hard-to-treat”, pre-1919 tenements in multiple ownership and mixed use. All of this points to there being a significant challenge ahead to reduce the energy demand and decarbonise these homes to meet net zero and fuel poverty targets. The Scottish Government is currently consulting on the introduction of minimum energy efficiency standards and clean heating requirements for all tenures in the Heat in Buildings Bill and Scottish Social Housing Net Zero Standard.

The SHCS survey also provides estimates about how homes are heated and kept warm. It reports that 3% of homes in Glasgow have no central heating, 6% of homes are not connected to the gas grid, 7% have less than 100mm of loft insulation, and 40% have no wall insulation.

Despite significant investment in energy efficiency measures in Glasgow properties over the last few decades in both the private and public sector, fuel poverty has not decreased, in fact, it has increased. For Glasgow, the most recent official measure of fuel poverty (in the Scottish House Condition Survey 2019) estimated 25% of all households (around 73,000) were in fuel poverty. Since then, the city has been significantly impacted by the effects of the COVID-19 pandemic alongside rising energy prices and inflationary pressures. In cognisance of these developments, it is justifiable to assume that fuel poverty rates for households in Glasgow is significantly higher than 25%.

Poor energy efficiency is a significant contributor to fuel poverty rates across the city. The transition to a net zero carbon city must also act as a springboard to address socio-economic issues such as fuel poverty and energy resilience. The City’s Local Heat and Energy Efficiency Strategy (LHEES) therefore takes a holistic approach to heating our built environment, one that seeks to reduce demand for heat in conjunction with decarbonising the city’s heat supply as a means of ensuring Glasgow can benefit from affordable, secure, and clean heating.

A key challenge for the future will be identifying and securing the investment required to deliver LHEES and to maintain and improve existing properties, particularly market sector properties. This could be achieved through a mix of retrofit measures which improve energy efficiency and replace fossil gas heating systems in existing buildings and by avoiding demolition, opting instead to adapt and future proof buildings which are no longer fit for purpose to bring them back into use which in line with NPF4.

The Council is developing a Housing Retrofit Strategy and Delivery Plan during 2024 which will provide a delivery framework for retrofit at scale for all property types and tenures. Initial areas of focus include finding a technical and logistical solution for the city's pre-1919 tenements and a heat pump accelerator programme targeting big emitters. A cross-sector, multi-disciplinary Retrofit Advisory Group was established in January 2024 to share learning, foster collaborative working and reach consensus on the best retrofit approach to decarbonise and affordably heat the city's homes. to a City Region level, a Housing Retrofit Delivery Group has also been set up with representatives from all 8 local authorities and other stakeholder organisations.

All of these actions combined will help to lower greenhouse gas emissions from existing buildings, but they will require considerable investment and will take time to deliver.

Demolition

NPF4 Policy 7 Historic Assets & Places and NPF4 policy 12 Zero Waste, both seek to avoid demolition of buildings to conserve place, reduce environmental impact and promote circularity. An extract from NPF4 Policy 12 Zero Waste (the full policy is shown in 5.5 Waste) in states the following:

NPF4 Policy 12 Zero Waste (extract)
a) Development proposals will seek to reduce, reuse, or recycle materials in line with the waste hierarchy. b) Development proposals will be supported where they: i. reuse existing buildings and infrastructure; ii. minimise demolition and salvage materials for reuse;

Section a) and b) (i) are explicit that re-use of existing buildings and infrastructure is the default position of the policy and in most cases would be the best environmental option in terms of avoiding increased and unnecessary emissions.

The requirements in section b(ii) can only be meaningfully met through detailed guidance which should include the adoption of a national protocol on a demolition methodology which seeks to maximise the circularity of any materials arising for re-use or reimagining. The NPF4 Zero Waste Policy guidance has not yet been published, but it is hoped that the Scottish Government's Circular Economy Route Map will prioritise construction and make the necessary adjustment to the Scottish Building Standards Technical Handbook in order to expedite the reduction in emissions from this sector.

It should be noted that not every demolition requires planning consent, but most demolition will pass through building standards.

NRS Housing supports the presumption to retain, reuse & refurbish buildings from a whole life carbon perspective to reduce emissions and also to alleviate the housing emergency by avoiding the unnecessary reduction of housing supply in the city. Joint collaboration on a demolition assessment framework is required to assess building obsolescence, maximise retention and retrofit of existing buildings to preserve embodied carbon and to minimise operational carbon and energy demand, and where demolition is supported to recycle and reuse materials. The intention to produce a demolition assessment matrix is noted in the Glasgow LHS 2023-28 Delivery Plan: Priority 1 Action 14 - Produce a scoping report outlining option appraisal criteria for regeneration and investment planning.

To deliver emissions reduction in existing buildings, Planning will enact NPF4 policies and state a strong presumption in favour of retaining buildings for re-use and/or refurbishment. Planning will support the work undertaken by GCC Sustainability on LHEES, the Circular Economy and the work of GCC Housing to develop a Housing Retrofit Strategy for the City, considering how best to incorporate into CDP2 any new requirements arising from those areas of work that are within the scope of planning, but not already covered by NPF4.

NPF4 Policy 19 Heating and Cooling

NPF4 Policy 19: Heating and Cooling puts in place the national level planning policy required to facilitate the roll out of LHEES which provides a pathway towards the decarbonisation of heat within the City and to a limited extent adaptation (point (f) on cooling). The detailed guidance for this policy has not yet been published by the Scottish Government but the intent is clear. A summary of the policy is outlined in the table below:

NPF4 LDP Requirement
LDPs should take into account the area's Local Heat & Energy Efficiency Strategy (LHEES). The spatial strategy should take into account areas of heat network potential and any designated Heat Network Zones (HNZ).
NPF4 Policy Intent
To encourage, promote and facilitate development that supports decarbonised solutions to heat and cooling demand and ensure adaptation to more extreme temperatures.
NPF4 Policy Outcomes
• Development is connected to expanded heat networks which use and store heat from low or zero emission sources. • Buildings and places are adapted to more extreme temperatures.
Requirements/Assessments needed to assess applications
a) Development proposals within or adjacent to a Heat Network Zone identified in a LDP will only be supported where they are designed and constructed to connect to the existing heat network. b) Proposals for retrofitting a connection to a heat network will be supported. c) Where a heat network is planned but not yet in place, development proposals will only be supported where they are designed and constructed to allow for cost-effective connection at a later date. d) National and major developments that will generate waste or surplus heat and which are located in areas of heat demand, will be supported providing wider considerations, including residential amenity, are not adversely impacted. A Heat and Power Plan should demonstrate how energy recovered from the development will be used to produce electricity and heat. e) Development proposals for energy infrastructure will be supported where they: i. repurposes former fossil fuel infrastructure for the production or handling of low carbon energy; ii. are within or adjacent to a Heat Network Zone; and iii. can be cost-effectively linked to an existing or planned heat network.

f) Development proposals for buildings that will be occupied by people will be supported where they are designed to promote sustainable temperature management, for example by prioritising natural or passive solutions such as siting, orientation, and materials.
Differences with CDP1 Policy and Guidance
• Similarities with CDP5 with regard to heat networks • No % requirement for low and zero carbon generating technology like in CDP5. • No focus on verifying energy efficiency, assumed now delegated to Building Standards incremental improvements to Technical Handbooks (domestic and non-domestic). From 1st February 2023, all domestic development meeting Part 6 of the Building Regs are deemed to have achieved Part 7 of the Building Regs Gold Aspect 1 on carbon emissions which is a part of the Gold Hybrid requirement, however, for non-domestic development Part 7 Gold Aspect 1 remains a higher standard than the non-domestic Part 6 and so CDP5 Gold Hybrid remains a stronger position and will continue to be applied in the interim until the Building Regs catch up on 1st April 2024 subject to the updated Handbook being brought into force. • GCC LHEES adopted November 2023, now moving to develop the Phase 1 Delivery Plan.

As the LHEES progresses to designate formal Heat Network Zones (HNZs) in accordance with the Heat Network Regulations, these HNZs and any further guidance will be incorporated into CDP2 as per the NPF4 Policy 19: Heating and Cooling.

New Buildings

The design, construction and occupation of new buildings within the city will increase greenhouse gas emissions through their heating, their choice of materials, their method of construction and the waste arising unless specifically addressed. The need for a single industry recognised methodology for net zero buildings is discussed in 5.1 Buildings.

The Scottish Government is committed to all buildings achieving net zero emissions by 2045 and over 2023 has been investigating how to deliver a Scottish equivalent to Passivhaus standards to be incorporated into the building regulations for new domestic and

non-domestic buildings to ensure that all new housing is built to Passivhaus (or an agreed Scottish equivalent) within the next 5 years.

Already in use for all public buildings funded through Scottish Futures Trust (SFT), the **Net Zero Public Sector Buildings Standard** (NZPSBS) developed by Zero Waste Scotland (ZWS) seeks to minimise greenhouse gas emissions from all new public buildings. The NZPSBS will be updated at a planned revision in 2025 to include retrofit, operational carbon, and embodied carbon. This will be freely accessible from a dedicated website and Zero Waste Scotland will continue to run live sessions for organisations that have registered with the Standard.

Heating and Cooling

From 1st April 2024, revisions to the Scottish Buildings Standards Technical Handbook mean that all new buildings (domestic or non-domestic) will incorporate the New Build Heat Standard. When applying for a building warrant from 1st April 2024 onwards it will be prohibited to install heating and cooling systems, located within the curtilage of any new building, which produce more than a negligible level of greenhouse gas emissions. This will reduce emissions from all new buildings dramatically.

A “direct emission heating system” means a system (other than a heat network) by which the building is heated or is cooled, or by which hot water is made available in the building, which uses thermal energy produced by a source of production which during normal operation produces more than a negligible amount of direct greenhouse gas emissions at the point of use.

Materials and Waste

In considering how to minimise or avoid greenhouse gas emissions from materials and waste associated with new development, NPF4 Policy 12 Zero Waste (an extract- the full policy is shown in 5.5 Waste) further states the following:

NPF4 Policy 12 Zero Waste (extract)
a) Development proposals will seek to reduce, reuse, or recycle materials in line with the waste hierarchy.
b) Development proposals will be supported where they: …
iii. minimise waste, reduce pressure on virgin resources and enable building materials, components, and products to be disassembled, and reused at the end of their useful life;

iv. use materials with the lowest forms of embodied emissions, such as recycled and natural construction materials;
v. use materials that are suitable for reuse with minimal reprocessing.

Further guidance on the implementation and use of this policy has not yet been published by the Scottish Government but the wording of the policy indicates that whole life cycle assessment (WLCA), designing for deconstruction/disassembly, embodied energy assessment and some type of demolition protocol could all form part of achieving the required policy outcomes.

To properly achieve these outcomes will require changes to the Scottish Building Standards Technical Handbook, in addition to what can be achieved via planning and NPF4. As the CDP2 preparation process moves forward, the NPF4 guidance will become available. The NPF4 guidance will then be evaluated with specialist input from colleagues in NRS Sustainability and NRS Housing to determine if there is a need to develop further CDP policy in the area of sustainable construction as part of the route map to net zero.

In considering points (iii), (iv) and (v), the London Plan Guidance Circular Economy Statements have been indicated by NRS Sustainability as being a model of good practice. These requirements apply to the largest developments in London that are referable to the Mayor, as required by London Plan Policy 2021 SI 7, however, individual boroughs are also encouraged to apply the policies to smaller developments. Planning would seek to review this and other approaches against the NPF4 Zero Waste guidance with NRS Sustainability once it becomes available to determine if there is a need for further policy development as part of the CDP2.

On reviewing the current literature around embodied energy assessments, such as ZWS' recent Final Report for the Carbon Neutral Cities Alliance (CNCA) Dramatically Reducing Carbon in Europe's Built Environment (published Sept 2023), which outlines a very useful series of lessons learned and challenges to carrying out of embodied energy assessments, it shows that there is still progress to be made to streamline the process and provide an easily workable method of assessment. The report states that the findings will be used to inform the updating of the Scottish Building Standards Technical Handbook on embodied energy and to support the development of the Circular Economy Route Map.

In relation to point (iv) use materials with the lowest forms of embodied emissions, such as natural construction materials, bio-based materials have a huge role to play in lowering emissions. While we await the NPF4 planning guidance, there is clearly a large role here for Building Standards which is where the detailed design and checking in relation to materials is carried out at warrant and completion certificate stage. As previously stated, guidance for policy 12 Zero Waste is forthcoming, it is hoped that this would be

developed to be complementary to the Circular Economy Route Map and should suggest amendments to the Scottish Building Standards Technical Handbook to achieve these outcomes.

Methods of Construction

This is not something that that Planning can stipulate, however, in the Council's own corporate projects this has often been specified in contracts as best practice. The move towards extending the use of pre-fabrication and modern methods of construction to reduce emissions from construction by limiting on-site waste generation and to enable quicker build programmes through increased accuracy should be brought forward in partnership with Circular Glasgow. There are clearly advantages to be derived from increased pre-fabrication which will give a greater transparency around the circularity of materials and components used in new buildings, allowing design for de-mountability and re-use, and more accurate Bills of Quantities improving opportunities for digitisation of data which permits better circularity and facilitates the process of embodied energy assessments.

Planning will support the work undertaken by NRS Sustainability in developing the Circular Economy and consider how best to incorporate any new requirements arising from that work into CDP2 that are within the scope of planning, but not already covered by NPF4.

The following strategies and projects should be delivered/supported through CDP2:

Policy / Project – Name, Weblink and Author	Commitment to Reducing Emissions	Requirements for CDP2	Services / organisations to be involved in drafting policy
Glasgow Climate Plan	Recommendation 11: The new City Development Plan identifies the benefits of green roofs / walls and sets out a strong presumption that new buildings will include green roofs / walls, wherever possible, to deliver benefits for biodiversity and surface water management. The Council actively promotes the installation of green	CDP: SG6 Green Belt & Green Network Draft Supplementary Guidance covers green roofs paras 2.13 – 2.21	GCC Planning

Policy / Project – Name, Weblink and Author	Commitment to Reducing Emissions	Requirements for CDP2	Services / organisations to be involved in drafting policy
	roofs/green walls on appropriate new and existing city buildings.		
Glasgow Climate Adaptation Plan	"Require developers to include adaptation onto development projects, undertake sympathetic retrofitting measures for older buildings, and other measures such as incorporating green roofs, green walls and/or rainwater collectors on buildings where appropriate."	Consider the existing policy position toward retrofit on historic buildings and other adaptation measures to bring historic buildings back into use. Explore the balance between the desire to bring a building back into use with the stated need to reduce carbon emissions. PDR will likely play a role in this once SG clarifies the most recent consultation. Consider new standards for climate adaptive buildings which expand on what we have in CDP1.	GCC Planning
Council Climate Action Scorecard[12]	3.4 Does the council require developers to carry out a whole life cycle carbon assessment of new build developments? **No**	To achieve NPF4 Zero Waste Policy requirements will necessitate a whole life carbon assessment of some description – require to review guidance once available.	GCC Planning
	3.2 Has the council committed to building all future council owned or managed housing to a high energy efficiency or operationally net-zero standard? **No.**	GCC does not own any Council housing, however, NRS Housing exerts an influence over social housing within the City through the SHIP and the disbursement of funds.	Building standards and Housing

[12] https://councilclimatescorecards.uk/

Policy / Project – Name, Weblink and Author	Commitment to Reducing Emissions	Requirements for CDP2	Services / organisations to be involved in drafting policy
	3.3a Does the Council require new homes to make an improvement on the Part L building regulations? **Yes**	Part L refers to English Building Regulations which are not applicable in Scotland. The current CDP 2017 policy CDP5 Resource Management does set a requirement which exceeded the equivalent Part 6 Scottish Building Standards at the time of its introduction. Building Standards now appear to be aligning towards greater emissions reduction and this policy will no longer be required in CDP2.	Building Standards
	3.3b Does the council require a fabric first approach for new development? **Yes**	Continual improvements to the Building Regulations mean that a fabric first is a default position e.g. From June 2023 all buildings achieving Part 6 automatically meet Gold Aspect 1 of Part 7. Fabric first is a sensible first approach, do not consider that it requires specific policy in CDP2 when it is addressed by Building Standards.	Building Standards
	3.3c Does the council set a requirement that all new homes to be built must be operationally (regulated) net zero? **No:**	Building Standards	Building Standards
Thriving Glasgow Portrait	Housing • Definition of thriving: Homes for all residents, in all tenures, are affordable, secure, energy	Liaise with NRS Housing on SHIP, Retrofit Strategy and Delivery Plan and Sustainability on LHEES	NRS Planning, Sustainability and Housing

Policy / Project – Name, Weblink and Author	Commitment to Reducing Emissions	Requirements for CDP2	Services / organisations to be involved in drafting policy
	efficient, and free from health hazards. • What could it look like: Glasgow's architectural heritage (tenements) is celebrated, but also possible to modernise/retrofit. Glasgow builds and regenerates more beautiful, low-carbon social housing.		
Building Standards	**Scottish Building Regulations 2023** Amendment requiring all new buildings and qualifying conversions (see regulations) to have a zero emissions heating/hot water system	Consider the inter-relationships between the regulations and planning applications for new buildings.	GCC Planning and Building Standards
Building Standards	Proposed Domestic Building Environmental Standards (Scotland) Bill, in December 2022, the Minister for Zero Carbon Buildings, Active Travel and Tenants' Rights confirmed that the Scottish Government will make legislation by December 2024 to deliver "a Scottish equivalent to the Passivhaus standard". This aligns with the Shared Policy Programme agreement on "explicit support for passivhaus and equivalent standards" and the recommendation from our Climate Assembly "to ensure that, within the next 5 years, all new	Continue to monitor progress with the development of the new Scottish equivalent to Passivhaus standard which will be incorporated into the Building Regulations	GCC Planning and Building Standards

Policy / Project – Name, Weblink and Author	Commitment to Reducing Emissions	Requirements for CDP2	Services / organisations to be involved in drafting policy
	housing is built to Passivhaus standards (or an agreed Scottish equivalent)". To develop proposals, a further review of energy standards within building regulations was initiated at the beginning of 2023. The review will consider standards for both new homes and new non-domestic buildings.		
Glasgow City Region - Clyde Mission, retrofit project.	**GCR Clyde Mission September 2023** All 8 local authorities and relevant stakeholder organisations represented.	Clyde Mission is a national development in NPF4. Monitor the development of the GCR Retrofit Project alongside the GCC Retrofit Strategy and Delivery Plan to ensure alignment with CDP2.	Glasgow City Region, NRS Housing, Planning
Adaptation through Design – UK Climate Risk	Recognise the need to adapt existing buildings to a warmer and wetter climate, as well as bringing forward design principles that ensure future buildings are fit for a changing climate.	CDP2 to review existing building design guidance through the perspective of climate adaptation, specifically as it relates to reduced heating demand, increased cooling demand, flooding, damp, building fabric as regards moisture, wind and driving rain. Considerations should also be made for water stress in times of drought.	GCC Planning and Building Standards
NRS Committee Report Sept 2023 EMF Review of	Actions 4,5,6,7: Develop Construction forum - using existing networks to build capacity in the sector, identify demo projects in the city and inform the next	Maintain awareness of best practice being developed by the Construction Forum's work led by GCC Sustainability, mindful of forthcoming NPF4 Policy 12	GCC Planning, Building Standards and Sustainability

Policy / Project – Name, Weblink and Author	Commitment to Reducing Emissions	Requirements for CDP2	Services / organisations to be involved in drafting policy
Circular Economy Routemap	city plan to ensure it incentivises circular economy design through planning criteria, development audits and a materials marketplace. Work has been undertaken with the support of Re-London to scope the format and operation of the forum. An initial meeting was also held with Industry and city Stakeholders in early 2023. There are plans to develop the Forum further in 2024.	Zero Waste Guidance and incorporate feasible outputs into CDP2.	

5.2. Transport and Air Quality

Transport emissions are the second highest source of greenhouse gas emissions in Glasgow. The Glasgow Transport Strategy Case for Change notes that:

- Transport sector accounts for around a third of greenhouse gas emissions and has not been declining as fast as other sectors. By mode, passenger cars are the largest source of greenhouse gas emissions in Scotland.
- Proportionally, transport consumes the lowest share of energy in terms of GWh in Glasgow compared to industry & commercial, and domestic, though this is largely aligned with the national picture. Glasgow consumes less energy for the transport sector compared to some larger and more rural authority areas such as Perth & Kinross and North & South Lanarkshire authorities.
- Over the last 10 years, energy consumption by personal transport in Glasgow has reduced although freight transport consumption has increased, particularly diesel LGVs.
- In terms of fuel consumption, diesel cars and diesel light goods vehicles have seen the largest growth in the last decade in Scotland. Road transport still relies almost completely on fossil fuels (over 95% of energy used).
- CO2 emissions overall have reduced in Glasgow since 2005, as have CO2 emissions from transport. As a proportion of all CO2 emissions in the local authority area however, the share from transport has increased in recent years. CO2 emissions have increased since 2005 in Glasgow from the motorway network and partnership working is therefore required.

As such, emissions will need to be brought down considerably for the city and Scotland to reach net zero. CDP2 therefore needs to integrate sustainable transport modes with development. The Transport Infrastructure Audit considers in detail what CDP2 needs to deliver with regards transport infrastructure, as such this table notes specific actions relating to carbon emissions.

NPF4 Local Development Plan Directive

Policy 13 Sustainable Transport:

- LDPs should prioritise locations for future development that can be accessed by sustainable modes. The spatial strategy should reflect the sustainable travel hierarchy and sustainable investment hierarchy by making best use of existing infrastructure and services.

- LDPs should promote a place-based approach to consider how to reduce car-dominance. This could include low traffic schemes, shared transport options, designing–in speed controls, bus/cycle priority, pedestrianisation and minimising space dedicated to car parking. Consideration should be given to the type, mix and use of development; local living and 20-minute neighbourhoods; car ownership levels; the accessibility of proposals and allocations by sustainable modes; and the accessibility for users of all abilities.
- LDPs should be informed by an appropriate and effective transport appraisal undertaken in line with relevant transport appraisal guidance. Plans should be informed by evidence of the area's transport infrastructure capacity, and an appraisal of the spatial strategy on the transport network. This should identify any potential cumulative transport impacts and deliverable mitigation proposed to inform the plan's infrastructure first approach. Where there is likely to be an impact on the trunk road or rail network, early engagement with Transport Scotland is required.

The following strategies and projects should be delivered/supported through CDP2:

Policy / Project – Name, Weblink and Author	**Commitment to Reducing Emissions / Adapting**	**Requirements for CDP2**	**Services / organisations to be involved in drafting policy**
Glasgow Climate Plan	Action 22: Explore options to utilise the ongoing development of the city centre. Glasgow's Low Emission Zone to contribute towards carbon reductions from transport in the city centre.	CDP2 policies to support LEZ and reduction of vehicles in city centre.	GCC Planning, Transport
	Action 56: CDP2, to include measures to make using a car less attractive, use of public transport, active travel more attractive. locational policy (vis-àvis sustainable locations), etc	NPF4 Policy 13 supports this policy position. For CDP2 team: • Review CDP policy to ensure it is in line with sustainable transport hierarchy and requires developers to follow this hierarchy by for example providing active travel	GCC Planning, Transport

		infrastructure into new developments. • In line with the Parking and Kerbside Management Plan, review existing standards for parking, inner and outer urban area. • Review locational policy to determine whether it is currently inducing unsustainable travel modes.	
	51. Deliver a comprehensive active travel network, incorporating the spaces for people measures (following consultation) and enabling 20-minute neighbourhoods through the liveable neighbourhood's plan	CDP2 to support delivery of Liveable Neighbourhoods programme and integration of new development into active travel network.	GCC Planning, Transport
	52. Enable a rapid and strategic shift to electric vehicles through increasing the current rate of deployment of EV charging infrastructure. 54. Engage with Fleet manager Accelerate delivery of EV charging infrastructure in the city Resource and accelerate the transition of the council's fleet to low carbon	CDP2 to include policy for EV charging infrastructure provision in new development. This will include facilitation of EV within the Council estate.	GCC Planning, Transport
Glasgow Climate Adaptation Plan	"The impact of heat on active travel should also be considered in design of cycling and walking infrastructure to ensure that shelter opportunities are considered and maximised."	CDP2 can support and guide where relevant/required for planning permission.	GCC Planning, Transport

Thriving Glasgow Portrait	Mobility • Definition of thriving: It is easy, safe, and affordable for Glaswegians and commuters to get around the city sustainably at all times of the day. • What could it look like: Glasgow's compact, liveable neighbourhoods with access to key infrastructure and services are connected by a cheap, decarbonised, fully integrated public transport system that provides a regular service throughout the day and night. Glasgow is well connected to other cities and rural areas.	Review CDP policy to ensure it is in line with sustainable transport hierarchy and therefore supports a decarbonised transport system.	GCC Planning, Transport
Glasgow Transport Strategy	Policy 7: Transport is a material consideration in the planning process, and the sustainable travel hierarchy is a core principle in the City Development Plan and in development management decision-making. • Action 7.A: The City Development Plan will continue to prioritise development where possible in areas of high accessibility to sustainable transport modes. Glasgow City Council will update Supplementary Planning Guidance to ensure a continued focus of development on areas with high public transport as well as cycling accessibility.	Review CDP policy to ensure it is in line with sustainable travel hierarchy.	GCC Planning, Transport

	A methodology for showing areas of high cycling accessibility will be developed. • Action 7.B: In conjunction with the City Development Plan, the Council will carry out a review of land uses that rely on and potentially encourage car dependency, such as drive-through facilities, and take a policy position on this in the next City Development Plan.		
	Policy 9: There is a presumption against new roads for the explicit purpose of capacity.	Ensure that new development does not require new roads for the explicit purpose of added capacity.	GCC Planning, Transport

Local air quality is directly linked to the transportation system. The Glasgow Transport Strategy Case for Change notes that despite improvements in local air pollutants, tyre and brake abrasion are still substantial sources of particulates and this remains a problem for low or zero carbon vehicles of any kind. Cleaner Air for Scotland 2 supports planning policies related to 20-minute neighbourhoods, spatial planning that reduces car dependency, low carbon living with digital infrastructure, energy efficiency, low carbon heat and renewable energy and expanding green infrastructure. These matters are covered throughout this document.

The following strategies and projects should be delivered/supported through CDP2:

Policy / Project – Name, Weblink and Author	**Commitment to Reducing Emissions / Adapting**	**Requirements for CDP2**	**Services / organisations to be involved in drafting policy**
Thriving Glasgow Portrait	Air pollution • Definition of thriving: Glasgow supports and requires activity in the city and its supply chains to	Transport matters covered above. Industrial emissions covered in section 5.6 in so far as CDP2 can direct sector	As noted in sections 5.3 and 5.6

	eliminate contributions to global air pollution. • What could it look like: Public and active transport is enabled throughout the city, with lots of connected walking and cycling routes. Highly polluting forms of transport (including air travel) are minimised. Policy and financial support is available for initiatives such as Liveable Neighbourhoods and Low Emission Zones, to disincentivise car use and promote active travel and more widespread use of public transport. Glasgow reduces its industrial emissions footprint by ending the production and consumption of single-use or short-life items (including products imported from around the world).	related land use. The ending of the production and consumption of single-use or short-life items is outwith the control of the planning system.	
	Cleanse the air • Definition of thriving: All Glasgow citizens breathe healthy and unpolluted air, and pollutants are well below maximum statutory guidelines for health. • What could it look like: Glasgow has active travel infrastructure, Low Emission Zones, urban trees and plants in public, private and	Transport matters covered above. Urban trees and plants covered in section 6.4 Carbon capture covered in section 5.8	As noted in sections 5.8 and 6.4

	commercial spaces. Its emissions from construction, transport and industry are minimised. Glasgow uses its policy levers to support widespread capture of pollutants, at individual and industrial levels.		

5.3. Energy

With national and local net-zero targets to meet, the City requires an energy transformation that is supported by an underlying energy infrastructure that has planned investment over the long term and is integrated across the electricity, heat, industry, and transport sectors.

This will require the City's electricity grid infrastructure to be expanded to support an increased demand for electricity as electrification displaces fossil gas for heating and there is increased renewable energy generation and use within the City at both a strategic and a local level. This will require new and/or upgraded connections and sub-stations across the City which need to be planned for. This could also include strategically placed battery storage, subject to safety requirements being met, to support increased demand for electricity and increased generation within the City. As systems decarbonise, a mix of energy, heating and cooling solutions will require to be deployed across the City.

The City's strategic proposals such as doubling the population of the city centre, EV roll out, a building retrofit programme and delivery of LHEES will, in combination, lead to an increased need for electrification which brings energy infrastructure implications and where early dialogue with the Distribution Network Operator (DNO) is required to ensure that the network capacity can be built in.

The gas distribution network is currently widespread across the City, with some 82% of Glasgow's households using fossil gas to heat their homes and 53.8% of non-domestic properties using fossil gas for heating. As the City decarbonises and there is a switch away from fossil gas, the phase down in the use will have an impact on the gas distribution network which is likely to be required to undergo some form Network Transitioning such as switching from fossil gas to hydrogen, or permanent disconnection and/or Network Decommissioning.

NPF4 contains 3 policies which relate to energy, all of which seek to transition the City towards a low carbon future: Policy 11 Energy, Policy 18 Infrastructure First and Policy 19 Heating and Cooling. Policy 19 Heating and Cooling is discussed in section 5.1 Buildings. Policy 11 Energy and Policy 18 Infrastructure First are discussed below.

NPF4 Policy 11 Energy

An outline of the policy, showing the requirement, the intent, and the difference from CDP1 is provided in the table below:

NPF4 LDP Requirement

LDPs should seek to realise their area's full potential for electricity and heat from renewable, low carbon and zero emission sources by identifying a range of opportunities for energy development.
NPF4 Policy Intent
To encourage, promote and facilitate all forms of renewable energy development onshore and offshore. This includes energy generation, storage, new and replacement transmission and distribution infrastructure and emerging low-carbon and zero emissions technologies including hydrogen and carbon capture utilisation and storage (CCUS) (discussed in section 5.12.2).
NPF4 Policy Outcomes
Expansion of renewable, low-carbon and zero emissions technologies.
Requirements/Assessments needed to assess applications
a) Development proposals for all forms of renewable, low-carbon and zero emissions technologies will be supported. These include: i. wind farms including repowering, extending, expanding, and extending the life of existing wind farms; ii. enabling works, such as grid transmission and distribution infrastructure; iii. energy storage, such as battery storage and pumped storage hydro; iv. small scale renewable energy generation technology; v. solar arrays; vi. proposals associated with negative emissions technologies and carbon capture; and vii. proposals including co-location of these technologies. b) Development proposals for wind farms in National Parks and National Scenic Areas will not be supported. c) Development proposals will only be supported where they maximise net economic impact, including local and community socio-economic benefits such as employment, associated business, and supply chain opportunities. d) Development proposals that impact on international or national designations will be assessed in relation to Policy 4. e) In addition, project design and mitigation will demonstrate how the following impacts are addressed:

i. impacts on communities and individual dwellings, including, residential amenity, visual impact, noise, and shadow flicker;

ii. significant landscape and visual impacts, recognising that such impacts are to be expected for some forms of renewable energy. Where impacts are localised and/or appropriate design mitigation has been applied, they will generally be considered to be acceptable;

iii. public access, including impact on long distance walking and cycling routes and scenic routes;

iv. impacts on aviation and defence interests including seismological recording;

v. impacts on telecommunications and broadcasting installations, particularly ensuring that transmission links are not compromised;

vi. impacts on road traffic and on adjacent trunk roads, including during construction;

vii. impacts on historic environment;

viii. effects on hydrology, the water environment and flood risk;

ix. biodiversity including impacts on birds;

x. impacts on trees, woods, and forests;

xi. proposals for the decommissioning of developments, including ancillary infrastructure, and site restoration;

xii. the quality of site restoration plans including the measures in place to safeguard or guarantee availability of finances to effectively implement those plans; and

xiii. cumulative impacts.

In considering these impacts, significant weight will be placed on the contribution of the proposal to renewable energy generation targets and on greenhouse gas emissions reduction targets.

Grid capacity should not constrain renewable energy development. It is for developers to agree connections to the grid with the relevant network operator. In the case of proposals for grid infrastructure, consideration should be given to underground connections where possible.

f) Consents for development proposals may be time-limited. Areas identified for wind farms are, however, expected to be suitable for use in perpetuity.
Differences with CDP1 Policy and Guidance
Fundamentally the message in NPF4 Policy 11 Energy is not that different from the current Development Plan (CDP 2017) Policy CDP5 Resource Management policy; it is an updated and expanded version which reflects new priorities and innovations in areas such as battery storage, hydrogen and re-powering which were not previously addressed in CDP1. We await the detailed NPF4 Guidance to accompany Policy 11 Energy from the Scottish Government. The outcome of the **PD Rights Phase 3 Consultation** is due to be laid before Parliament in Spring 2024. Phase 3 of the review focusses primarily on new and extended PDR for domestic and non-domestic renewable energy equipment. The proposals would streamline the planning process for various zero and low carbon technologies, such as solar panels and heat pumps. The proposed changes are intended to support households and businesses who are looking to reduce bills and emissions by adapting their properties. Other proposals in the Phase 3 consultation relate to electricity network infrastructure, reverse vending machines, certain domestic flues, and the temporary use of land.

NPF4 Policy 18 Infrastructure First (Energy)

To support the baseline evidence gathering for the CDP2 Evidence Report and to better understand the capacity and condition of the City's underlying energy infrastructure to support the low carbon energy transition, a high-level energy infrastructure audit was carried out autumn/winter 2023 the findings from which are summarised below.

Capacity and Condition: Electricity Network

The Distribution Network Operator (DNO) for Glasgow is Scottish Power Energy Networks (SPEN). Discussions with SPEN reveal that all currently known network capacity shortfalls to 2030 have been identified for Glasgow and have been extensively tested to identify solutions to remedy those capacity shortfalls and network constraints.

This has been fed into the RIIO-ED2 price control agreed by the DNO with Ofgem which sets the outputs that the DNO needs to deliver for their consumers and the associated revenues that they are allowed to collect for the five-year period from 1 April 2023 to

31 March 2028. The current 5 year plan has an opportunity for review to re-prioritise work, or to add in new work, at 2025; early discussion with SPEN in that scenario is essential.

At the moment, it is difficult to say if the current 5-year plan will meet the requirements of LHEES or the City's forthcoming Retrofit Strategy as the detailed delivery plans for these pieces of work are not yet known and will only be known during the timeframe of the current SPEN 5 year plan. Ideally, any new requirements for energy upgrades or re-prioritisation of projects should be flagged for the 2025 window of opportunity to review the 5 year plan.

For now, it is assumed that the detailed study undertaken by SPEN to inform their current 5 year plan maintains sufficient capacity, condition, and opportunity for growth of the electricity network in Glasgow to meet the known needs of the City.

Capacity and Condition: Gas Network

The gas network is operated and maintained by Scotland Gas Networks (SGN). There is an acknowledgement by SGN that fossil gas will require to be phased down in order to meet the Scottish & UK Government's Net Zero commitments. Uncertainty currently exists around whether the gas network should be transitioned to replace fossil gas with hydrogen for heating, or if the dominant move will be towards decommissioning.

SGN continue to invest in the safety and maintenance of the gas distribution network and large amounts of the existing network is suitable for hydrogen (Polyethylene (PE) pipe and low strength steel) however there is still some uncertainty over the high strength steel used in parts of the high-pressure network. The current assumption is that iron isn't suitable due to HSE safety concerns, however, by 2032 when the iron mains risk reduction programme is scheduled to complete, Glasgow's gas distribution network should be upgraded and suitable for hydrogen distribution if that is the Heat Policy decision made by the UK Government in 2026. The overall network is sized appropriately for hydrogen with little need for reinforcement despite the lower energy density of hydrogen. There is also an on-going programme of research to determine the suitability of hydrogen for a wide range of non-pipeline network assets.

Heat Networks

Heat networks have been identified as a low-regret decarbonisation technology through the Heat in Buildings Strategy. Glasgow is a significantly heat dense urban area so heat networks will be a key mechanism in delivering net zero carbon and is a priority focus for the first iteration of Glasgow's Local Heat and Energy Efficiency Strategy (LHEES).

Glasgow currently has >8 large, stand-alone heat networks operating across the City and numerous smaller communal heating systems. These heat networks are owned and operated by a range of providers, and it is not known if they share a common heat network specification which would allow them to be 'joined up' as and when heat networks roll out across the City at a later date. A map of the existing communal heating and heat networks is shown in Fig.1.

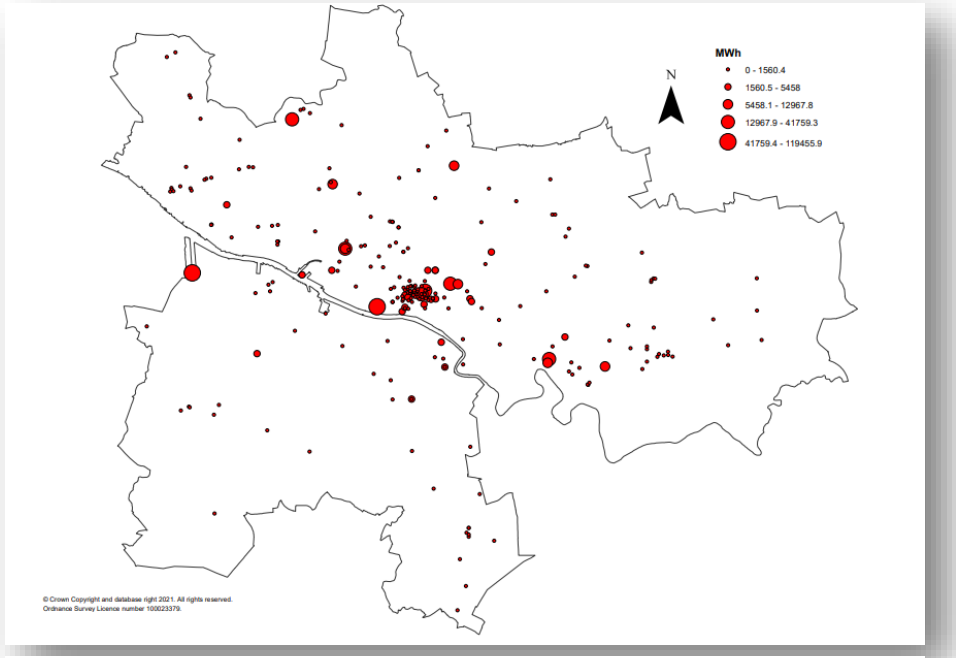


FIGURE 4 EXISTING COMMUNAL HEATING AND HEAT NETWORKS (SOURCE: GCC LHEES 2023)

It is likely that there will be a need for a review of the existing heat network specifications to determine if there will be stranded assets as heat networks roll out across the City. At present there is no nationally agreed standard technical specification for heat networks, but work is ongoing at the Scottish Government with the UK Government to develop the Heat Network Technical Assurance Standards (HNTAS). Once known, the HNTAS can be used to compare the specifications currently deployed across the City to determine opportunities for expansion of existing networks.

Proposed Energy Supplies Infrastructure

The National Infrastructure Commission's Audit states that to tackle climate change and ensure energy security, the UK should move away from its reliance on fossil fuels which will require a fundamental change in the country's energy infrastructure. Over the next

30 years, the country will need a larger electricity system running mostly from renewable sources like wind and solar; heat pumps and heat networks to replace gas boilers in homes and business; and industry running on electricity where possible, but where it is not possible, new infrastructure to supply green hydrogen or carbon capture and transport to remove any carbon emitted from burning fossil fuels to underground stores.

There is still a high degree of uncertainty about how the decarbonisation of the gas network away from fossil gas might progress. Whilst substantial investment has been made in reducing the uncertainty in the ability of assets to accept hydrogen and for the network to operate safely, there is a high degree of uncertainty regarding transition research to date, both in terms of technical assumptions and cost assumptions. Additionally, the mechanics of how the entire energy system transitions at a system level, the customer journey, experience, and support in transition is largely unknown and is not considered in the current industry research.

While SGN await the UK Government's official Heat Policy decision in 2026 which will determine the future of fossil gas and whether the gas distribution network should be re-purposed for the supply of hydrogen for heating in the UK, the Second National Infrastructure Assessment (October 2023) suggests that Government should not pursue the use of hydrogen for home heating: *it will not be ready in time to meet climate goals and is far less efficient than electricity*. The economic, environmental and efficiency arguments may see green hydrogen reserved for heavy industrial uses which cannot easily be electrified and rule out the general roll out of hydrogen for home heating.

If green hydrogen was to be deployed within the City for heavy industrial process, analysis would need to be done to identify the location of these types of operations within the City, and the spatial and safety implications of the supply and storage of green hydrogen to ascertain it's impacts.

Heat Network

The City's LHEES process will determine the future locations, the extent, and the methods of delivery of heat networks in Glasgow. The LHEES has undertaken an extensive spatial analysis exercise to identify where in the city heat networks could be the most viable. This mapping has primarily sought to match heat demand with heat supply, identifying areas where there is sufficient demand density alongside potential low carbon or renewable heat supply opportunities. The map below of Indicative Heat Zones (fig.2) highlights the outputs of this work at city level.

The opportunity for the expansion of heat networks across the City will be examined in greater spatial detail as the LHEES moves into its Phase 1 work on the Delivery Plan which should include the formal designation of HNZs.

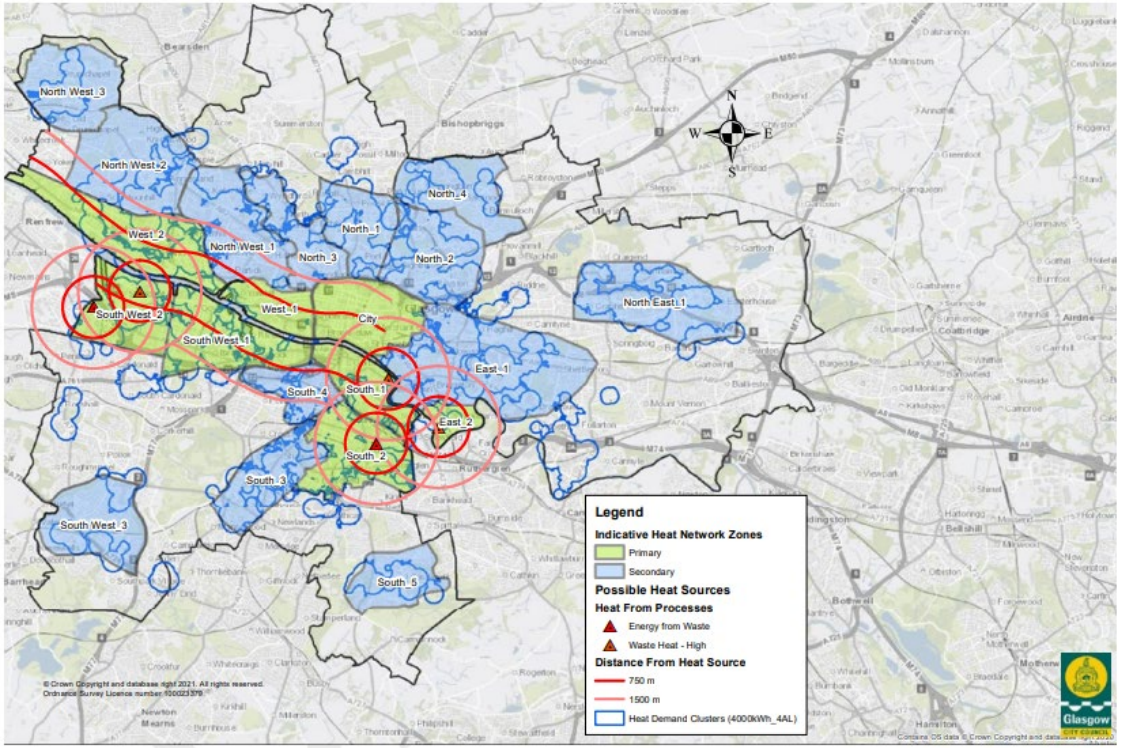


FIGURE 5. INDICATIVE HEAT ZONES (SOURCE: GCC LHEES 2023)

Individual or Communal Heat Pumps

Where larger-scale district heat networks do not present a viable decarbonisation pathway, the deployment of heat pumps at either individual scale or as part of smaller community heat networks may be the most appropriate intervention. Glasgow's LHEES has undertaken mapping work to identify concentrations of domestic properties that appear suitable for the installation of a heat pump. This has considered building thermal efficiency alongside potential planning restrictions that may impede delivery (such as listed buildings or conservation areas). The map below (Fig.3) identifies discrete zones of on-gas grid delivery areas where projects to deploy individual or communal heat pumps are the most feasible. The national policy landscape around the rollout of heat pumps is evolving, as is the method of delivery. It is likely that new Utility Companies will enter the heat market as the provision of heat

becomes decentralised e.g., heat networks based around shared loop array ground source heat pumps. As such, the current iteration of the LHEES provides an evidence base for future project identification and will be used as a live tool to be updated in line with local progress and national developments. The Sustainable Glasgow Heating and Housing Hub is a cross sector, multi-disciplinary group working to progress learning and projects at the intersect of the housing and heating sustainability agendas to meet the city's net zero goals. It has prioritised the exploration of shared ground arrays as a method of decarbonising neighbourhoods outwith the primary and secondary heat network zones, targeting the "on gas grid" delivery areas noted in the LHEES along with pilots for pre-1919 tenements and multi-storey flats with inefficient electric heating. Delivery will therefore focus on engagement with residents in these areas to better understand the appetite for low-carbon heating and refining identified areas into potential projects. For this reason, mapping work at this stage has been kept broad. It is anticipated that future iterations of the LHEES will identify projects to a higher degree of granularity as the national landscape becomes clearer.

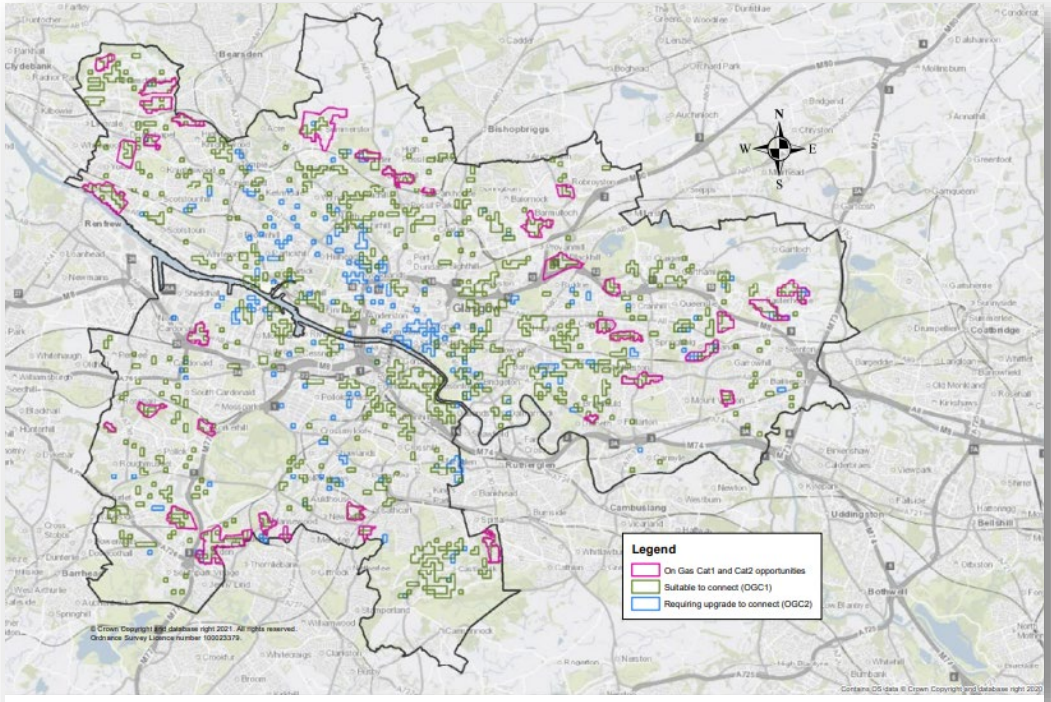


FIGURE 6. ON GAS GRID DELIVERY AREAS (SOURCE: GCC LHEES 2023)

Battery Energy Storage Sites (BESS)

Battery Storage sites are currently regulated as generation, not storage or distribution. This means for example that to install a 50MW battery storage facility, there would need to be 50MW capacity available in the local network which would need to be reserved for the battery storage proposal which can create capacity constraints within the network. SPEN has highlighted this to the UK Government and are looking for a change in legislation. If/when this changes, there is likely to be an increase in applications for battery storage, strategic and local.

There is an urgent need for planning guidance on battery storage which has been highlighted via the Heads of Planning Scotland (HoPS) Energy Climate Change & Resources (ECCR) Sub-Group. The main area of concern is specifically around fire safety and the social, economic, and environmental implications of a major incident occurring. At present, the Scottish Fire & Rescue Service (SFRS) are not statutory consultees in planning, however, there is a need for their involvement in BESS at the planning stage as there will be urban sites that are not suitable for BESS on fire safety grounds. SFRS have generally deferred to HSE (Health & Safety Exec) for guidance but HSE has not yet produced any guidance on BESS. It is likely that BESS sites should be considered under the COMAH (Control of Major Accident Hazards) regulations but they have not yet been formally incorporated into the regulations.

Deliverability (environmental, operational, and funding constraints)

There are issues of Just Transition around the delivery of a decarbonised energy and heat infrastructure which need to be considered in how the transformation is funded, the legal situation around connections, how affordable it will be for consumers and whether the ownership of assets promotes a fairer, generative, green economy.

Electricity Network

SPEN is delivering upfront investment in the electricity network which it recovers over 45 years via wholesale energy market suppliers. An expanded National Grid is a direct and inevitable consequence of decarbonising our energy supply to achieve net zero: it is a public good. The approach of seeking to match Grid capacity to current usage is now outdated as policy and SPEN's DFES' for Glasgow seek to move away from this. The Scottish Government's Net Zero, Energy and Transport Committee has made a call for the prudential investment in Grid capacity in anticipation of future need in order to meet the 2045 net zero target. Amongst other things, this would also increase long-term public and investor confidence in the renewables industry.

The current 5-year investment plan is RIIO-ED2 covers the period to 2028 and has an opportunity for review to re-prioritise or add in new work in 2025. At present, major reinforcements of the network can take up to 3-4 years so early engagement with SPEN is critical to ensure deliverability.

Gas Network

As previously outlined, the future of the gas network is currently uncertain and current investment reflects this whilst keeping options open.

The supply of green hydrogen could be an opportunity for existing fossil gas fired district heating schemes in the City to switch and for heavy industrial processes that cannot be electrified, but recent statements by the National Infrastructure Commission indicate that it is unlikely to be widely rolled out as a direct replacement for natural gas in individual homes.

Heat Networks

Once there is clarity around the Heat Network Regulations, the Delivery Plan for LHEES will be developed. Work is currently being undertaken by the LHEES team to evaluate the various delivery models available to bring forward heat networks within the City.

Individual or Communal Heat Pumps

There is currently Scottish Government financial support for individuals who wish to install heat pumps (and/or other renewable energy technologies) in their homes. The Home Energy Scotland Grant and Loan can help with the cost of installing both heat pumps

and energy efficiency improvements. Grant funding for heat pumps is up to £7,500 or £9,000 for households which qualify for a rural uplift. The remainder of funding requested can be taken up as an optional interest-free loan.

In the case of Communal Heat Pumps, it is likely that new Utility Companies, such as Kensa Utilities backed by Legal and General, will enter the heat market as the provision of heat becomes decentralised e.g. heat networks based around shared loop array ground source heat pumps.

Battery Energy Storage Systems (BESS)

Battery storage within the City has not yet been planned strategically and at the moment, proposals within the City appear opportunistic. If there is a change in the law from generation to distribution, then they are more likely to be strategically planned across the City as part of a smart energy grid infrastructure, however, there is still the issue over the need for more targeted regulation and planning guidance for BESS.

Permitted Development Rights (PDR)

Householder PDR (Updated 2021) covers a wide range of renewable energy installations such as microgeneration, micro-wind turbines, solar thermal, PV, heat pumps (air, ground, and water) and their flues which can be installed domestically without planning permission, subject to a number of conditions being met. It should be noted that a building warrant is still likely to be required and householders should check with Building Standards.

The **PD Rights Phase 3 Consultation** closed in 23rd August 2023 and the Phase 3 PD Rights will be laid before Parliament in Spring 2024. Phase 3 of the review focusses primarily on new and extended PDR for domestic and non-domestic renewable energy equipment. The proposals would streamline the planning process for various zero and low carbon technologies, such as solar panels and heat pumps. The proposed changes are intended to support households and businesses who are looking to reduce bills and emissions by adapting their properties. Other proposals in the Phase 3 consultation relate to electricity network infrastructure, reverse vending machines, certain domestic flues, and the temporary use of land.

The full list of areas covered in the consultation is:

- Domestic renewables: solar panels; air, water, and ground source heat pumps; wind turbines; and the removal of PDR for certain flues.
- Non-domestic renewables: solar panels; solar canopies in qualifying parking areas; and air, ground, and water source heat pumps.
- Replacement windows for domestic and non-domestic properties.
- Electricity network infrastructure.

The following strategies and projects should be delivered/supported through CDP2:

Policy / Project – Name, Weblink and Author	**Commitment to Reducing Emissions / Adapting**	**Requirements for CDP2**	**Services / organisations to be involved in drafting policy**
Glasgow Climate Plan	Themes: • Low carbon retrofits and buildings that are fit for purpose • Strengthen Energy Networks	Inherent within NPF4.	GCC Planning
	15. Deliver projects that utilise the recovery of heat from geothermal sources	Work to be led by LHEES team with input from NRS Planning , Project Management (Geotechnical) and BGS work to determine what learning can be incorporated into CDP2.	GCC Planning, Sustainability, Project Management (Geotechnical), BGS
	17. Deliver heat and energy generation projects including distribution of heat and energy from parks in Glasgow based on existing feasibility studies.	CDP2 to identify most appropriate sites in conjunction with the LHEES and Parks (Park Power Study)	GCC Planning, Sustainability, Parks

Policy / Project – Name, Weblink and Author	Commitment to Reducing Emissions / Adapting	Requirements for CDP2	Services / organisations to be involved in drafting policy
	23. Require Glasgow's Gold Hybrid plus 20% low and zero carbon generating technologies (LZCGT) or better, to be achieved for all new build new homes.	Updates to the Building Standards Technical Handbook mean that this is unlikely to be required.	GCC Planning, Building Standards
	39. Encourage and enable retrofit of all existing owner-occupied housing to EPC level C or above, and to reduce flood risk (where appropriate).	EPC Reform is ongoing at a national level. Consider potential barriers to implementation where Planning Permission is required (e.g. SPG9 Historic Environment, Installation of Renewables including shared ground arrays), potential policy development area. Advice from NRS Housing.	GCC Housing, Planning, Sustainability, MGSDP
	41. Upgrade insulation and heating of all building stock in the city, and install measures to reduce flood risk, city council leading by example.	Links to requirements of LHEES and its interface with future phases of the Housing Retrofit Strategy and Delivery Plan (insulation and heating) led by NRS Housing in production 2024.	NRS Housing, Sustainability, Planning, MGSDP
	42. Ban gas heating systems in all new buildings within the city boundary.	Building Standards changes from 1st April 2024 to to prohibit the use of heating and cooling systems, located within the curtilage of any new building, which produce more than a negligible level of greenhouse gas emissions for all new developments.	Building Standards
	46. Establish a framework of engagement with local energy	Likely to be considered via LHEES Phase 1 of the Delivery Plan or the Housing Retrofit Strategy and Delivery	NRS Housing

Policy / Project – Name, Weblink and Author	Commitment to Reducing Emissions / Adapting	Requirements for CDP2	Services / organisations to be involved in drafting policy
	cooperatives, enabling them to be set up and providing support.	Plan led by NRS Housing being produced during 2024.	
	50. Review the need for an energy services company (ESCO) for the city as appropriate in relation to local energy generation and distribution projects.	This will be considered in conjunction with the development of Phase 1 of the Delivery Plan for the LHEES	NRS Sustainability
Local Heat and Energy Efficiency Strategy (LHEES)	Glasgow's Local Heat and Energy Efficiency Strategy (LHEES) was approved by the City Administration Committee on 16th November 2023 The aim of Glasgow's LHEES is to provide affordable, reliable, and low carbon heat that helps the city reach its net zero carbon target in a just and inclusive manner by 2030. Successful delivery of this ambition will be achieved by focusing on reducing demand, decarbonising supply, and decentralising systems. Glasgow's LHEES has four key focus areas, these include: Heat Networks; Individual or Communal Heating Solutions; Poor Energy Efficiency as a Driver of Fuel Poverty; and Pre-1919 Tenemental Properties.	Integration of the LHEES into CDP2, allocation of sites for district heating, identifying opportunities to co-locate developments with a high heat demand together with or alongside sources of heat supply, and policy required to deliver heat networks through development. Including energy and heat infrastructure as part of site appraisals for the allocation of sites – identifying any issues with capacity that require resolution for development to go ahead.	NRS Planning, Sustainability, Housing

Policy / Project – Name, Weblink and Author	Commitment to Reducing Emissions / Adapting	Requirements for CDP2	Services / organisations to be involved in drafting policy
	This first iteration of the LHEES will provide an evidence-base that will underpin the forthcoming Retrofit Strategy which is being developed by NRS Housing and has a focus on pre-1919 tenemental properties. LHEES are required to be updated five years from original publication. In this respect, the LHEES acts as a live document and will seek to incorporate outcomes from other strategies. The Retrofit Strategy may identify strategic actions to accelerate retrofit and at a scale larger than previously thought. The LHEES has also outlined the City Council's intention to assess how an Energy Partnership may contribute to delivering on the ambition in the LHEES, particularly where high upfront capital costs may impede delivery in areas such as district heating. The next steps for the delivery of the LHEES will:		

Policy / Project – Name, Weblink and Author	Commitment to Reducing Emissions / Adapting	Requirements for CDP2	Services / organisations to be involved in drafting policy
	• Explore options in relation to delivery of heat networks, pushing for clarity on zoning development from Scottish Government, and identify viable delivery structures for consideration by committee • Progress indicative Heat Networks Zones (HNZs) into designated Heat Network Zones (HNZs). This will involve thorough engagement and consultation with stakeholders and residents in proposed zones alongside further work to clarify the social, commercial and climate opportunities presented by potential heat networks within proposed zones • Support the development of the Retrofit Strategy to ensure strong alignment between NRS Sustainability and NRS Housing The Retrofit Strategy will provide the next step for certain elements of the LHEES		

Policy / Project – Name, Weblink and Author	Commitment to Reducing Emissions / Adapting	Requirements for CDP2	Services / organisations to be involved in drafting policy
GCC Housing Retrofit Strategy	Aims to bring forward a delivery framework for retrofit at scale of property types and tenures, Initial focus on decarbonisation of pre-1919 tenements, profiling of the city's housing stock to identify a heat pump accelerator programme targeting big emitters and neighbourhood approaches and properties where poor energy efficiency is a driver of fuel poverty	Strategy in production during 2024. Will continue to liaise with NRS Housing as Strategy develops in collaboration with NRS Sustainability LHEES via joint officer's group.	NRS Housing, Sustainability LHEES, Building Standards
Council Climate Action Scorecard	3.9 Does the Council have a minimum requirement for on-site renewable energy generation for new building development? **Yes**	It is considered that this will no longer be required in CDP2. From 1st April 2024 update to Building Standards Technical Handbook will require all new development to install zero direct emissions heating systems.	GCC Planning
	3.10a Does the Local Plan identify suitable area for new solar energy, wind developments and district heat networks? **Yes**	This needs to be reviewed in CDP2, considering LHEES, CREF and any other ongoing site searches.	GCC Planning, Sustainability
	3.10b Has the Council approved any planning applications for new or expanded solar or wind developments, battery storage, or renewable district heat networks since 2019? **Yes**	N/A	
	3.11 Has the Council approved a planning application for a carbon	N/A	

Policy / Project – Name, Weblink and Author	Commitment to Reducing Emissions / Adapting	Requirements for CDP2	Services / organisations to be involved in drafting policy
	intensive energy system to be built or expanded from 2019? **No**		
Thriving Glasgow Portrait	Energy • Definition of thriving: All of Glasgow's energy needs are met from renewable sources. Everyone is able to afford their energy requirements. • What could it look like: Glasgow's energy consumption (direct and indirect) is much reduced overall, in particular by combining energy efficiency measures with decarbonising heating, and reducing the consumption of high-consumption industries and individuals. More renewable energy infrastructure is locally owned and managed within Glasgow and surrounding communities, generating community wealth.	The aspirations of the Thriving Glasgow Portrait are compatible with NPF4. The City is developing a range of workstreams such as LHEES, the Retrofit Strategy and CREF which will feed into CDP2.	NRS Planning, Sustainability, Housing
	Harvest Energy • Definition of thriving: The Glasgow energy mix is harvested from renewable sources to benefit Glasgow residents and businesses. Glasgow pursues	The aspirations of the Thriving Glasgow Portrait are compatible with NPF4. The City is developing a range of workstreams such as LHEES, the Retrofit Strategy and CREF which will feed into CDP2.	NRS Planning, Sustainability, Housing , Building Standards, Parks

Policy / Project – Name, Weblink and Author	Commitment to Reducing Emissions / Adapting	Requirements for CDP2	Services / organisations to be involved in drafting policy
	renewable energy generation and storage solutions. • What could it look like: Glasgow maximises opportunities to use solar, wind, water, and ground source heat for its energy, distributed through local heat networks. More approvals are granted for solar power and low-carbon energy infrastructure on publicly owned buildings. All new buildings fitted with solar panels and zero carbon heat sources. Glasgow explores new methods of generating and storing renewable energy e.g., kinetic energy, harvesting 'Park Power' from parks and open spaces.	Changes to the building regulations will also deliver on some of these objectives.	
NPF4 National Development 3: Strategic Renewable Electricity Generation and Transmission Infrastructure. *Location: All Scotland.*	This national development supports renewable electricity generation, repowering, and expansion of the electricity grid. A large and rapid increase in electricity generation from renewable sources will be essential for Scotland to meet its net zero emissions targets. Certain types of renewable electricity generation will also	The tranmission work is led by SPEN and is addressed in Policy 18 Infrastructure First.	Planning, Sustainability, SPEN

Policy / Project – Name, Weblink and Author	Commitment to Reducing Emissions / Adapting	Requirements for CDP2	Services / organisations to be involved in drafting policy
	be required, which will include energy storage technology and capacity, to provide the vital services, including flexible response, that a zero carbon network will require. Generation is for domestic consumption as well as for export to the UK and beyond, with new capacity helping to decarbonise heat, transport, and industrial energy demand. This has the potential to support jobs and business investment, with wider economic benefits. The electricity transmission grid will need substantial reinforcement including the addition of new infrastructure to connect and transmit the output from new on and offshore capacity to consumers in Scotland, the rest of the UK and beyond. Delivery of this national development will be informed by market, policy and regulatory developments and decisions.		

5.4. Business and Industry and the Low Carbon Economy

Business, industry, and commercial sectors are a significant source of emissions in Glasgow. The Council have committed to being net zero by 2030 and so public sector emissions will need to be reduced faster than private industry whose target is 2045. Nevertheless, CDP2 will need to facilitate the transition toward net zero across all sectors, encouraging and directing, where appropriate, net zero or low carbon development to meet those aims.

The National Atmospheric Emissions Inventory sets out high emission sites and there are 15 'large industrial installations' located within Glasgow which are noted in the dataset. Industry accounted for 21% of greenhouse gas emissions in the UK in 2021 and in authorities with large industrial sites is a very significant source of emissions. Emissions from fuel use in large industrial installations have been mapped using the National Atmospheric Emissions Inventory database of point sources, which combines data from the UK Emissions Trading Scheme and EU Emissions Trading System with data reported by operators that are held in regulators' pollution inventories. The list includes hospitals (Queen Elizabeth University Hospital, Glasgow Royal Infirmary), landfill sites (Summerston and Greenoakhill), distilleries, factories, the Glasgow Recycling & Renewable Energy Centre, and Scottish Water water treatment facilities.

NPF4 Local Development Plan Instruction:

Policy 26, Business, and Industry

- LDPs should allocate sufficient land for business and industry, considering business and industry land audits, in particular ensuring that there is a suitable range of sites that meet current market demand, location, size, and quality in terms of accessibility and services. This allocation should take account of local economic strategies and support broader objectives of delivering a low carbon and net zero economic recovery, and a fairer and more inclusive wellbeing economy.

The following strategies and projects should be delivered/supported through CDP2:

Policy / Project – Name, Weblink and Author	Commitment to Reducing Emissions / Adapting	Requirements for CDP2	Services / organisations to be involved in drafting policy
Glasgow Climate Plan	44. Develop a Carbon Neutral Innovation District in the GCID. This will act as a catalyst and exemplar for rolling out across the city	CDP2 to allocate site and provide policy regarding appropriate land uses and requirements for the site.	GCC Planning
Climate Ready Clyde Adaptation Strategy	Rebalance SEILs toward low-carbon economy	Review SEILS that have carbon intensive activities (see section 2 for site specific inventories). CDP2 policy to set out requirements for sites.	GCC Planning
Thriving Glasgow Portrait	Income and Work • Definition of thriving: All Glaswegians have sufficient income from a sustainable/fulfilling source. There is zero poverty in the city. • What could it look like: Job growth areas are in sustainable industries such as renewable energy, culture, and wellbeing services. Long-term investment is made in the skills and training to support these good quality jobs. Glasgow invests in and supports (through tools such as procurement) alternative business models e.g. social enterprises and cooperatives. Glasgow residents are connected to high quality employment opportunities e.g.	CDP2 to support sustainable industries through land allocations and requirements for sites.	GCC Planning

Policy / Project – Name, Weblink and Author	Commitment to Reducing Emissions / Adapting	Requirements for CDP2	Services / organisations to be involved in drafting policy
	through accessible transport options and inclusive recruitment practices.		
Circular Economy Route Map	Re-manufacturing Sector Support and develop re-manufacturing within the city through planning and regeneration policy. Ensure the prioritisation of re-manufacturing through refining the City Development Plan (CDP) and supplementary guidance. And promote re-manufacturing where possible through public procurement policy.	CDP2 to support sustainable industries through land allocations and requirements for sites.	GCC Sustainability, City Property, GCC Planning, GCC Property Asset Management
	Open Estate – utilising the Council estate for the use of circular businesses/incubation Community Innovation Hubs – utilising town centres/vacant buildings and consider new industrial/enterprise parks where groups of circular businesses can collaborate	CDP2 to support sustainable industries through land allocations and requirements for sites.	GCC Sustainability, City Property, GCC Planning, GCC Property Asset Management
Not part of any existing plan or strategy.	Battery Storage Facilities	Consider where and how these development proposals could be in the city and operate safely.	GCC Planning

5.5. Waste

Glasgow is a growing city and as the city's population increases, so too do the demands on recycling and waste management services. In section 3, Glasgow's greenhouse gas emissions from the waste management sector stood at 7% of the City's total emissions, against a Scottish average of 3%. There was a slight dip in landfill and waste management in 2020 most likely due to inactivity during the Covid-19 pandemic but these are both now on an upwards trajectory.

In looking at the expected change within the City's demographics there needs to be a consideration of how this will affect household waste management infrastructure to ensure that there is synergy between the GCC Resource & Recycling Strategy 2020-2030 and CDP2 in planning for waste management services .

The City Development Plan highlights:

- Population Change is expected to rise from 633,120 to 662,738 by 2043
- The number of households in the city is forecast to grow by 43,308 by 2041, with the largest increase being in single-person households
- Significant change in planned household growth will be in the City Centre where there is a projected doubling of the population to 40,000 residents by 2035.

In Glasgow, householder waste services are provided by the Council and most other commercial services are conducted by the private sector. In addition to kerbside collection, the Council further provides a network of c.500 glass and textile recycling sites across the city. The textile banks are owned and operated by external partners. The network of blue bins for the collection of dry mixed recyclables have been removed where adjacent domestic properties have their own blue bins. There are also numerous privately operated waste disposal plants around the city dealing mainly with commercial and food waste.

The Resource and Recycling Strategy 2020-2030 identifies the development of effective residential waste collection infrastructure, particularly in the City Centre, as a key challenge for planning. Household collection infrastructure currently depends on property type and material stream. In high density areas, part of this infrastructure has included the provision of a network of public collection points, primarily located in areas of high-density housing, for the recycling of dry mixed materials (blue bins) and glass bottles and jars (purple bins) in addition to the containers for the collection of textiles as noted above. These collection points are well used, however, a review is required on procedures for siting the bins and an evaluation of options to improve the aesthetics of the containers, including cleaning, maintenance and housing. The provision of bin hubs is being trialled for flats within the Pollokshields, Haghill and Finniestion areas, however, further review is required on their suitability within the city centre.

Glasgow operates four household waste recycling centres (HWRC) in the city (Polmadie, Dawsholm, Shieldhall and Easter Queenslie) and one Materials Recovery Facility (MRF) at Blochairn. Easter Queenslie is planned for re-development featuring comprehensive up-grading and modernisation. Shieldhall, Dawsholm and Polmadie HWRCs have dedicated storage areas/bays for placing household items that are suitable for re-use; however, the type of material and suppliers used is market dependent. Only collection partners are permitted to remove items from the sites for re-use.

At the Blochairn MRF the council receives approximately 30,000 tonnes (per annum) of comingled Dry Mixed Recyclables (DMR), collected by the council from the blue bin recycling collection service consisting of newspapers and magazines, mixed papers and cardboard, plastic bottles, steel, and aluminium cans. Of this material, approximately half is removed from site and treated by an external supplier while the council procures a new MRF at the re-developed Easter Queenslie site.

The Council is in the process of introducing a new twin-stream recycling service which will involve issuing an additional recycling bin to householders in order to segregate paper and cardboard from mixed containers; this will reduce contamination and increase the quality and quantity of material captured for recycling. Recyclables produced by the MRF are marketed by the council. These materials are typically purchased by the re-processing markets for further refinement and ultimately for use in the manufacturing industry as a replacement for virgin materials.

Glasgow, in a public/private collaboration with Viridor also operates a new, state-of-the-art recycling and sustainable residual waste management facility at its long-established waste treatment plant at Polmadie.

The Glasgow Recycling and Renewable Energy Centre (GRREC) facility is Glasgow's largest waste treatment facility, dealing with all residual waste generated in Glasgow, including the residual waste fraction generated by the Blochairn MRF. It handles up to 200,000 tonnes of residual (general/black bag) waste every year, diverting it from landfill. The amount of household waste sent to landfill in the city has fallen from 167,502 tonnes in 2018 to 48,134 tonnes in 2023, with the majority of that total from reprocessing contractors sending material to landfill, and also including inert landfill fractions which do not biodegrade and therefore do not contribute towards climate change. The facility can produce enough energy to power the equivalent of 26,496 households and heat the equivalent of some 8,000 homes. The current heat and energy produced goes to operating the plant however it is proposed that this heat recovery will eventually benefit local housing through a district heating plan being developed as part of the LHEES.

The council also encourages citizens to reduce, reuse and recycle through passive messages embedded in the council website and recent reports show that this needs to be strengthened. Data on all waste managed by the council is reported to SEPA on an annual basis, who subsequently publish the figures. Over the last ten years, tonnages have fluctuated with a peak in total household waste

tonnage in 2020 of 265,910 tonnes but has since declined over the preceding three years and is now comparable to figures in 2013, and in 2023 was 235,159 tonnes. Over the same timeframe the household waste recycling rate has fluctuated between 25-29% and in 2023 was 27.2% As highlighted in the text above, with the construction of the GRREC, there has been a significant reduction in the quantity of waste sent to landfill from 73.1% in 2013 to 20.5% in 2023. Although the management of waste is moving up the waste hierarchy, further public engagement is required to increase participation within recycling services, particularly the food waste collection service, to increase the quantity and quality of materials collected for recycling. Where service changes are implemented, comprehensive engagement with residents is already being undertaken as the bin hub trials are implemented and the twin stream recycling service is introduced to all kerbside properties in 2024.

Zero Waste Scotland reports have highlighted food waste is one of the most carbon-intensive waste materials, responsible for 25% of Scotland's total waste carbon footprint, despite constituting only 5% of Scotland's waste by weight. Now and over the next ten years, increasing focus is required on managing waste streams that have the highest carbon impact. The management of food waste, plastics, and textiles, all carbon-intensive, will be key material streams in mitigating climate change and adoption of the vision, themes and actions within this strategy will seek to reduce the carbon impact and assist the Council move towards carbon neutrality by 2030.

The resource and recycling sector is undergoing significant policy change, impacting how local authorities deliver waste and recycling services and manage waste thereafter. The plans for plastic and glass outlined in GCC's Resource & Recycling Strategy 2020-30 have been impacted by the decision to delay the Deposit Return Scheme (DRS) to 2025. Other legislation and impending policy, including, but not limited to, Extended Producer Responsibility for Packaging Waste, textile collections, the ban on biodegradable material going to landfill, and Scotland's Circular Economy and Waste Route Map to 2030, will influence future re-iterations of the council's Resource and Recycling Strategy.

In considering the requirements of NPF4 Policy 12 Zero Waste as shown below, it is evident that CDP2 should be informed by more than the Council's own Resource & Recycling Strategy 2020-30 which only deals with household waste collection and management. There remains a gap in the duties for strategic oversight and analysis of waste management activities within the City as we transition towards a circular economy.

SEPA licenses all of the waste carriers and waste holders within the City and collect a range of data, including capacity, which is published on their Waste Sites and Capacity Tool website. Zero Waste Scotland (ZWS) has a remit for Circular Economy and is working on several interesting research projects such as the fundamentals for establishing resource exchange mechanisms: Circular Economy Materials Management Facilities, A Feasibility Study of Regional Materials Reuse Hubs in Scotland and Understanding

best practice waste prevention and reuse in the Scottish built environment- all of which are due to report back in April 2024. Within the City, the Chamber of Commerce is leading on Circular Glasgow with the business community.

NPF4 LDP Requirement
LDPs should identify appropriate locations for new waste management infrastructure to support the circular economy and meet identified needs in a way that moves waste as high up the waste hierarchy as possible.
NPF4 Policy Intent
To encourage, promote and facilitate development that is consistent with the waste hierarchy.
NPF4 Policy Outcomes
• The reduction and reuse of materials in construction is prioritised. • Infrastructure for zero waste and to develop Scotland's circular economy is delivered in appropriate locations.
Requirements/Assessments needed to assess applications
a) Development proposals will seek to reduce, reuse, or recycle materials in line with the waste hierarchy. b) Development proposals will be supported where they: i. reuse existing buildings and infrastructure; ii. minimise demolition and salvage materials for reuse; iii. minimise waste, reduce pressure on virgin resources and enable building materials, components, and products to be disassembled, and reused at the end of their useful life; iv. use materials with the lowest forms of embodied emissions, such as recycled and natural construction materials; v. use materials that are suitable for reuse with minimal reprocessing. c) Development proposals that are likely to generate waste when operational, including residential, commercial, and industrial properties, will set out how much waste the proposal is expected to generate and how it will be managed including: i. provision to maximise waste reduction and waste separation at source, and

ii. measures to minimise the cross-contamination of materials, through appropriate segregation and storage of waste; convenient access for the collection of waste; and recycling and localised waste management facilities.

d) Development proposals for waste infrastructure and facilities (except landfill and energy from waste facilities) will be only supported where:

i. there are no unacceptable impacts (including cumulative) on the residential amenity of nearby dwellings, local communities; the transport network; and natural and historic environment assets;
ii. environmental (including cumulative) impacts relating to noise, dust, smells, pest control and pollution of land, air and water are acceptable;
iii. any greenhouse gas emissions resulting from the processing and transportation of waste to and from the facility are minimised;
iv. an adequate buffer zone between sites and sensitive uses such as homes is provided taking account of the various environmental effects likely to arise;
v. a restoration and aftercare scheme (including appropriate financial mechanisms) is provided and agreed to ensure the site is restored;
vi. consideration has been given to co-location with end users of outputs.

e) Development proposals for new or extended landfill sites will only be supported if:

i. there is demonstrable need for additional landfill capacity taking into account Scottish Government objectives on waste management; and
ii. waste heat and/or electricity generation is included. Where this is considered impractical, evidence and justification will require to be provided.

f) Proposals for the capture, distribution or use of gases captured from landfill sites or waste water treatment plant will be supported.

g) Development proposals for energy-from-waste facilities will not be supported except under limited circumstances where a national or local need has been sufficiently demonstrated (e.g. in terms of capacity need or carbon benefits) as part of a strategic approach to residual waste management and where the proposal:

i. is consistent with climate change mitigation targets and in line with circular economy principles;

ii. can demonstrate that a functional heat network can be created and provided within the site for appropriate infrastructure to allow a heat network to be developed and potential local consumers have been identified;
iii. is supported by a heat and power plan, which demonstrates how energy recovered from the development would be used to provide electricity and heat and where consideration is given to methods to reduce carbon emissions of the facility (for example through carbon capture and storage)
iv. complies with relevant guidelines published by Scottish Environment Protection Agency (SEPA); and
v. has supplied an acceptable decarbonisation strategy aligned with Scottish Government decarbonisation goals.

As noted in section 3, whilst waste emissions have been reduced, ongoing emissions reduction in Glasgow is required to reach net zero.

NPF4 Local Development Plan Instruction

Policy 12, Zero Waste:

- LDPs should identify appropriate locations for new waste management infrastructure to support the circular economy and meet identified needs in a way that moves waste as high up the waste hierarchy as possible.

The following strategies and projects should be delivered/supported through CDP2:

Policy / Project – Name, Weblink and Author	**Commitment to Reducing Emissions / Adapting**	**Requirements for CDP2**	**Services / organisations to be involved in drafting policy**
Glasgow Climate Plan	Action 40, 58: The new City Development Plan will also align with our Circular Economy Route map, an important step in reducing carbon emissions in the city and making Glasgow carbon neutral by 2030	Covered below	

Policy / Project – Name, Weblink and Author	Commitment to Reducing Emissions / Adapting	Requirements for CDP2	Services / organisations to be involved in drafting policy
Glasgow Climate Adaptation Plan	Higher temperatures leading to an increase in vermin/pests and increase demand for refuse collection.	Review current refuse requirements for new builds/conversion and assess whether adaptation is required.	GCC Planning
Scotland's Circular Economy and Waste Route Map to 2030	• Work with industry to accelerate the adoption of best practice standards. • Investigate options to incentivise refurbishment of buildings. • Coordinate a Scottish Programme for Reuse of Construction Materials and Assets. • Investigate the potential use of recycling bonds to divert material from landfill. • Consider how devolved taxes can incentivise the use of secondary aggregates and support circular economy practices. • Work with industry to identify ways to reduce soil and stones going to landfill. • Facilitate the development of a soil symbiosis programme.	Will consider the Scotland's Circular Economy and Waste Route Map to 2030 in relation to NPF4 with Sustainability to determine whether new policy is required for CDP2.	GCC Planning, Sustainability

Policy / Project – Name, Weblink and Author	Commitment to Reducing Emissions / Adapting	Requirements for CDP2	Services / organisations to be involved in drafting policy
Development of a Circular Economy Route Map for Glasgow 2020-2030	Large storage options (spatial) for the city. An audit is being undertaken to identify suitable locations.	Proposed plan can consider spatial implications of the audit once available.	GCC Planning, Sustainability
GCC Resource and Recycling Strategy 2020-2030	The overarching vision for the Strategy is Empowering Glasgow to become a zero-waste City. Our 'Empowering Glasgow' vision aims to deliver change by providing greater opportunities for residents to participate in our services which seek to be more efficient, resilient, and sustainable. A 'zero-waste city' does not mean that no waste will be produced, but refers to a set of principles to minimise the production of waste and recognise waste as a valuable resource and not simply as something which is thrown away. Our ambition is to effectively manage waste to: • Harness the maximum resource use from the material • To reduce the impact that waste contributes to climate change • To support residents, local businesses, and visitors within Glasgow to manage their waste more	Work with Recycling and Sustainability colleagues to ensure that Planning assists in the development and delivery of impending policy and legislative changes by reflecting any requirements additional to NPF4 in CDP2.	NRS Recycling, Planning, Sustainability, ZWS, SEPA

Policy / Project – Name, Weblink and Author	Commitment to Reducing Emissions / Adapting	Requirements for CDP2	Services / organisations to be involved in drafting policy
	sustainably • Assist Glasgow to achieve a carbon-neutral status by 2030 The Strategy will seek to: • Increase materials re-used, repaired, or refurbished • Increase recycling of the most carbon-intensive waste streams, including; food, textiles, and plastics • Increase the type, quality and quantity of materials collected for recycling • Continue the reduction of waste sent to landfill • Increase public understanding and engagement on waste and recycling, ultimately changing the way people think about waste • Deliver efficient, accessible, and resilient waste and recycling services		
NPF4 National Development 4. Circular Economy Materials Management Facilities	This national development supports the development of facilities required to achieve a circular economy. This sector will provide a range of business, skills, and employment opportunities as part of a just transition to a net zero economy. The range and scale of facilities required to manage secondary materials and their circulation back into the economy is not yet clear. However, sites and facilities	ZWS are leading the national level feasibility research on this, due April 2024.	ZWS, Sustainability, Planning

Policy / Project – Name, Weblink and Author	Commitment to Reducing Emissions / Adapting	Requirements for CDP2	Services / organisations to be involved in drafting policy
	will be needed to retain the resource value of materials so that we can maximise the use of materials in the economy and minimise the use of virgin materials in order to reduce greenhouse gas emissions. This is particularly significant for the construction and demolition industries and decommissioning industry. Careful assessment of specific proposals will be required to ensure they provide sustainable low carbon solutions, include appropriate controls, manage any emissions, and mitigate localised impacts including on neighbouring communities and the wider environment.		

5.6. Agriculture and Urban Food Growing

Glasgow's agricultural emissions are minor relative to other sectors. Nevertheless, the amount of and grade of, agricultural land is an important consideration for CDP2. As the climate warms, there could be improvements in the quality of agricultural land in the city boundary. Despite the relatively small amount of agricultural land, CDP2 will need to facilitate the changes that are required to draw down greenhouse gas emissions from this land use. The prime agricultural land can be seen in the CDP2 Mapping Hub.[13]

With respect to urban food growing, there are multiple aspects that require consideration for CDP2 which are broadly covered in existing planning policy such as SG6 and the Open Space Strategy. Generally, carrying over existing policy with a view of expanding the plan to include the food growing plan and city food plan.

NPF4 Local Development Plan Instruction:

Policy 8: Green belts

- LDPs should consider using green belts, to support their spatial strategy as a settlement management tool to restrict development around towns and cities.
- Green belts will not be necessary for most settlements but may be zoned around settlements where there is a significant danger of unsustainable growth in car-based commuting or suburbanisation of the countryside.
- Green belts should be identified or reviewed as part of the preparation of LDPs. Boundary changes may be made to accommodate planned growth, or to extend, or alter the area covered as green belt. Detailed green belt boundaries should be based on evidence and should be clearly identified in plans.

The following strategies and projects should be delivered/supported through CDP2:

Policy / Project – Name, Weblink and Author	**Commitment to Reducing Emissions / Adapting**	**Requirements for CDP2**	**Services / organisations to be involved in drafting policy**
Glasgow Climate Plan	Recommendation 36: The new City Development Plan (CDP2) to include a policy to ensure new housing	Review existing policy position (ENV2, SG6) and the Open Space Strategy which supports this aim.	GCC Planning

[13] More information available from Cleaner air for Scotland 2 section 7

Policy / Project – Name, Weblink and Author	Commitment to Reducing Emissions / Adapting	Requirements for CDP2	Services / organisations to be involved in drafting policy
	developments include space for food growing		
Food Growing Plan	A2: Develop new allotment sites	CDP2 can identify and support food growing where land-use issues may arise.	GCC Planning, Greenspace and Biodiversity
City Food Plan	Establish an accessible food information hub that will provide access to a range of resources, such as community food projects, community meals information hubs and growing spaces	CDP2 could support this through mapping of growing spaces on the policy and proposals map.	GCC Planning, Greenspace and Biodiversity
	Incorporate edible plants and fruit trees into council planting in parks and on streets	CDP2 could make this an expectation of development proposals, where appropriate.	GCC Planning, Greenspace and Biodiversity
	Scaling up allotments and community growing space, as well as the larger scale urban farming in the city.	Firm understanding of scale of urban agriculture within the city required. By protecting open space and greenbelt we can maximise our ability to deliver these things by safeguarding agricultural land.	GCC Planning, Greenspace and Biodiversity
	Through planning policy make provision for community food spaces, alongside other developments	Noted above.	GCC Planning, Greenspace and Biodiversity
Circular Economy Route Map	Spatial need to consider where urban agriculture/hydroponic/vertical agriculture could be undertaken in the city.	Noted above.	GCC Planning, Greenspace and Biodiversity

Policy / Project – Name, Weblink and Author	Commitment to Reducing Emissions / Adapting	Requirements for CDP2	Services / organisations to be involved in drafting policy
Thriving Glasgow Portrait	Food (local) What could it look like: Local community food growing, and food sharing initiatives are widespread, and healthy food options are more accessible and affordable than ultra-processed options.	Noted above.	GCC Planning, Greenspace and Biodiversity
Thriving Glasgow Portrait	Land Conversion Definition of thriving: Glasgow's supply chain is built upon transparent and sustainable land use practices, ensuring responsible and accountable land management. Glasgow maximises its global influence to support restorative land use practices. What could it look like: Glasgow makes use of urban allotments, vertical farming, and city rooftops, to reduce the amount of land used for agriculture, and allow more natural biodiversity to flourish.	Noted above.	GCC Planning, Greenspace and Biodiversity

5.7. Digital Infrastructure

Digital infrastructure can help to reduce emissions by facilitating the digital economy and reducing emissions in a range of sectors. It can facilitate local living by enabling people to work remotely. It can also transform public service delivery. Digital infrastructure will need to be low-carbon, and climate resilient. The Digital Strategy Glasgow notes that: "Increasingly digital technology is being applied to improve environmental sustainability. Smart city technologies, such as intelligent street lighting and smart bins that were trialled and pioneered in Glasgow, and smart home technologies such as Nest and Hive smart thermostats, can help people to better manage their energy consumption. Smart grid technologies, together with digitally-enabled renewable energy sources are allowing energy companies to improve the efficiency of energy supply, and technologies such as electric vehicles and autonomous vehicles provide opportunities to transform transport and to reduce pollution."

NPF4 Local Development Plan Instruction:

Policy 24, Digital Infrastructure

- LDPs should support the delivery of digital infrastructure, including fixed line and mobile connectivity, particularly in areas with gaps in connectivity and barriers to digital access.

The following strategies and projects should be delivered/supported through CDP2:

Policy / Project – Name, Weblink and Author	**Commitment to Reducing Emissions / Adapting**	**Requirements for CDP2**	**Services / organisations to be involved in drafting policy**
Digital Strategy Glasgow	Sets out a range of actions which will require digital connectivity.	The Digital Infrastructure Audit identifies the existing and planned infrastructure for Glasgow and the requirement for CDP2 to support and facilitate the delivery of this infrastructure.	GCC Planning
Thriving Glasgow Portrait	Connectivity • Definition of thriving: All citizens in Glasgow have access to fast, affordable broadband and are supported in accessing online	As above.	GCC Planning

	communication networks and the internet. There are no digital inequalities by age, wealth, or education status. • What could it look like: Information not produced.		

5.8. Negative Emissions Technologies (NETS)

NETS has been defined by the Scottish Parliament Information Centre (SPICe) as being: Bioenergy CCS and Direct air capture CCS are sometimes termed as 'negative emissions technologies' as they either capture CO2 direct from the atmosphere or the carbon captured during the growth of the bioenergy, is then re-captured and stored by CCS. Direct Air Capture CCS is where CCS is used solely for the purpose of capturing CO2 from the atmosphere as opposed to being used alongside an energy utilisation or conversion process. Bioenergy CCS is using bioproducts such as wood pellets to produce electricity with CCS.

The Scottish Government expects Carbon Capture & Storage (CCS) to contribute significantly to overall net zero. In the Scottish Climate Change plan update from 2020, 'negative emission technologies (NETs)' (a term capturing various process using CCS) are forecast to reduce overall GHG emissions by 24% in 2032 (the last year of the plan). In the Climate Change Plan update, it is CCS that largely permits the use of 'net' rather than absolute zero targeting, as all planned NETs include a form of CCS. The Climate Change Plan update also highlights the Climate Change Committee's (CCC) view that there is 'relatively greater potential' for NETs in Scotland than the rest of the UK.

In May 2023, the Scottish Government released the annual Climate change monitoring report. These reports are a statutory requirement under the 2019 Climate Change Act and assess progress in terms of emission reductions and various other indicators. In the section on Negative Emissions Technologies (NETs) the report states that with respect to CCS: '*Scotland can deliver at scale in due course but not at the pace assumed in the CCPu* (Climate Change Plan 2018-32 update)'.

This stated change in assumptions is important due to the implications it has for emission reduction planning in Scotland. Without this level of contribution, if the 2030 interim target is to be achieved, greater emission reductions will be needed in other sectors e.g., transport, agriculture, heating buildings etc.

The change in expectation for CCS is due to 'various shifts on the evidence' including:

- 'The UK Government's decision not to allocate the Scottish Cluster as a Track-1 cluster for delivery in the mid-2020s, impacting on when carbon storage underpinning NETs will be available, and industries' appetite to invest in NETs technologies' and
- 'No public commitment to date by a commercial operator to employ a NETs model for a single large power station in Scotland.'

There are no known proposals for NETS projects in Glasgow. A new Scottish draft Climate Change Plan is expected in 2024, delayed from 2023.

The following strategies and projects should be delivered/supported through CDP2:

Policy / Project – Name, Weblink and Author	Commitment to Reducing Emissions / Adapting	Requirements for CDP2	Services / organisations to be involved in drafting policy
Scottish Carbon Capture and Storage	Focused predominantly on heavy industrial operations that can't transition purely to electrification. No known proposed projects in Glasgow.	Further research and understanding required on how this would work in an urban environment. https://carbonneutralcities.org/wp-content/uploads/2020/01/Report_How-Carbon-Capture-Storage-and-Utilisation-Can-Help-Cities-Go-Carbon-Neutral.pdf	NRS Planning, Sustainability

6. Site Appraisals and Spatial Strategy – Issues and Opportunities

This section considers areas of policy which will have an influence on the Spatial Strategy for CDP2, both in terms of where development should and shouldn't be located and in terms of policy required to adapt the city's existing land uses and built fabric to climate change. As such this section also draws out areas of vulnerabilities in the city. Existing Council policies and projects have been identified that specify supportive or deliverable actions for the next development plan with requirements for CDP2 stated where relevant.

6.1. Local Living

The concept of local living is predicated on providing choice to communities. By creating well connected and compact neighbourhoods, residents have more options available to them in deciding how to go about meeting their daily needs. Glasgow is, for the most part, already a series of interconnected neighbourhoods with local facilities that can meet the daily needs of its residents. Where the above does not apply tends to be in areas of the city where housing has been built without local facilities for the resident population to draw on. Compounding the issue, these areas tend to lack alternative forms of transportation which can induce localised dependance on car use. This creates a situation where many people feel like they have no other choice but to travel by car to locations in their immediate vicinity. The role of the spatial strategy and masterplans in the proposed plan can address these issues from the outset, by carefully considering how best to provide people with as many options as possible to carry out their lives in sustainable and positive ways. A full site appraisal will be carried out to shape the proposed plan.

NPF4 Local Development Plan Instruction

Policy 15, Local living and 20-minute neighbourhoods

- LDPs should support local living, including 20-minute neighbourhoods within settlements, through the spatial strategy, associated site briefs and masterplans. The approach should consider the local context, consider the varying settlement patterns, and reflect the particular characteristics and challenges faced by each place. Communities and businesses will have an important role to play in informing this, helping to strengthen local living through their engagement with the planning system.

The following strategies and projects should be delivered/supported through CDP2:

Policy / Project – Name, Weblink and Author	**Commitment to Reducing Emissions / Adapting**	**Requirements for CDP2**	**Services / organisations to be involved in drafting policy**
Glasgow Climate Plan	Action 56: to set out how 20-minute neighbourhoods can be achieved with Liveable Neighbourhoods Plan proposing specific interventions.	Liveable Neighbourhoods interventions are focused on active travel and public realm – this requires integrating into CDP2 policies on local living and as part of site specific requirements.	GCC Planning, Transport
Climate Action Scorecard	Does the council include a policy in the Local Plan to create 15/20 minute neighbourhoods? (No)	CDP2 to expand on NPF4 local living and 20 minute neighbourhoods (policy 15). Place Reports provide information on existing local living facilities and requirements across the city. Consideration is required of CDP2 policies needed to enhance existing neighbourhoods. Future community growth will require to employ the principles of local living into masterplans and development briefs to ensure that residents across the city	GCC Planning

		have reasonable access to services that they rely on within walking distance of their home.	

6.2. Water and Flood Risk Management

Flood Risk is a known issue in Glasgow. Based on the expected increase in rainfall to the region in light of a warming climate, the issue is likely to become more acute without step-change in how the city deals with its watercourses and with surface water drainage. Whilst there are no emissions reductions required, adaptation to the changing climate on this topic is of utmost importance in order to ensure that flooding is de-risked in line with projections.

Strategic Flood Risk Assessment

A key tool CDP2 will employ to “strengthen resilience to flood risk by promoting avoidance as a first principle and reducing the vulnerability of existing and future development to flooding” is Strategic Flood Risk Assessment. Glasgow City Council’s Planning Service requires a Strategic Flood Risk Assessment (SFRA) to support work for the city’s next Local Development Plan (CDP 2) by delivering the intention of National Planning Framework 4 (NPF4) Policy 22 (and Policy 10) to strengthen resilience to flood risk by promoting avoidance as a first principle and reducing the vulnerability of existing and future development to flooding.

The Glasgow SFRA will inform development planning processes; ensuring that flood risk is considered in the formulation of the Council's spatial strategy; in the identification of development allocations; and in the review of land use policies, whilst contributing towards satisfying the statutory duties Glasgow City Council (GCC) has under the Flood Risk Management (Scotland) Act 2009. Work is underway on the Stage 1 SFRA which will include a high-level, map-based, and strategic level assessment used to inform the broad direction of the Spatial Strategy are available. At time of writing no outputs are available to view.

The Stage 1 SFRA will be a high-level, primarily map-based, overview of the scope and nature of all sources of existing and future flood risk within the local development plan area to inform the development planning process. It will take climate change into account.

Designing with Water

The Council’s ambitions for the River Corridor place it at the scale of a major urban renewal project - balancing regeneration (and its wider social, environmental, and economic benefits) with the complexities of flood management and climate change. Retreating

from the river is not considered a proportionate response if the long-term objective is to create a liveable city, to support integration with existing neighbourhoods and to attract people to the waterfront.

The recently published Tidal Flooding on the Clyde Options Analysis and Scoping of Adaptation Pathways (below) supports the principle of future development in the area covered by the SDF and the preparation of locally appropriate guidance to avoid poor long-term investment decisions.

Designing with Water - Design Guidance for Glasgow's River Corridor should be considered as an early part of the adaptive pathways approach to help unlock vacant sites along the river, repair the urban fabric and ensure future development is able to 'resist and absorb' the impacts of sea level rise and tidal surge.

Tidal Flooding on the Clyde Options Analysis and Scoping of Adaptation Pathways

Adaptation pathways is a decision-making tool employed to adapt to climate change and the inherent uncertainties of future risk. This research[14] sets out to explore the evidence base to help design and apply adaptation (investment) pathways to the tidal reach of the Clyde drawing on international practice and UK guidance. This research is a first for Scotland providing:

- information to help frame actions and decisions at a local, regional, and national level around future flood resilience and long-term adaptation on the Clyde;
- practical insights into the application of adaptation pathways practice to the Clyde; and
- a starting point for the co-design and development of a route map and future actions.

Recommended first steps for adaptation on the Clyde include to:

- agree a framework for the application of adaptation pathways for the Clyde that fosters systems-thinking and a process for place-based decision making;
- agree what "a resilient Clyde" means, to inform design principles for investment and pathway development, and shape indicators for monitoring and evaluation;
- establish a 'resilience zone', a geographic boundary for decision-making;
- build an action plan (Mission Map) for the first five years of investment; and
- scope and develop a knowledge portal to support innovation, collaboration and long-term monitoring and evaluation.

[14] Climate Exchange - Tidal Flooding on the Clyde Options Analysis and Scoping of Adaptation Pathways

Factors effecting assessment may include Climate Change, scale of urban development, levels of economic growth, demographic change etc. These would have implications for what future flood risk management, water services availability, water ecology management and water management infrastructure capacity.

SEPA has produced flood hazard maps (Flood maps | Beta | SEPA | Scottish Environment Protection Agency) for Scotland that show the current predicted extent of flooding from river (fluvial), surface water (pluvial) and coastal sources for low (0.1%), medium (0.5%) and high (10%) likelihood events. The flood maps also have data for a 'future' climate change scenario (to 2080) for river and coastal sources, but not surface water. SEPA anticipates publishing updated surface water flood maps, including a 'future' scenario, in early 2025.

The Climate Vulnerability Map[1] produced by Climate Ready Clyde for Glasgow City Region is a spatial tool that shows overlays the 20% most deprived postcodes against current river and surface water flooding medium risk and increased heat risk. The climate vulnerability map does not visually distinguish between surface water flood risk and river flood risk or include an allowance for climate change. However, it can be inferred based on known watercourses in the city. Work will be undertaken to cross-review where flood and heat risk are most pressing in the city in the proposed plan stage. A cursory overview has been provided below. Other sources of data provided by SEPA Flood Mapping, Clyde and Loch Lomond Flood Risk Management Plan, One planet tool, Adaptation Scotland Resources and Tools will be analysed during the Proposed Plan.

[1] Climate Ready Clyde: Climate Vulnerability Map

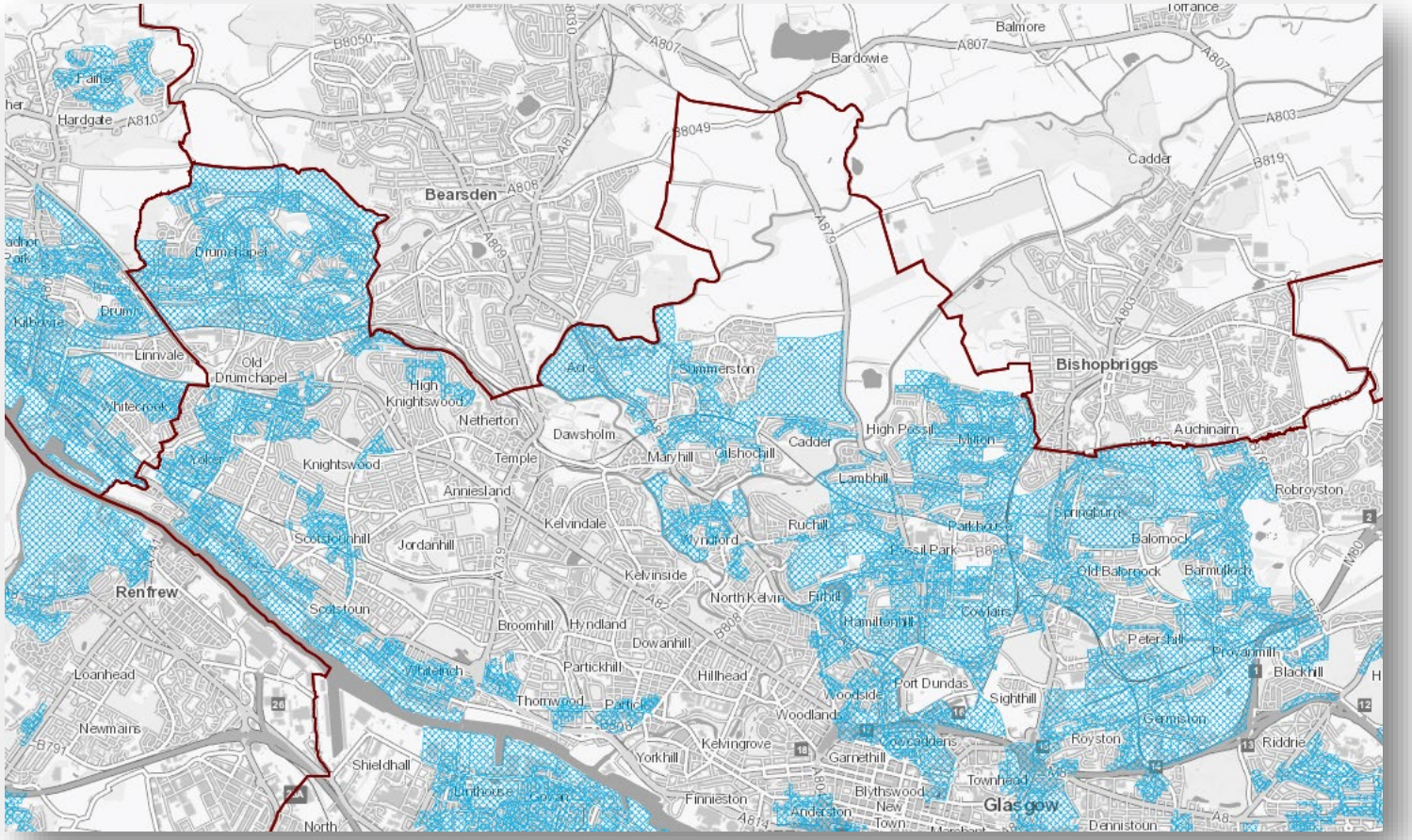


FIGURE 7 - GLASGOW NORTH AND WEST FLOOD RISK – CLIMATE READY CLYDE

Glasgow North and West

In general, the communities most at risk of future flooding are within the periphery areas of the western and northern edges of the city including the areas of Drumchapel, Yoker, Scotstoun and Whiteinch, Maryhill, Possil and the neighbourhoods north of the M8 ring road.

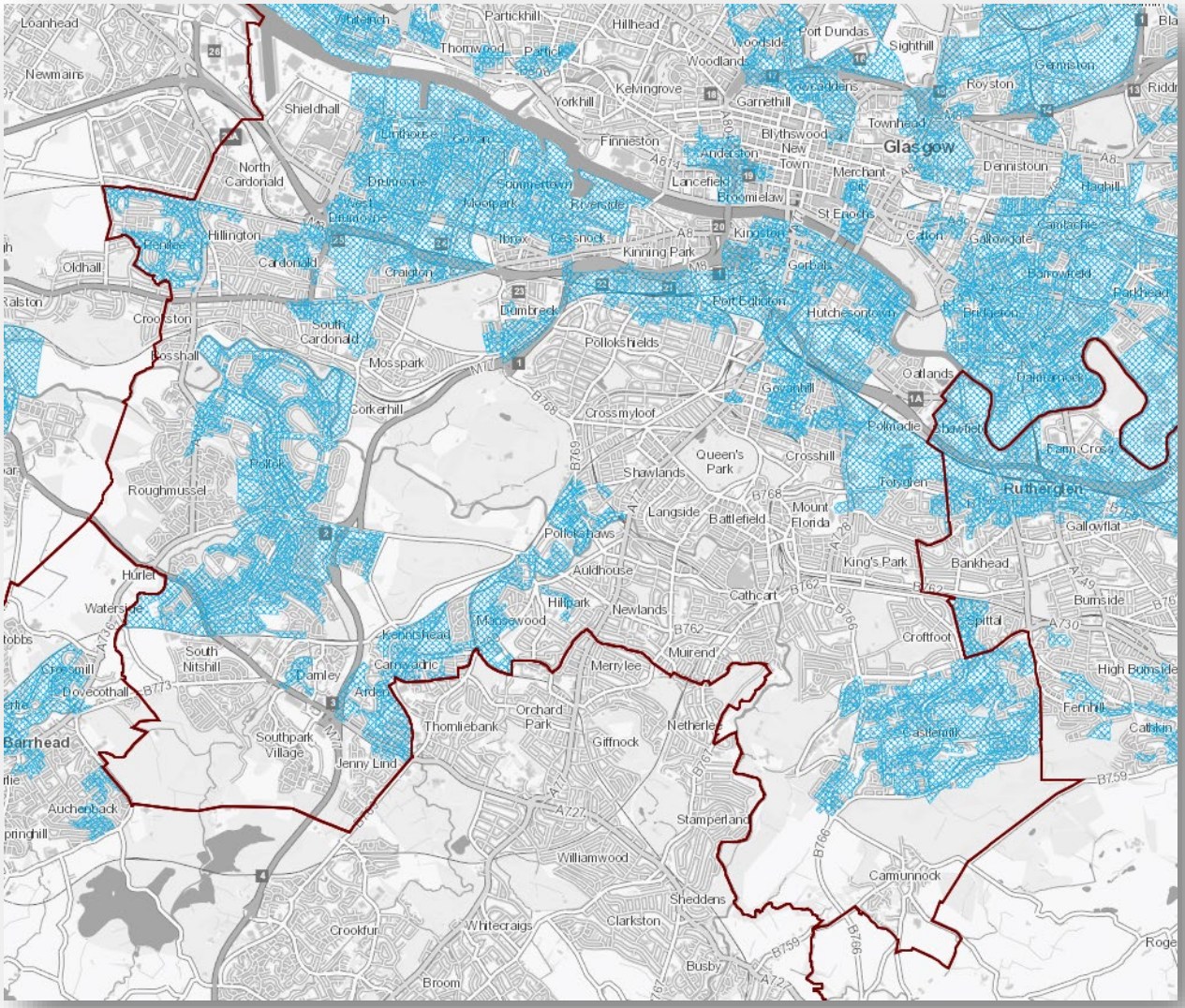


FIGURE 8 - GLASGOW SOUTH FLOOD RISK - CLIMATE READY CLYDE

Glasgow South

Most areas between the River Clyde and the M8 are flood prone whilst Pollok and Castlemilk are included. Neighbourhoods that run the spine of Pollok park (Pollokshaws Road) and parts of Govanhill and Toryglen are identified. The Pollok LDF has identified communities around Peat Road, Priesthill, Nitshill Road and key corridors, given the proximity of five river valleys at the White Cart, Levern Water, Blacksey, Aurs and Brockburn.

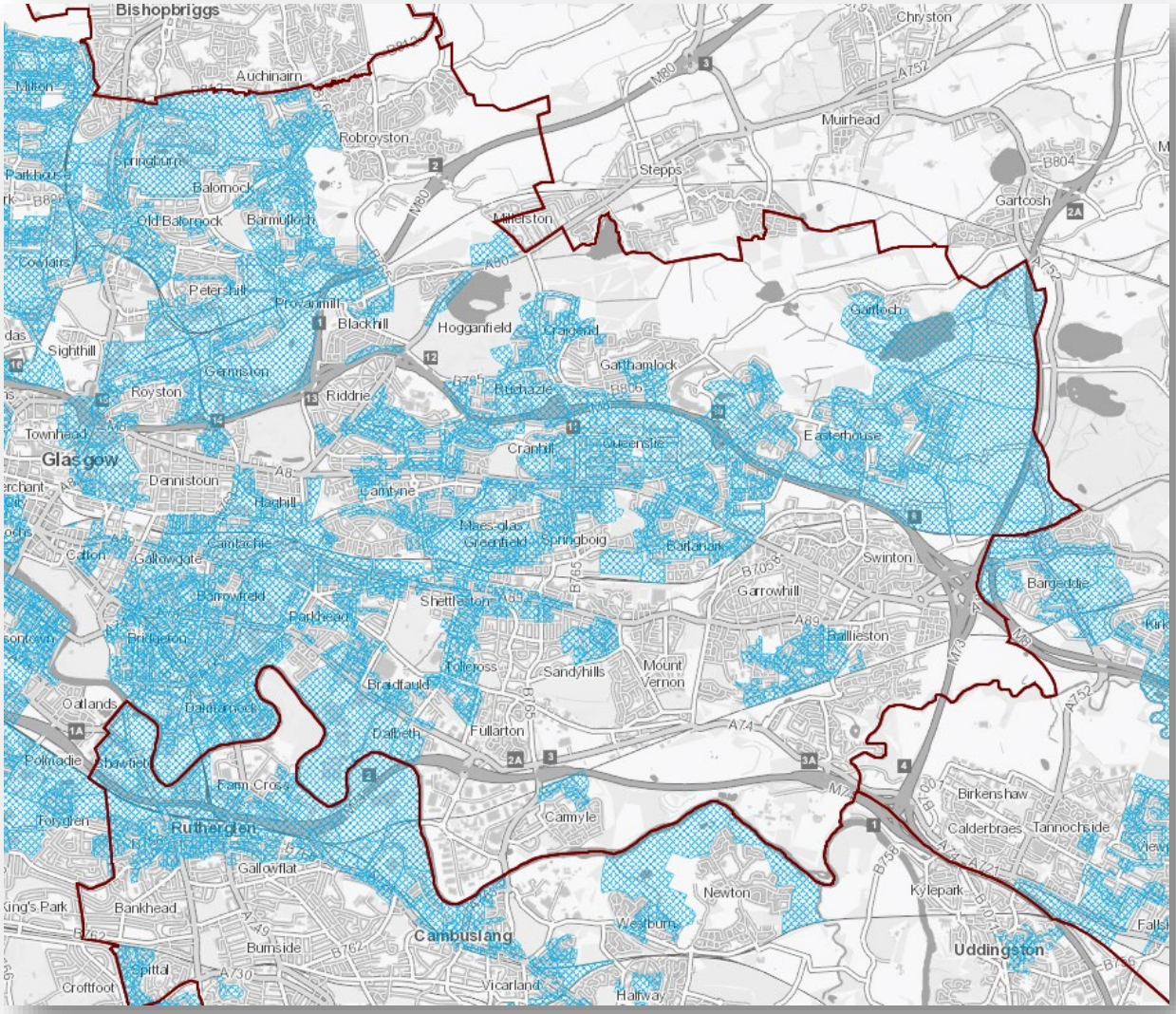


FIGURE 9 - GLASGOW EAST - CLIMATE READY CLYDE

Glasgow East

The neighbourhoods immediately east of Calton including Bridgeton, Dalmarnock and Parkhead are included as well as those communities along and north of Shettleston Road. Most communities north of the M8 are also identified, including Easterhouse, Ruchazie and Craigend. This is considered in detail within the Greater Easterhouse SDF.

Flood Risk Management Plans

Flood risk management plans exist for the Glasgow area by way of the Clyde and Loch Lomond Local Plan District which sorts the Strathclyde area 21 potentially vulnerable areas. Where relevant, these should be added to place reports.

The following strategies and projects should be delivered/supported through CDP2:

Policy / Project – Name, Weblink and Author	**Commitment to Reducing Emissions / Adapting**	**Requirements for CDP2**	**Services / organisations to be involved in drafting policy**
Glasgow Climate Plan	Require all new development/ infrastructure to deliver flood risk net gain (similar to biodiversity net gain principle).	This is covered by the Strategic Flood Risk Assessment. More information is available in the Evidence Report, Infrastructure Audit: Water	GCC Planning GCC Property and Consultancy Services – Water / MGSDP
Glasgow Climate Adaptation Plan	"The City Development Plan to mandate green roofs for new buildings, or retrofit, over a certain m2 size threshold, for the multiple benefits this could bring in terms of flood risk, biodiversity, and urban cooling. Require developers to include adaptation onto development projects,	A cross-cutting policy that could provide benefits for mitigation and adaptation.	GCC Planning GCC Property and Consultancy Services – Water / MGSDP

Policy / Project – Name, Weblink and Author	Commitment to Reducing Emissions / Adapting	Requirements for CDP2	Services / organisations to be involved in drafting policy
	undertake sympathetic retrofitting measures for older buildings, and other measures such as incorporating green roofs, green walls and/or rainwater collectors on buildings where appropriate. c. Control urban creep through requirements for source control for property extensions and reduction of permitted development rights."		
Clyde and Loch Lomond Flood Risk Management Plan	Includes information on potentially vulnerable areas for flooding. Includes, Yoker catchment (Clydebank to Partick), River Kelvin, City Centre, Glasgow North, and East of Glasgow	Include GCC relevant targets within the plan relating to the areas of the city identified.	
The Metropolitan Glasgow Strategic Drainage Partnership	Masterplan is available for Glasgow and City Region.	CDP2 to integrate	
Not part of any existing plan or strategy.	Permeable surfaces and challenges around the suitability of adopted footpaths	Will need further consultation with Roads and Sustainability about developing a Council standard or requiring it in new development.	GCC Roads, Planning, Sustainability, Property and Consultancy Services – Water / MGSDP

Policy / Project – Name, Weblink and Author	Commitment to Reducing Emissions / Adapting	Requirements for CDP2	Services / organisations to be involved in drafting policy
		Existing and future flood risk – areas of the city where development should not occur or requires mitigation or compensatory capacity.	

6.3. Urban Heat Island

Primary source data on Urban Heat Island risk for the UK is provided by 4 Earth Intelligence[15] which is divided into a postcode heat health index.[16] The Climate Ready Clyde map shows postcode locations that are ranked 4 or 5 by the index, or within the 90-99% pecentile of all UK postcodes.

[15] Check your postcode: Is your area vulnerable to extreme heat?
[16] Glasgow Caledonian University - Climate Proofing Glasgow

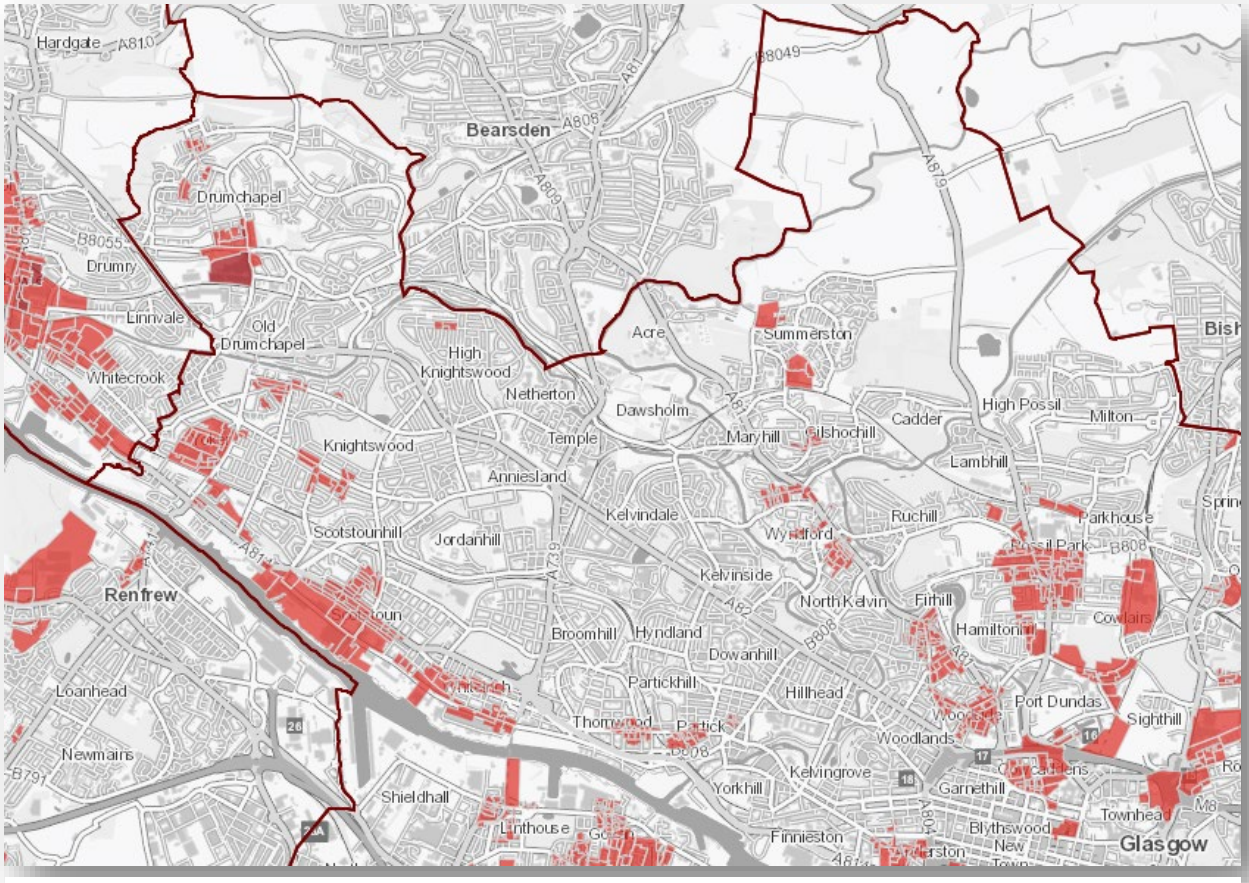


FIGURE 10 - HEAT RISK - CLIMATE READY CLYDE

North and West:

There are fewer areas in the north and west of the city that are at risk of heat compared to flooding but there are concentrations or risk around Scotstoun/Whiteinch, Drumchapel and around Possil/Hamiltonhill and Port Dundas.

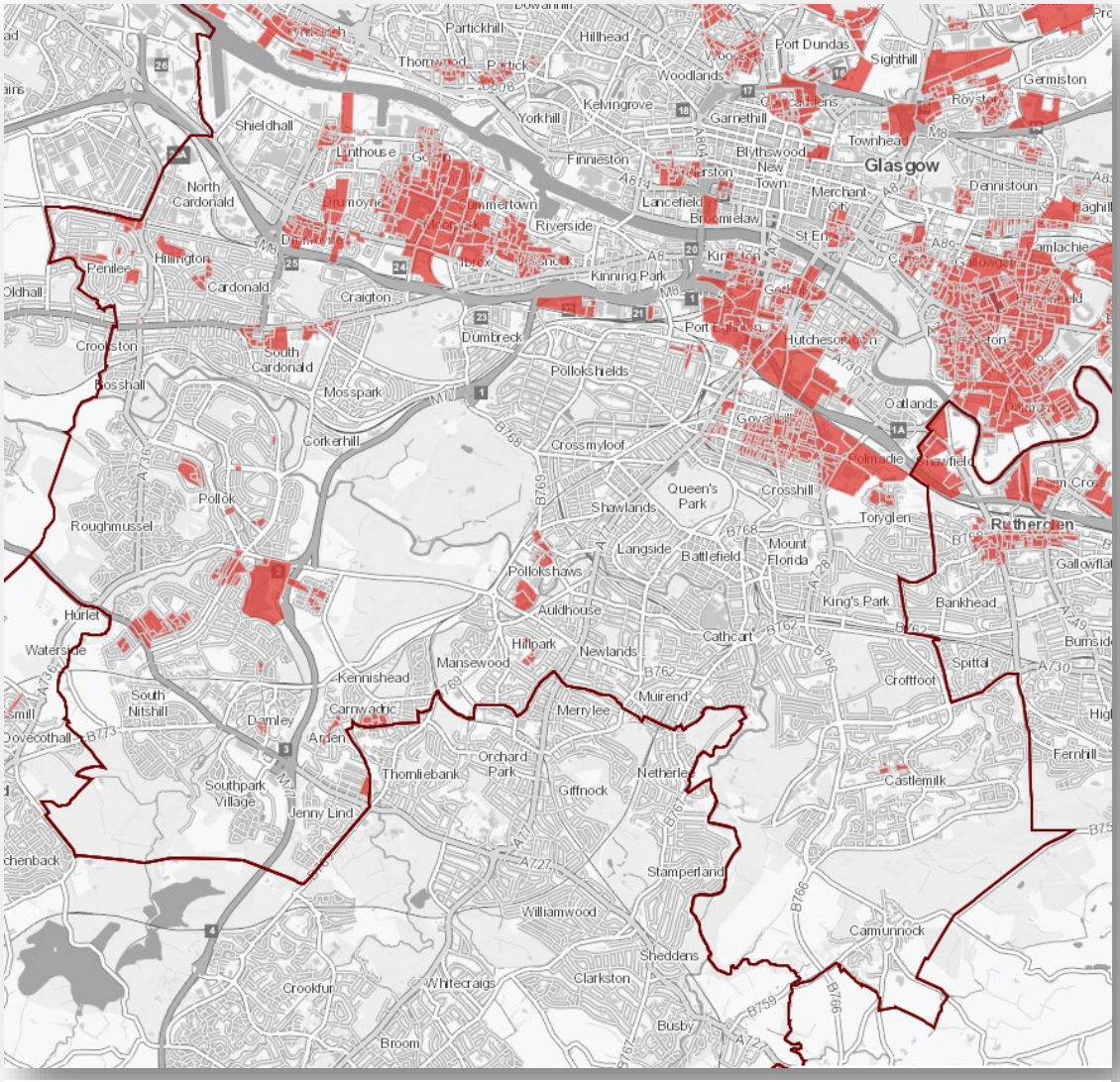


FIGURE 11 - GLASGOW SOUTH - CLIMATE READY CLYDE

South:

Key areas of heat risk are located in the Govan, Ibrox and Cessnock east to west corridor. Other areas with risk are located in Tradeston, Eglington Toll and Govanhill/Polmadie and smaller areas around Pollokshaws.

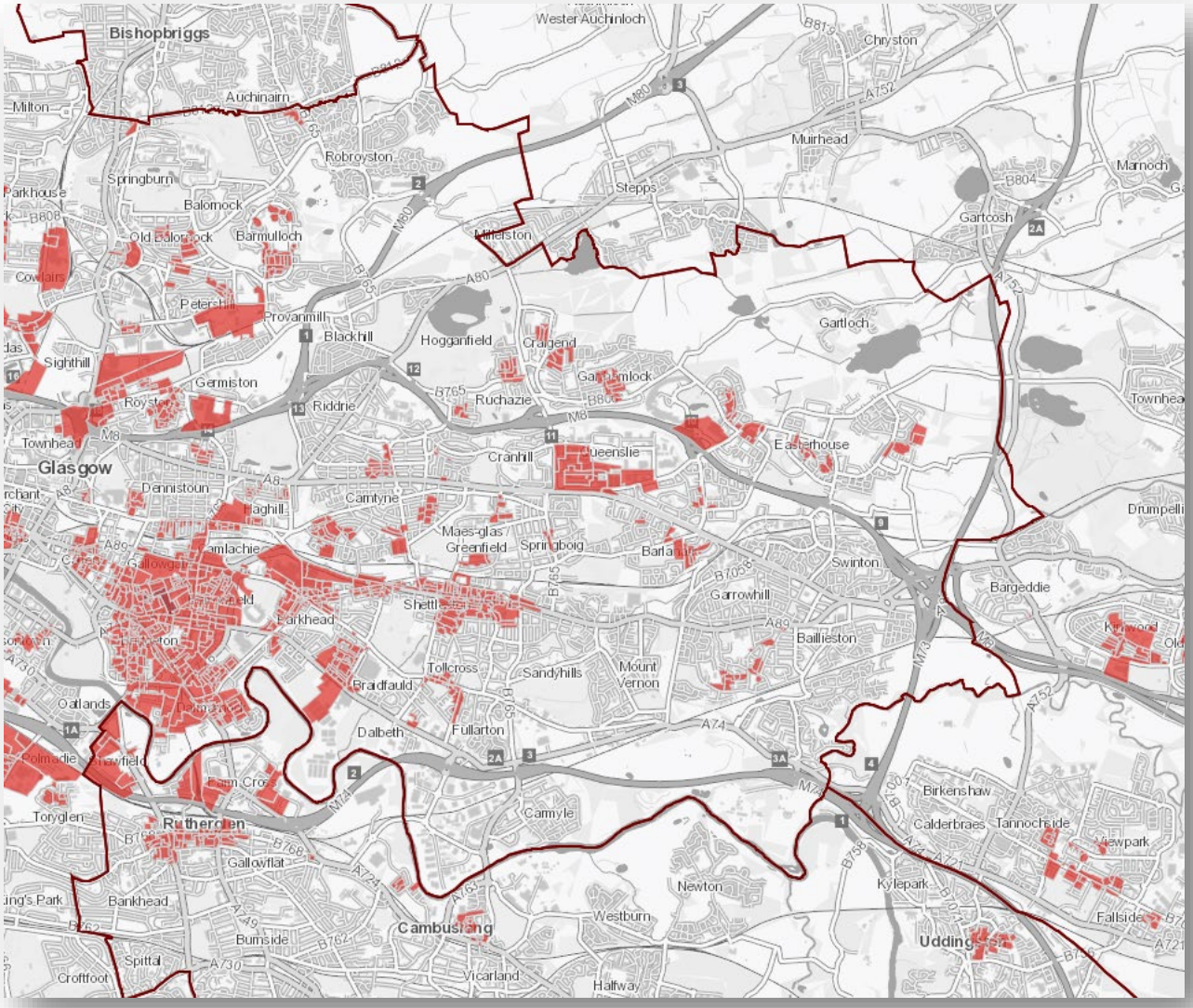


FIGURE 12 - GLASGOW EAST - CLIMATE READY CLYDE

East:

The areas of heat risk in the east include large parts of Bridgeton, Shettleston Road corridor and parts of Queenslie and Easterhouse.

The following strategies and projects should be delivered/supported through CDP2:

Policy / Project – Name, Weblink and Author	**Commitment to Reducing Emissions / Adapting**	**Requirements for CDP2**	**Services / organisations to be involved in drafting policy**
Thriving Glasgow Portrait	Regulate the temperature • Definition of thriving: Considered design of the natural and built environment in Glasgow creates a balance of green, grey, and blue spaces that contribute to temperature regulation. • What could it look like: More urban green spaces are created to achieve a better balance between 'urban' and 'natural' spaces. Small spaces are maximised for plants and trees e.g. pocket street parks.	CDP2 to include policy to: • Identify and safeguard nature networks to provide a network across the city which can assist in adapting the city to climate change and increasing biodiversity and habitat connectivity. • Provide design based policy to sit along side NPF4 in order to ensure nature based solutions to climate change are delivered as part of development.	GCC Planning

6.4. Nature Based Solutions

The IUCN definition of Nature-based solutions is:
Nature-based solutions are actions to protect, sustainably manage, and restore natural and modified ecosystems that address societal challenges effectively and adaptively, simultaneously providing human wellbeing

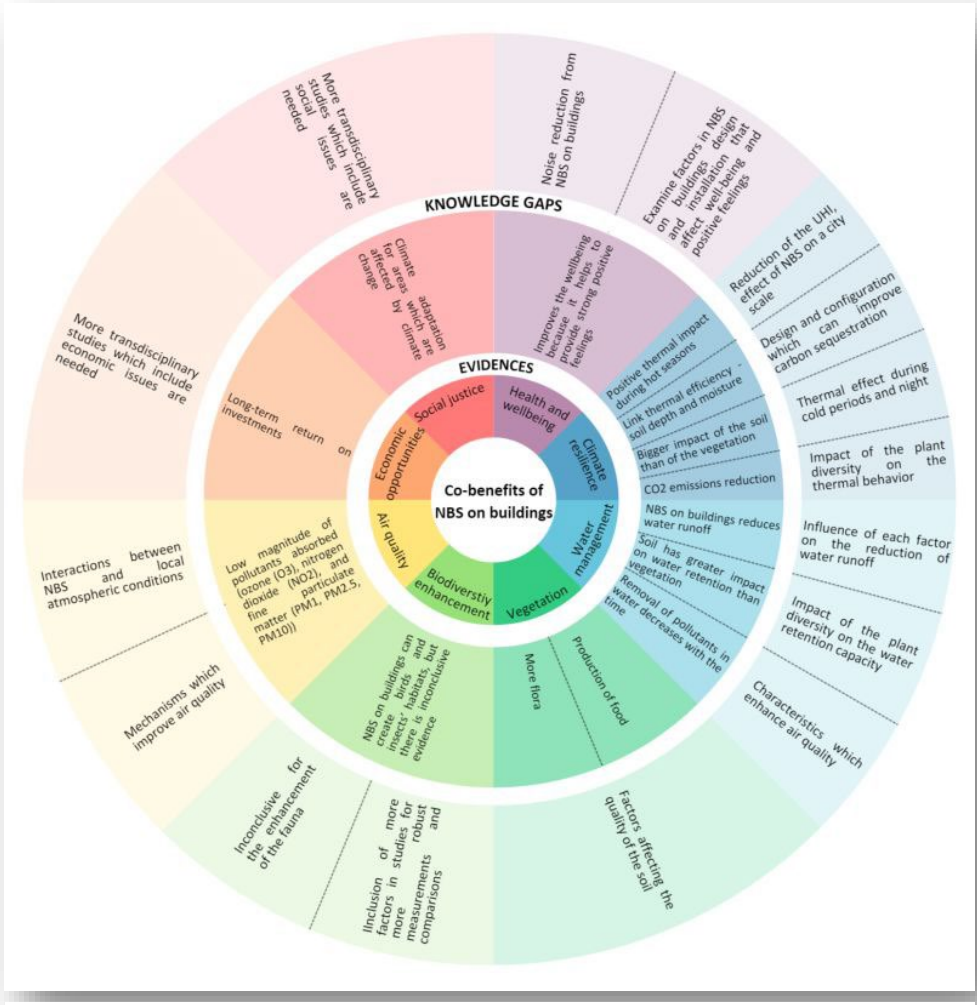


FIGURE 13 - NATURE BASED SOLUTIONS DIAGRAM

and biodiversity benefits.[17] The European Commission defines nature-based solutions to societal change as solutions that are "inspired and supported by nature, which are cost-effective, simultaneously provide environmental, social and economic benefits and help build resilience. Such solutions bring more, and more diverse, nature and natural features and processes into cities, landscapes, and seascapes, through locally adapted, resource-efficient, and systemic interventions."

Nature-Based Solutions therefore provide multiple benefits for biodiversity. Any approaches that do not improve biodiversity, are not based or delivering on a range of ecosystem services, are not Nature-Based Solutions**.**

Nature-based solutions protect, sustainably manage and restore natural or modified ecosystems, which address challenges facing humanity (e.g. climate change, food and water security or natural disasters). At the same time nature-based solutions bestow wider benefits to human well-being and biodiversity.

Nature-based solutions are quite a new concept and the phrase is not widely used. This is changing however, as society seeks to effectively tackle environmental issues through and for innovation.

So, what does an urban nature-based solution look like? Street trees, parks and urban green areas provide a range of natural benefits such as intercepting dust, toxins, and noise, sheltering and cooling property, sinking carbon, and buffering flooding. They also provide spaces for recreation, fostering well-being, and a host of other social benefits.

However, thinking on nature-based solutions has evolved to include more benefits, such as increased biodiversity, species conservation, energy production and waste management; while promoting social cohesion using collaborative processes. This means that the ideal nature-based solution uses a comprehensive co-design and co-creation of ideas process, with strong innovation possibilities, leading to multiple ecological, environmental, and social gains.[18]

It is a big task; but this approach will ultimately change the way we make and manage our urban areas, and lead to more resilient and sustainable urban living. A look at the built environment shows that opportunities lie in transforming buildings with nature-based solutions for fostering climate resilience.

[17] (IUCN Global Standard for Nature-based Solutions 2020)

[18] Nature-based solutions and buildings: A review of the literature and an agenda for nurturing our cities one building at a time

The following strategies and projects should be delivered/supported through CDP2:

Policy / Project – Name, Weblink and Author	Commitment to Reducing Emissions / Adapting	Requirements for CDP2	Services / organisations to be involved in drafting policy
Strategic Plan 2022 to 2027	Grand Challenge 3, Mission 2 includes: Ensure planning policy meets the challenge of the climate emergency and supports nature promotion and biodiversity through interventions such as bee bricks, swift bricks, green roofs, and roof gardens, encouraging hedgerows.	CDP2 to include policy to: • Identify and safeguard nature networks to provide a network across the city which can assist in adapting the city to climate change and increasing biodiversity and habitat connectivity. • Provide design-based policy to sit alongside NPF4 in order to ensure nature-based solutions to climate change are delivered as part of development.	GCC Planning
Glasgow Climate Plan	Recommendation 4: The new City Development Plan, and associated guidance, strengthens and extends existing requirements on the protection and enhancement of biodiversity and includes a default requirement for overall biodiversity net gain, as well as for specific actions such as the provision of swift bricks and bird and bat boxes, to guide the development of proposals and planning decisions. This should be supported through additional professional development for all planning officers. The	CDP2 to include policy to: • Identify and safeguard nature networks to provide a network across the city which can assist in adapting the city to climate change and increasing biodiversity and habitat connectivity. • Provide design-based policy to sit alongside NPF4 in order to ensure nature-based solutions to climate change are delivered as part of development.	GCC Planning

Policy / Project – Name, Weblink and Author	Commitment to Reducing Emissions / Adapting	Requirements for CDP2	Services / organisations to be involved in drafting policy
	City's Open Space Strategy Delivery Plan will identify the open spaces that should be used to provide more opportunities for biodiversity and for habitat connectivity and the Council will act, with its partners, to deliver these opportunities		
	Recommendation 8: The Council supports new, and further extensions to, Local Nature Reserves to improve green corridors and pollinator ways and protect and enhance habitats and species throughout the city. 38. Support new and further extensions to Local Nature Reserves in the city, protecting and enhancing biodiversity and habitat connectivity	CDP2 will include and allocate all Local Nature Reserves for protection.	GCC Planning, Parks
	Recommendation 35: Develop an Urban Woodland Strategy for the city	Production of Forestry and Woodland Strategy, see below.	GCC Planning
	Recommendation 47. Increase investment in peatland restoration in the city region to enhance biodiversity and increase capacity for carbon sequestration.	CDP2 to identify peat land and protect it.	GCC Planning
GCR Climate Adaptation Strategy and Action Plan (Climate Ready Clyde)	• "Adapt the Clyde Corridor for the 22nd Century" and "Clyde Adaptation Mission" to align with Clyde Mission National Development	CDP2 to include policy to: • Identify and safeguard nature networks, including along the Clyde, to provide a network across the city which can assist in adapting the city	GCC Planning

Policy / Project – Name, Weblink and Author	Commitment to Reducing Emissions / Adapting	Requirements for CDP2	Services / organisations to be involved in drafting policy
	• Delivery nature-based solutions for resilient, blue-green ecosystems, landscapes, and neighbourhoods.	to climate change and increasing biodiversity and habitat connectivity. • Provide design-based policy to sit alongside NPF4 in order to ensure nature-based solutions to climate change are delivered as part of development.	
Thriving Glasgow Portrait	Store carbon • Definition of thriving: Glasgow stores more carbon in its trees, soils, greenspaces, and waterways than it releases. It maintains and protects its natural carbon sinks. • What could it look like: Heating, transport, and construction sectors are decarbonised, through use of Nature-Based Solutions, the use of net zero construction materials, and repurposing of industrial infrastructure for carbon sequestration. Glasgow supports the restoration of carbon sinks across the wider region e.g., peatlands, seagrass.	CDP2 to include policy to: • Identify and safeguard nature networks, including along the Clyde, to provide a network across the city which can assist in adapting the city to climate change and increasing biodiversity and habitat connectivity. • Provide design-based policy to sit alongside NPF4 in order to ensure nature-based solutions to climate change are delivered as part of development. CDP2 to identify peat land and protect it.	GCC Planning
UN Decade on Ecosystem	Green spaces need to be placed at the heart of urban planning to adapt to Climate Change.	Ensure that CDP2 policy/guidance facilitates:	GCC Planning, NRS Greenspace, Biodiversity &

Policy / Project – Name, Weblink and Author	Commitment to Reducing Emissions / Adapting	Requirements for CDP2	Services / organisations to be involved in drafting policy
Restoration (2021-2030) Generation Restoration Glasgow is a Role Model City as part of this programme		• Tree planting and creation of urban woodland • Creation of wildlife habitats • Permeable surfaces • Urban wetlands • Re-use of vacant and derelict land for urban greening	Bereavement Services
Open Space Strategy and Delivery Plan	Outcome 3 of the Open Space Strategy focuses on the long-term resilience of the City in relation to the threats, and potential opportunities, arising from climate change and other external factors such as reducing budgets. The relevant actions to net-zero are in under A Resilient Glasgow, Mitigating and Adapting to Climate Change. Action 27: We will investigate the potential of the City's open spaces to deliver renewable energy and heat and whether any associated financial savings could be used to help deliver the ambitions of this Strategy. Action 28: We will work to significantly increase the number of trees within the city over the next 5 years and to assess the potential of the City's open spaces	Options for renewable energy and heat are coved in section 5.3. Production of Forestry and Woodland Strategy, see below.	NRS Planning, NRS Sustainability, NRS Greenspace, Biodiversity & Bereavement Services

Policy / Project – Name, Weblink and Author	Commitment to Reducing Emissions / Adapting	Requirements for CDP2	Services / organisations to be involved in drafting policy
	and vacant/derelict land for carbon sequestration.		
Forestry and Woodland Strategy	The F&WS directs tree planting to the most appropriate locations where there are opportunities to contribute towards mitigating climate change and increasing the City's biodiversity, while also providing multiple benefits such as improving amenity and green networks, increasing carbon capture, and contributing to water management.	CDP2 should provide policies for woodland expansion: • Promoting the potential role of new street trees and urban woodlands in contributing to climate change adaptation; • Build on creative proposals for retrofitting green infrastructure in urban areas; • Expanding woodland networks in transport corridors to help address air quality issues and make an enhanced contribution to character and biodiversity. • vacant and derelict land can present an opportunity to invest in our local blue and green infrastructure to deliver sustainable inclusive growth and mitigate climate change. • Increasing riparian tree cover can improve water management in upstream areas and reduce flooding and soil erosion further downstream	NRS Planning, NRS Greenspace, Biodiversity & Bereavement Services
Clyde Climate Forest	20% increase in tree canopy cover in urban Glasgow ~1.5 million trees (by 2032)	To support Clyde Climate Forest, CDP2 could usefully set out policies/proposals/identify native	NRS Planning, NRS Greenspace, Biodiversity &

Policy / Project – Name, Weblink and Author	Commitment to Reducing Emissions / Adapting	Requirements for CDP2	Services / organisations to be involved in drafting policy
	40,000 trees to be planted in Glasgow City Council area	woodlands and highlight areas of low canopy cover and deprivation where canopy cover can be increased. Identifies Bridgeton, Dalmarnock, Govan, Levern and District, and Possilpark as provisional target neighbourhoods to increase urban canopy cover.	Bereavement Services

6.5. Vacant and Derelict Land

Glasgow's intensive industrial legacy has left the city with an excess of vacant and derelict land, the most of any local authority in Scotland. The Council's Property and Land Strategy states that: "The council has made significant progress in recent years to reduce the level of vacant and derelict land across the city. Since 2016 there has been a 10.4% reduction in the hectare-age of vacant and derelict land representing a reduction of 40 sites. Notwithstanding this, more than 1000 hectares of unused land remains across the city of which half is in Council ownership. The Council will target those properties and land which are problematic, are in poor condition and draw complaints from nearby residents."

Vacant and Derelict land can be used for a variety of end uses, providing land for new employment, housing, and greenspaces. Subsequent development plans have sought to direct development to vacant and derelict land to redress the negative effects it has on local communities and the image of the city. There is also an opportunity for this land to provide additional benefits as relates to climate change mitigation and adaptation. Positive interventions via development of sites should address negative impacts like flooding, contamination, and soil degradation by incorporating Nature Based Solutions and Green and Blue Infrastructure.

NPF4 Local Development Plan Requirement
Policy 9, Brownfield, vacant and derelict land, and empty buildings

- LDPs should set out opportunities for the sustainable reuse of brownfield land including vacant and derelict land and empty buildings.

The following strategies and projects should be delivered/supported through CDP2:

Policy / Project – Name, Weblink and Author	**Commitment to Reducing Emissions / Adapting**	**Requirements for CDP2**	**Services / organisations to be involved in drafting policy**
Council Strategic Plan 2020-2027	• Grand Challenge 2, Mission 2. Priority 17 - Work with the Scottish Government to deliver the Clyde Mission, focused on transforming vacant and derelict land and investing in communities along the Clyde, and ensure a focus on climate adaptation and community wealth building in Clydeside regeneration	CDP2 to identify V&DL and allocate uses for each site to include development and/or greening/climate adaptation.	GCC Planning
Glasgow Climate Plan	37. Identify and utilise Vacant and Derelict Land for greening and rewilding in combination with renewable energy generation measures and reducing flood risk.	CDP2 to identify V&DL and allocate uses for each site to include development and/or greening.	GCC Planning
Thriving Glasgow Portrait	Social Equity • Definition of thriving: All Glasgow citizens are valued equally, and all Glasgow's communities' benefit from inclusive access to, and representation in, city spaces and institutions.	CDP2 to be consulted on as it is produced. The Call for Ideas will ask for suggestions for V&DL. Development on V&DL will reflect demand for land uses.	GCC Planning

Policy / Project – Name, Weblink and Author	Commitment to Reducing Emissions / Adapting	Requirements for CDP2	Services / organisations to be involved in drafting policy
	• What could it look like: Dramatic improvement and investment in the fabric of historically poorer areas, improving access to and ownership of 'The Commons' across all communities. Glaswegians act as stewards of public resources for the benefit of future generations. VDL sites in deprived areas are regenerated to provide amenities (natural, cultural, social, economic) to those who most need them. Policy levers are employed to protect against gentrification. Patterns of intergenerational poverty are broken.		
Thriving Glasgow Portrait	Build and protect soil. • Definition of thriving: Soil in Glasgow is healthy, nutrient-rich, and fertile, which supports healthy biodiversity, food growth, and diverse green spaces. • What could it look like: Impermeable hard surfaces are minimised and replaced with permeable surfaces. Spaces are provided to support soil health	CDP2 to identify V&DL and allocate uses for each site to include development and/or greening. Delivery of sites will include work programme relating to decontamination.	GCC Planning, Developers

Policy / Project – Name, Weblink and Author	Commitment to Reducing Emissions / Adapting	Requirements for CDP2	Services / organisations to be involved in drafting policy
	through composting, regenerative agriculture, and hosting biodiversity. Vacant and Derelict Land sites need to be decontaminated and transformed in pursuit of soil health. Sites of Special Scientific Interest (SSIs) need to be conserved.		

Appendix 1 – Key Climate Change Mitigation and Adaption Policy Documents for Glasgow City Council

Policy Document	Summary
Council Strategic Plan 2022-2027	Includes Grand Challenge 3 – Fight the Climate Emergency in a Just Transition to a Net Zero Glasgow.
Glasgow Climate Plan – Glasgow City Council	The Climate Plan brings together a series of commitments to mitigate and adapt to climate change. The report asserts the Council's commitment to being Net Zero by 2030. The Climate Emergency Working Group put forward 61 recommendations whilst the Ecological Emergency Working Group put forward 25 recommendations. The report provides an update on the progress which has been made. The report puts forward 5 key themes: 1. Low carbon retrofits and buildings that are fit for purpose. 2. Tree planting, peatland restoration and green infrastructure 3. Strengthen Energy Networks 4. Improving infrastructure for walking, cycling and remote working 5. Moving toward a Circular Economy
Glasgow's Adaptation Plan	The Adaptation Plan sets out how the climate is expected to change in Glasgow and proposes a series of interventions to ensure that Glasgow can best meet the challenge. The plan proposes that delivery of adaptation should create a 'triple dividend' by avoiding future biodiversity losses, generating positive economic gains through innovation, and delivering additional social and environmental benefits thus addressing local inequalities. The specific actions asked of the next City Development Plan are covered elsewhere in this document.
Thriving Glasgow Portrait, C40 City Portrait/Gallant Project Glasgow as a Living Lab Accelerating Novel Transformation City Portrait	The Thriving Glasgow City Portrait presents a vision for the future of Glasgow. It is a vision of a city where the people and environment of Glasgow mutually thrive, and do so in ways that also benefit people, the biosphere, and climate on a global scale. To build this picture of a thriving future, the Portrait downscales the principles and framework of Doughnut Economics – a conceptual framework which aims to answer, 'how can we meet the needs of all people while maintaining ecological and climatic processes within bounds that are consistent with those needs?'

	The Portrait will act as an evidence base and starting point (baseline) for the goals and work strands of the Thriving Cities Initiative in Glasgow; the starting point for a series of more detailed, action-focused workshops and engagement events. The insights of the Thriving Glasgow City Portrait, when viewed together, offer a vision for Glasgow's future. The Portrait also offers an insight into what a 'thriving' city may look like in any given part of the system, as well as highlighting the key links and connections between different yet connected parts of a thriving city. The Thriving Glasgow City Portrait provides a framework for acting on social and ecological priorities in tandem, as well as a consistent focus on reducing inequalities in line with a Just Transition.
Glasgow City Region Climate Adaptation Strategy and Action Plan	
Glasgow City Region Heatwave Report - Climate Ready Clyde	Report with data on GCR predictions for 2045-2055, 2066-2075 using data from UKCP18. Days exceeding 28C expected to become more frequent by the 2050s and 2070s in GCR. Extreme heat predicted in England could have indirect effects on Scotland/GCR which are not explored.
Adaptation Strategy and Action Plan – Report (climatereadyclyde.org.uk)	11 interventions: 1. Reform, reshape and expand governance mechanisms to respond to adaptation needs, nurture new leadership, and create expectations in society. 2. Develop the ability of organisations, businesses and communities to adapt. 3. Increase adaptation finance through leverage and innovation. 4. Enable and equip communities to participate in adaptation, focusing on the most vulnerable. 5. Embed reflection, monitoring, evaluation and learning into adaptation action. 6. Adapt the Clyde corridor for the 22nd century.

	7. Enhance early warning and preparedness for floods and heatwaves. 8. Ensure everyone's homes, offices, buildings, and infrastructure are climate resilient. 9. Deliver nature-based solutions for resilient, blue-green ecosystems, landscapes, and neighbourhoods. 10. Enhance regional decision-making and establish Glasgow City Region as a global research and knowledge adaptation hub. 11. Begin the transition to an economy resilient to future climate impacts. Place-based priorities: - Clyde River Corridor - RSS – Forth and Clyde Canal marked for Glasgow. - SEILS rebalance toward low-carbon economy. - Urban and Town Centres Flagship actions - Local authorities in the region working together to build capabilities and deliver collaborative adaptation. - Communities shaping climate-ready plans. - Increasing community agency in adaptation processes through culture and creative practice - Clyde Climate Forest - A multi-hazard climate warning alert system - Climate resilient design principles and guidelines - Net-zero climate resilient housing retrofit. - Regional transport climate resilience group - Roadmap to an adaptation forum on infrastructure and utilities - Private sector challenge for a climate resilient economy - Clyde Adaptation Mission - Regional Investment pipeline and adaptation finance lab - Independent expert advisory committee on adaptation and climate resilience - Climate resilience embedded into Regional Economic Strategy and Regional Spatial Strategy - Climate resilience integrated into regional supply chains and procurement. - International leadership: Race to resilience and TCFD supporters' initiative

Carbon Management Plan 3	Newly adopted March 2024. Will cover the years 2024-2030.
Circular Economy Route Map	- Recognising Residual Value - Support the Sharing Economy - Community Sharing - Reduce Consumption and Promote Reuse - Behaviour Change - Develop the “Second hand” market - Encourage Eco-design - End Planned obsolescence 10.2 Develop a Circular Strategy for all Construction Projects (London Plan Guidance on circular construction and whole life carbon assessments) Construction Materials Large storage options (spatial) for the city. An audit is being undertaken to identify suitable locations. 10.3 Production Action 6. Re-manufacturing Sector Support and develop re-manufacturing within the city through planning and regeneration policy. Ensure the prioritisation of re-manufacturing through refining the City Development Plan (CDP) and supplementary guidance. And promote re-manufacturing where possible through public procurement policy. 11. Open Estate – utilising the Council estate for the use of circular businesses/incubation Community Innovation Hubs – utilizing town centres/vacant buildings and consider new industrial/enterprise parks where groups of circular businesses can collaborate. Soil biodiversity/ecological emergency. Spatial need to consider where urban agriculture/hydroponic/vertical agriculture could be undertaken in the city.

Climate Ready Clyde Adaptation Risk Summary:

In December 2023, Climate Ready Clyde published guidance for the 8 City Region authorities producing a Local Development Plan evidence report. The actions categorise the key issues for climate adaptation in the City Region.

Key: “More action needed”, “Build capacity and understanding”, “Sustain current action”, “Watching brief”

Theme 1: Infrastructure	Key
IN3: Risk to infrastructure services from coastal flooding and erosion	More action needed
IN7: Risks to energy, transport and ICT infrastructure from storms and high waves	More action needed
IN8: Risks to energy, transport, and ICT infrastructure from extreme heat	More action needed
IN1: Risks of cascading failures from interdependent infrastructure networks	Build capacity and understanding
IN11: Risks to water- based transport and trade infrastructure from sea level rise, floods, and storms	Build capacity and understanding
IN2: Risk to infrastructure services from river and surface water flooding	Sustain current action
IN4: Risk of sewer flooding due to heavy rainfall	Sustain current action
IN5: Risks to bridges and pipelines from high river flows and bank erosion	Sustain current action
IN9: Risks to infrastructure from increase in vegetation growth	Sustain current action
IN6: Risks to transport networks from slope and embankment failure	Watching brief
IN10: Risks to infrastructure from wildfires	Watching brief

IN12: Potential benefits to water, transport, digital and energy infrastructure from reduced extreme cold events	Watching brief
Theme 2: Built Environment	
BE2: Risks to building fabric from moisture, wind, storms and driving rain	Build capacity and understanding
BE4: Risks to traditional and historic buildings from moisture, wind and driving rain	Build capacity and understanding
BE5: Increased maintenance of green space due to rising temperatures and severe weather	Build capacity and understanding
BE7: Risk of overheating of buildings from increased energy efficiency/insulation	Build capacity and understanding
BE10: Increased viability of electricity and heat from renewable energy sources	Build capacity and understanding
BE1: Risks to homes from flooding and sea level rise	Sustain current trend
BE3: Risks to cultural heritage from landslides, flooding, or coastal erosion	Sustain current trend
BE6: Increased cooling demand in buildings as a result of rising temperatures	Watching brief
BE8: Opportunities for local food growing from warmer temperatures and increased growing season	Watching brief
BE9: Reduced heating demand for buildings due to rising temperatures	Watching brief
Theme 3: Society and Human Health	
SH5: Risks to NHS estates due to flooding and overheating	More action needed
SH1: Risks to people and communities from flooding and flood disadvantage	Build capacity and understanding
SH2: Increase in summer temperatures and heatwaves leading to increased morbidity and mortality	Build capacity and understanding
SH3: Risks to health from changes in air quality	Sustain current action

SH6: Risks to business continuity of health and social care from extreme weather	Sustain current action
SH7: Increased patient demand on NHS services from extreme weather	Sustain current action
SH4: Risks to health from vector-borne pathogens	Watching brief
SH8: Potential benefits to health and wellbeing from reduced cold	Watching brief
SH9: Improved physical and mental health from increased use of parks and green space due to warmer weather	Watching brief
Theme 5: Economy, Business, and Industry	
BI1: Risk to new and existing business sites from river, surface water and coastal flooding.	More action required
BI4: Risks to business from disruption to supply chains and distribution networks	More action required
BI5: Opportunities for products and services to support adaptation to climate change	More action required
BI3: Risks to business from reduced employee productivity due to infrastructure disruption and higher temperatures in working environments	Building capacity and understanding
BI2: Risks to business operations from water scarcity	Sustain current trend
BI6: Increased tourism revenue from increased temperatures	Sustain current trend
Theme 4: Natural Environment	
NE1: Risks to soil stock from changes in temperature and water regime	More action required
NE5: Risk to crops and livestock from extremes in temperature and water regime	More action required
NE17: Risks to freshwater biodiversity from pests, invasive species, and disease	More action required
NE3: Risks to soils from pests, pathogens, and invasive species	Build Capacity and understanding

NE4: Risks and opportunities for agriculture from changes in land suitability NE6: Risks to agriculture from pests and disease	Build Capacity and understanding
NE8: Risks to forestry and woodlands from extreme weather events	Build Capacity and understanding
NE9: Risks to forestry and woodlands from pests, invasive species, and diseases	Build Capacity and understanding
NE10: Risk and opportunities for biodiversity from changes in habitat suitability	Build Capacity and understanding
NE11: Risks to coastal habitats and industries from sea level rise	Build Capacity and understanding
NE12: Risks to marine biodiversity from increases in sea temperature	Build Capacity and understanding
NE13: Risks to marine biodiversity from ocean acidification	Build Capacity and understanding
NE15: Risks to freshwater biodiversity from changes in water regimes	Build Capacity and understanding
NE16: Risks to changes in freshwater biodiversity from changes in temperature	Build Capacity and understanding
NE2: Risks to soil carbon storage from temperature rises and changes in precipitation	Sustain current action
NE7: Risks and opportunities to forestry and woodlands from changes in land suitability and productivity	Sustain current action
NE14: Risks to marine biodiversity from pests and invasive species	Sustain current action
NE18: Risks to nationally and internationally significant geoheritage sites from flooding and erosion, and coastal, vegetation, freeze-thaw, and rainfall change	Sustain current action
Theme 6: International Risks and Cross Cutting and Adaptive Capacity	
IT1: Risks from weather-related shocks to international food production and trade	

IT2: Imported food safety risks
IT3: Risks and opportunities from long-term, climate-related changes in global food production
IT4: Risks to the UK from climate- related international human displacements
IT5: Risks to the UK from international violent conflict IT6: Risks to international law and governance
IT7: Opportunities from changes in international trade routes CC1: Indirect impacts from Scottish, UK and international climate change risks
CC2: Potential for co-benefits and transformation in adaptation responses
CC3: Risks and Opportunities to social justice and inequalities from climate change and adaptation responses
AC1: Failure to position adaptation as a strategic economic and social issue, leading to inadequate adaptation responses
AC2: Reduced access to project development and implementation funding from leaving the European Union