GREATER MANCHESTER

5 YEAR ENVIRONMENT PLAN

2025-2030

To ensure everyone in Greater Manchester has a healthy, low carbon, nature-rich environment in which to live-well, prosper and grow

(Draft V6.0)

Version Control
V1.0 – Initial Draft with tracked changes
V2.0 – Clean copy with new sections, tables and comments incorporated into text
V3.0 – full review and text changes
V4.0 – 1st full clean draft for wider comment (internal only)
V5.0 - 1st full draft with comments (internal only)
V6.0 - 1st full clean draft for comment (internal/external)

Contents

Mayor's Foreword

To be completed once the plan is finalised

Intro - Cover the breadth of the plan

Build on GMS `Green Fairer, More prosperous

Link to growth agenda & Mayoral Manifesto

Briefly summarise progress since 2019

Will likely exceed science based target budget but will keep as a benchmark and continue to aim for carbon neutral by 2038

How to take forward

Calls to action – one for each aim?

1.0 Introduction

In 2019, Greater Manchester declared a climate emergency, launched its first 5 Year Environment Plan (2019-2024) and set a target to become a carbon neutral city region by 2038. In 2021, Greater Manchester also declared a biodiversity emergency. Whilst a significant amount has been achieved in the last 5 years (See Section 5), there remains more still to do. Whilst our carbon budget may soon be exceeded, we have laid a strong foundation on which to build and accelerate our progress. We believe that achieving carbon neutral by 2038, whilst very challenging, is still achievable, especially if national measures are accelerated to align with the Climate Change Committees carbon budget.

This 5 Year Environment Plan (2025-2030) creates a framework for all decision makers to take the next actions required to progress towards our long-term environmental vision and ensure everyone in Greater Manchester has a healthy, low carbon nature–rich environment in which to live-well, prosper and grow. Whilst national and local government have a role to play in enabling and encouraging action, it is the decisions that we all take as residents, businesses, communities, investors, home and car owners that will determine whether we will achieve our shared goals.

Our environment and why we need to act

Our environment is essential to all aspects of our daily life from the air we breathe, the food we eat, the water we drink and the green spaces we spend time in. A thriving environment is fundamental to our citizen's health and well-being and the prosperity of the city region. Through taking action to improve our environment, we can create a city region with abundant attractive green, nature-rich spaces in both our urban and rural areas, a place where all citizens live in climate-resilient homes and with an integrated, accessible, active and public transport system.

Greater Manchester is increasingly experiencing the impact of climate change and extreme weather events will continue to cause damage to people and infrastructure. Average GM temperatures have increased by 0.75°C (1961-1990) and the 2022 summer heatwave saw temperatures of 40°C recorded for the first time. Average annual summer rainfall across most of GM has decreased by between 10 and 25% since 1961 and average annual winter rainfall has increased by between 10-50% (since 1961). These trends have the potential to have wide ranging consequences for our people and businesses, from increasing incidence of heatwaves, droughts, floods and wildfires to adverse health impacts particularly for those people who are already most vulnerable and price shocks to our businesses through potential impacts on global supply chains.

This plan outlines actions to not only mitigate our carbon emissions and to become more resilient to the impacts of climate change, but also to create improved green spaces for both people and nature, creating a circular economy to reduce waste and reducing poor air and water quality from domestic, industrial and travel emissions.

Note: include more on biodiversity emergency

Fulfilling the actions in this plan will require a wide spectrum of roles including well-skilled technical jobs, that are growing now and will provide long-term employment opportunities for residents. The plan promotes more sustainable lifestyles and business models which, if implemented carefully, will save people and companies money from their bills, improve the health and quality of life of our people and stimulate innovation and growth in the green economy. Convincing all decision makers to take action now will depend on us realising these wider socio-economic benefits, in addition to

the environmental improvements that are at the core of this plan. To accelerate our activity, we will need greater access to investment, increased delivery capacity in the local supply chain capacity, committed political leadership, alongside support from national government.

Note: how have we learnt lessons from previous activity

Note: potentially include an infographic on what has been achieve since 2019 – key highlights

2.0 The Journey to Carbon Neutral by 2038

In Greater Manchester, we want to create a 'Manchester-Energy Model', a systemic, low carbon energy system, that other places will aspire towards, and which will meet our target of being carbon neutral by 2038. Reaching this target remains challenging and will require accelerated and scaled up action across all aspects of society, both public and private sector as well as from residents and, importantly, national government.

Such a system will be based around the three pillars of energy efficiency, energy generation and smart energy innovation:
Energy Efficiency - Where our homes and buildings are improved to use as little energy as possible, using the most efficient insulation, cost-effective appliances and heating systems.
Energy Generation - Where our homes, businesses and transport are all powered through cheap renewable energy, built all over Greater Manchester, including local heat networks, on-shore wind and solar panels on roofs, to give people more control over their energy bills.
Smart Innovation - Where this is all integrated by embracing the latest developments in technology and energy innovation to allow people to smartly store and control their energy use, adapting to their individual requirements and benefiting financially from being able to manage when they buy, sell and use energy.

A Local Place Based Approach

Greater Manchester was a pioneer of the industrial revolution. We can now drive the green industrial revolution too. By setting out our systemic approach, utilising Local Area Energy Plans to guide our prioritisation, we are sending a clear signal to the market that Greater Manchester is the place for businesses to develop, invest and grow as we embrace the opportunities from the race to net zero. Our new devolution deal will give us increased flexibility to plan and invest in decarbonising our local infrastructure. Our Net Zero Accelerator programme aims to develop a pipeline of up to £1bn of low carbon infrastructure projects to take to the investment market by April 2026.

A local, place-specific approach to tackling climate change can deliver double the energy savings and wider social benefits for less than half of the investment costs than a national approach. Our largest carbon emission challenges arise from private road transport and domestic buildings. Reducing these emissions at the necessary pace will require a significant scale up of current domestic retrofit work and a continued transition to Zero Emission Vehicles, alongside enabling a reduction in private car use with a reliable, integrated, inclusive and affordable public transport system and active travel network.

Electrification of heating in most buildings remains the most cost-effective pathway to carbon neutral. The requirement of smoothing 'peak heat' demand is one of the biggest innovation challenges for carbon neutrality. To do this, and mitigate expensive electricity network upgrades, we need to create a smart, connected zero carbon energy system and electricity grid, improve the fabric efficiency of our homes and buildings along with improving heating and storage controls. The use of hybrid systems could also be important in enabling the transition and managing peak heat transition away from natural gas in the longer term must be carefully planned and managed.

Achieving carbon neutrality will therefore require consumer engagement and support for residents and businesses to actively manage and reduce their energy demand and unlock flexibility in when and how energy is used. Compelling consumer facing solutions for different customer segments, including low income and vulnerable households, will be critical.

Note: May add timeline for NE, SCP, AQ & Transport – SE, SM, LS

National Support

Although much can be achieved through local leadership, Greater Manchester will still require national policy, funding and support to attain our Carbon goals. We need the rapid development and deployment of both mature and novel low carbon technologies including onshore wind and solar; electrification and smart control of heating in our homes and buildings; as well as significant and rapid deployment of District Heating Networks in our urban centres. We also need to accelerate innovation in the decarbonisation of heavy-duty vehicles; trains, aviation and maritime propulsion, which may need a reprioritisation of policy and investment at the national level. More urgent and clearer national incentives and standards to stimulate innovation and market creation for these technologies will be needed.

Whilst the city region can generate more local renewable electricity and low carbon heat, we will require national action to support our ambition through decarbonising the electricity grid (e.g. through nuclear power and offshore wind) and stimulating low carbon hydrogen and bioenergy production. In addition, innovations around negative emissions and carbon capture and storage technology options are nascent and will need to be supported at the national scale – although we may capture many the economic benefits locally.

Low carbon hydrogen has a key role to play in the decarbonisation of UK industry. Industrial decarbonisation must be accelerated and local levers to enable this are limited. Strategic coordination of national and local hydrogen infrastructure as part of wider energy system planning, alongside demonstration and acceleration of hydrogen production, storage and application technologies across sectors will be essential. Hydrogen will likely be utilised in areas close to industrial clusters, with an opportunity to supply energy centres connected to large heat networks, alongside its very significant role in industry, power and transport. Whilst Greater Manchester can help stimulate local demand for low carbon hydrogen, the development of the production and distribution infrastructure must be a national priority.

Note: Check this mirrors the updated FES Holistic Scenario pathway. – DG

3.0 Structure of the Plan

This Plan is set out as follows:

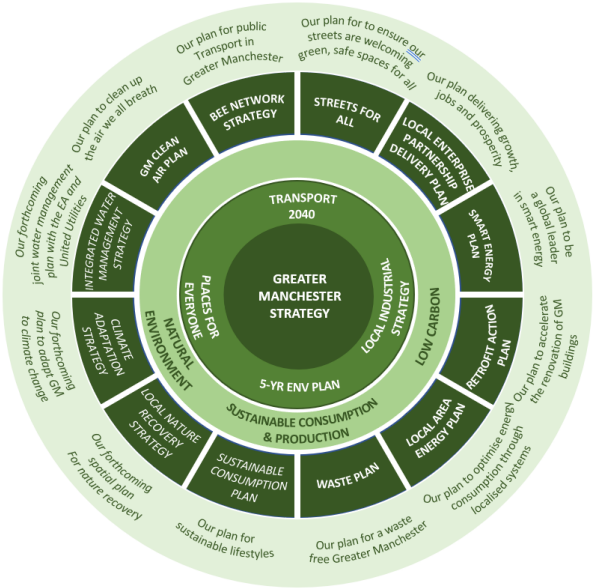
Vision	What the longer-term vision for a greener GM looks like
Aims	The key long-term results required to achieve that vision for a greener GM
Objectives	The shorter term, specific results required to achieve our aims
Actions	The practical actions to be taken over the next 5 years that will contribute to delivering on our objectives.
Enabling Actions	The practical actions to be taken over the next 5 years that will facilitate the delivery of the above actions, through engagement, influencing and support

We have dedicated one section in the Plan for each of our 8 Aims. The Aims build upon and extend those selected in the last 5 Year Environment Plan. A small number of objectives are defined for each Aim, most of them quantifiable. Where a quantifiable target has been set, they have been selected to be challenging but achievable and will be used to monitor our future progress annually.

For each Objective, the Actions (see Annex 3) are directed towards the decision makers who are empowered to make a choice, or a change happen. `Enabling actions' have also been included and are directed towards enabling or supporting the decision maker to choose a positive environmental outcome.

Links to other plans

The Plan should not be read in isolation, it sits below the Greater Manchester Strategy (GMS) published in 2022 (and refreshed in 2024) which sets out the economic plan for the city-region for the next three years, with a headline of delivering `greener, fairer, and more prosperous city region'. The Five Year Environment Plan mainly delivers on the greener element of this plan and sits alongside other strategic plans including the Local Industrial Strategy, Places for Everyone and the GM Transport Strategy 2040.



Note: to be updated - Robyn.

Underneath the Five Year Environment Plan sit multiple daughter documents that cover in more detail the delivery for the different elements of work required to deliver our environmental goals. The Five Year Environment Plan provides the strategic link between the overall plan for the city region and the detailed delivery plans. Key daughter documents include:

- RetrofitGM (2021)
- Local Area Energy Plan (2022)
- Sustainable Consumption and Production Plan (2023)
- Clean Air Plan (2024?)
- Local Nature Recovery Strategy (2025)
- Climate Adaptation Strategy (2025)
- Clean Growth Sector Development Plan (2025) Note: Add links - RS

Addressing Inequalities

Ensuring everyone in Greater Manchester has a healthy, low carbon environment in which to live-well, prosper and grow will require a transformational shift in society that has the potential to address wider inequalities. For example, improving damp and cold homes through retrofit, increasing the number of green spaces and reducing air pollution can bring health and wellbeing benefits, particularly for older people and those with pre-existing health conditions. The most deprived communities in GM own the least cars. An improved, more accessible, inclusive and affordable public and active transport network can support social mobility for everyone in Greater Manchester, encouraging those with cars to make more sustainable travel choices and providing sustainable access to increased opportunities for those without. Additionally, accessibility, safety concerns and digital exclusion can prohibit the use of public and active transportation.

We must also ensure that the transition to carbon neutrality does not leave more vulnerable sections of our society behind. Many of the actions needed from residents can be cost prohibitive such as purchasing an electric car, retrofitting your home and buying eco-products. Without strong public sector leadership, those most vulnerable could be left behind unable to afford commercial solutions. We need to take our communities and businesses with us as we seamlessly transition away from fossil fuels use. For them to fully engage, we need to demonstrate the benefits of a low carbon future to their quality of life e.g. through the creation of new jobs and growth and providing secure, affordable energy. It is possible that some sunset" jobs will disappear as a result of the low carbon transition, but these will be more than offset by new jobs created which could be used as a mechanism to reduce wider labour market and pay inequality.

The specific co-benefits associated with delivery of the Actions in this plan, together with the bespoke challenges to delivery, are explored in more detail under each thematic Aims section of the plan.

Community Wealth Building

The Plan recognises the important role community wealth building can play in contributing to green growth, and will look, where possible, to redirect wealth back into the local economy through progressive procurement of goods and services, which support the development of good enterprises and shorter supply chains.

Note: does this fully communicate `how' we will operate – our values?

4.0 Vision, Aims & Objectives

Our Vision

Greater Manchester will be a biodiverse and carbon neutral city region where all citizens have access to affordable renewable energy, warm climate resilient homes, high quality blue and green spaces, healthy and locally produced food, and a reliable, integrated, inclusive, sustainable and affordable transport system, where avoidable waste is significantly reduced.

Greater Manchester will lead the way in becoming an innovative, circular and resource efficient green economy with thriving sustainable businesses, secure and well-paid green jobs and an active local supply chain. Increased prosperity will also bring benefits for nature with increased urban greening and investment in the natural environment.

Greater Manchester's urban environments will be cleaner and greener containing more trees and green spaces. Buildings will be energy efficient and powered by renewable energy. Rural environments will be managed for nature recovery and to protect wildlife. Across the city region air and water quality will be cleaner due to reduced emissions and pollution.

This transition will reduce inequalities across the city region and both citizens and businesses will be actively engaged in creating and maintaining a thriving biodiverse and carbon neutral city region.

Note: need to cross reference the above with the desired Outcomes – Logic flow – All (page 12)

Aims

To support the achievement of the vision for Greater Manchester we have set out eight key aims for the city-region. The action needed to achieve these aims is outlined further in the chapters of this plan highlighting the key objectives for the next five years for all sectors of society.

1. Our **energy infrastructure** is smart, flexible and fit for a low carbon, sustainable future.
2. Our **buildings** are smart, flexible and energy efficient.
3. Our **transport** system is reliable, integrated, inclusive, affordable and enables active and sustainable **travel.**
4. Our **natural environment** is enhanced, providing benefits for nature and people.
5. Our city region transitions to a **circular economy** and our **waste** is reduced, reused, recycled or recovered.
6. Our city-region is better **adapted** and more **resilient** to the increasing impacts of climate change we can't adapt to.
7. Our **air quality** enhances the health, well-being and quality of life of the city region.
8. Our **economy** will grow sustainably because of the interventions we make to benefit both our residents and businesses.

Summary of the Aims and Objectives

Aim 1: Our energy infrastructure is smart, flexible and fit for a low carbon future

1. Increase renewable energy generation and energy storage installed
2. Increase capacity and provision of Green Hydrogen
3. Increase the capacity and flexibility of the energy network
4. Increased number, generation capacity and level of operational heat networks

Aim 2: Our buildings sustainable and energy efficient

5. Increase the number of homes retrofitted
6. Increase the number of public and commercial buildings retrofitted
7. Increase the number of low carbon heating systems installed
8. Ensure all new developments are enabled towards net zero

Aim 3: Our transport system is reliable, integrated, inclusive, affordable and enables active and sustainable travel

9. Establish a long-term strategy and detailed delivery plan for an integrated transport system
10. Deliver an integrated transport system to enable the GM population to switch to active/public transport
11. Support the transition to electric mobility
12. Deliver policies and programmes that make sustainable transport and travel as attractive as possible
13. Engage with and support communities to adopt more sustainable travel habits

Aim 4: Our natural environment is enhanced, providing benefits for nature and people

14. Expand and enhance our best spaces for nature
15. Better connect the best spaces for nature by creating and restoring habitats
16. Reduce pressures on the natural environment
17. More existing green and blue spaces
18. More green and resilient transport routes, streets and highways
19. More green and resilient new infrastructure, regeneration and development.
20. More community-led action and better connection to nature

Aim 5: Our city region transitions to a circular economy and our waste is reduced, reused or recovered

21. Reduce use of raw materials through increasing use of recyclable materials on products
22. Reduction in greenhouse gas emissions
23. Reduce volume of waste in every waste stream by reducing consumption and increase reuse, repair and redistribution
24. Increase in quality and quantity of recycling

Aim 6: Our city region is better adapted and more resilient to the increasing impacts of climate change

25. Risks from and vulnerability to climate change impacts are managed and reduced
26. The adaptive capacity and resilience of our communities and organisations is increased with a focus on the most vulnerable.
27. Nature based solutions are prioritised in delivering resilient, well-adapted ecosystems and communities
28. The groundwork is laid to enable longer term and more transformative actions

Aim 7: Our air quality enhances the health, wellbeing and quality of life of the city region

29. Reduce emissions that contribute to poor air quality
30. Engage with communities and business to encourage them to adopt behaviours that contribute to improving Air Quality

Aim 8: Our economy will grow sustainably because of the interventions we make, benefiting our residents and businesses

31. Businesses are more resource efficient, reducing their operating costs and carbon emissions and sustainably innovating their products and services.
32. Businesses have resilient supply chains, managing and mitigating risks from a changing climate.
33. GM's Environment & Low Carbon sector grows and is more productive, creating secure, good quality jobs for our residents
34. Residents have the skills needed to work in the green economy.

What will it look like if we succeed?

Wider impacts (contextual)

Our businesses have higher productivity and our public sector has lower operating costs, and more money stays local
Our environmental goods and service sector has grown, creating sustainable good quality jobs as we not only buy sustainably, we supply it
Our residents' homes are warmer, healthier and have better air quality, cost no more to heat and allow access to nature in their community
Our actions are recognised as leading the way, attracting inward investment

Final outcomes

Our businesses and residents recognise and advocate the wider benefits net zero and sustainability brings, and act accordingly	Our land use is resilient, supports nature, biodiversity and provides us with the amenities we need, when we need them	Our water environment is resilient, stable, supports nature and provides us with the amenities we need, when we need them	Our energy is renewable, resilient and increasingly locally generated keeping our money local too	Our impact decision making, and evaluation makes the important measurable not the measurable important
Our approach to consumption and ownership reflects and supports our environmental objectives	Our products are designed, made, distributed and used to minimise environmental impacts and maximise benefits	Our existing homes are healthy, resilient, well adapted and efficient and can be affordably heated by all of us	Our new buildings are efficient, adapted, and resilient meeting user needs and are aligned with our goal	Our wider built environment is resilient, well adapted and efficiently heated and cooled with renewable energy
Our approach is adaptive, innovative, inclusive and open to doing things differently	Our access to finance products enables the acceleration of our actions to benefit everyone	Our economy has the resilience, capacity, skills and means to deliver and benefit from our environmental ambitions	Our transport and travel choice decisions prioritise public transport and active travel before private vehicles	Our transport system is decarbonised, designed to be suit everyone's needs and to encourage the use of active / public transport

Intermediate Milestone

Increased leverage of private sector investment to accelerate delivery
Increased awareness of the environmental opportunities and services available to support
Increased availability of skilled companies and workers in GM
Implementation of new financial instruments / funding vehicles to support activity

Aim 1: Our energy infrastructure is smart, flexible, and fit for a low carbon future.

Objectives

- Increase renewable energy generation and energy storage installed by x.
- Increase capacity and provision of Green Hydrogen to y.
- Increase the resilience, capacity and flexibility of the energy network by z.
- Increased number, generation capacity and level of operational heat networks to @.

Draft Targets (to be confirmed):

- Add 280MW renewable energy generation by 2030
- 800GWh of Green Hydrogen production by 2030
- Add 175MWh energy storage capacity by 2030 (excluding large battery storage facilities)
- 90 GWh capacity of heat networks active

The Challenge

Currently, Greater Manchester's energy infrastructure is highly centralised. This needs to transition to support a smart, flexible, increasingly decentralised, connected system with electricity grid infrastructure adapting to meet increasing energy demand, generation, and storage needs. In GM, we have started that transition with almost 40,000 renewable installations supplying over 250MW of power, mainly from solar power. Although this appears significant, it is only 0.5% of the renewable energy generated nationally, when we have 4% of UK households.

The decarbonisation of industry is another key area to address when considering the challenge of transitioning Greater Manchester's energy infrastructure. Greater Manchester's industry currently emits ~19% of the region's greenhouse gas emissions from the processes they conduct. Supporting a reduction of their energy consumption and the demonstration of alternative clean energy, including Green Hydrogen, will be essential to meeting the emissions reduction targets for the city-region.

There will need to be an increased deployment of roof-top and large-scale energy generation and storage assets including solar PV, onshore wind, green hydrogen, heat networks and battery and cryogenic storage. Generating more local renewable energy generation and storage will not only reduce operating costs but also help meet the expected increased demand for electricity for heating and transport. In addition to the development of new energy infrastructure, a reduction in energy consumption will also be required to meet our 2038 carbon neutral target and help balance demand with supply.

Action Required

1) Increase renewable energy generation and energy storage installed - We will need to see a step change in the deployment of renewable energy and storage in order to meet both our local and national targets. Greater Manchester will need to play its part and has significant potential to contribute towards this, capturing the economic and financial benefit locally, especially through community energy. Our primary opportunities are in the deployment of solar and onshore wind, not just to support the national grid but also utilising on-site and roof-mounted to directly benefit our businesses and communities.

2) Increased capacity and provision of Green Hydrogen - In addition, there is a potential role for generating hydrogen and biogas from renewable sources both as a way of maximising the use of

renewable energy through storage and direct deployment to assist with industrial decarbonisation. We will need to work with local and national partners to develop the supply and distribution of hydrogen, including through fuel cells and capitalise on other innovative uses for transport and heat as they emerge.

3) Increase the capacity and flexibility of the energy network - Our electricity grid is one of the most vital parts of our infrastructure; we will rely upon it even more as we move away from fossil fuels. We will work with our energy infrastructure partners locally and nationally to ensure our future grid supports both our decarbonisation and growth ambitions. We will maximise energy efficiency and use of renewables through increased capacity, greater flexibility, and adoption of innovative and smart solutions from our businesses.

4) Increased number, generation capacity and level of operational heat networks - Renewable heat will also play an important role in our ambition, both through property level retrofit and through the establishment of heat networks in our urban centres. We will work to increase the scope and scale of low carbon heat networks across Greater Manchester, building on existing networks where possible and utilising waste heat where we can.

Links to other 5YEP aims

The availability of low carbon energy supports all our decarbonisation ambitions across the built environment and transport, including our wider ambitions to retrofit buildings and improve the quality of our homes through electrification of heat. It will also support mobility and accessibility through powering sustainable, low carbon transport. In delivery, we will need to consider the wider environmental impacts and biodiversity gain opportunities of new energy infrastructure. An increasingly localised, diverse and robust energy supply can also improve resilience to climate impacts.

Co-benefits (e.g. health, cost saving etc.)

Our smart, flexible, low carbon energy infrastructure underpins our ambitions for economic growth across Greater Manchester, ensuring that our businesses and communities are resilient to future energy price and supply shocks. Customers need confidence that they will have the energy they need in the right place and at the right time. Developing our own energy generation will not only help secure good quality green jobs of the future, but also encourage innovation and market growth for our low carbon companies. Increasing the electrification of domestic heat and improving ventilation will also improve indoor air quality and reduce health impacts of cold damp homes.

Co-enablers (factors that will enable delivery e.g. finance, skills, national government)

There are a range of co-enablers needed for the delivery of our energy ambitions. We will require funding for regional and national energy networks to be increased and aligned. We will need our Network Operators to support flexible grid connections, heat and local energy networks and markets. We will also need to use public sector assets, such as land or buildings, as off-takers. GB Energy is also likely to be a key co-enabler; we will need to work closely with government to coordinate local and national action and lever additional funding. We will also need to explore new financial models for delivery and catalyse private sector investment, skills and capacity.

Aim 2: Our buildings are sustainable and energy efficient

Objectives

- Increase the number of homes retrofitted by x.
- Increase the number of public and commercial buildings retrofitted by y.
- Increase the number of low carbon heating systems installed by z.
- Ensure all new developments are enabled towards net zero.

Draft Targets (to be confirmed):

- Retrofit 50,000 homes by 2030 (cf text figures below)
- Retrofit 1000 public sector buildings by 2030
- Retrofit 9000 commercial buildings by 2030
- Install 95,000 low carbon heating systems across GM by 2030 (85,000 domestic, 10,000 public/commercial)

The Challenge

Greater Manchester's buildings currently emit 40% of the city regions total emissions with ~34% coming from homes and a further ~6% from how businesses heat and cool their buildings. Improving the energy efficiency and reducing the energy demand from heating and cooling buildings will be critical to meeting our carbon neutral goal. To meet this aim, we will need to significantly scale up the retrofit of existing homes and buildings as well as a move towards net zero new build, as outlined in Places for Everyone. It is also important to consider the wider environmental impacts of our buildings on air quality, the natural environment and the move towards a circular economy.

Out of the 1.2m homes in Greater Manchester the Local Area Energy plans identify that 887,000 will require some form of retrofit. Approximately, 250,000 of these are social homes and 63,000 of these need to be elevated to at least an EPC C by 2030. Commercial and public buildings are also a significant part of the buildings that need decarbonising. 2,700 public buildings will require some form of retrofit but around 10% have already been tackled. There are almost 50,000 commercial buildings across Greater Manchester which will all need some form of retrofit, but the largest 7% make up over half of all emissions. There is a significant scale of funding needed to tackle the retrofit challenge, with an estimated £27bn needed for homes and a further £24bn for commercial properties.

Action Required

5) Increase the number of homes retrofitted - Improving our housing stock to be more energy efficient remains our priority for action. The scale of the challenge is considerable so there is a need to focus our investment on the worst performing homes and those most in need, particularly in the rented sector, whilst also enabling able-to-pay homeowners to invest in their property with confidence.

6) Increase the number of public and commercial buildings retrofitted – over the last 5 years, 10% of our public buildings have been retrofitted but there is still a lot to do to ensure that the public estate is fit for the future. We will need to focus on the worst performing buildings, encourage the adoption of low carbon heating systems, including connections to new heat networks and also provide support to the many hundreds of schools across Greater Manchester.

For public transport infrastructure projects, we are following the guidelines of the carbon management standard for buildings and infrastructure (PAS 2080). This standard seeks to lower

'whole life carbon' during the whole lifespan of all transport infrastructure projects. To achieve PAS 2080, we are implementing Carbon Management Plans for transport infrastructure activities to find ways to constantly improve. (Note: need to check the extent of PAS2080 adoption)

Many commercial landlords are already seeing the benefits of improving the energy efficiency of their buildings. We need to build on this to accelerate the adoption of higher standards and financial mechanisms, especially for our largest and worst performing buildings.

7) Increase the number of low carbon heating systems installed - Although full retrofit is preferred, there will be circumstances where the heating system is being replaced and the priority action is to enable residents, landlords, schools and others move to a low carbon solution.

8) Ensure all new developments are enabled towards net zero – In order to ensure we do not have to retrofit new buildings; we will continue to use the Planning and Building Control system to accelerate the adoption of high standards for new and refurbished buildings. We will also use our influence and lead by example in our growth priority areas through working with developers to adopt higher standards.

Links to other 5YEP aims

Whilst improving energy efficiency, there is also the opportunity to address other aims of the Five Year Environment Plan. For example, biodiversity can be increased through measures such as green roofs and green walls on buildings, waste from building materials can be reduced by moving to a circular economy model. In the retrofitting of properties, there are also opportunities to link to the energy generation objectives, especially for on-site and rooftop renewable energy, and in linking to heat networks.

Co-benefits (e.g. health, cost saving etc.)

Improving the energy efficiency of housing is a core element of our ambition to provide better homes across Greater Manchester. This ambition, in turn, provides the foundation for improving the health of residents and the well-being of our communities. Energy efficiency is also important in tackling the cost of living for residents and reducing energy costs for businesses. Reducing energy use in public buildings will also have benefits for public service delivery costs across Greater Manchester.

Co-enablers (factors that will enable delivery e.g. finance, skills, national government)

Access to finance, developing the supply chain, and consumer confidence are the key enablers of the retrofit challenge. We will need to leverage significant funding above the level currently provided by government, energy companies and matched funds from our social landlords to achieve the scale of retrofit activity required. We will also need to provide confidence and encouragement to homeowners and the private property sector, including developing innovative delivery and financial models to assist. The cost of retrofit needs to decrease through innovation of technology and new business models. The retrofit supply chain needs to be supported for growth and training in new technologies. The government could further support our ambitions through embedding higher standards into planning, building regulations, and minimum energy efficiency standards in the rented sector.

Aim 3: Our transport system is reliable, integrated, inclusive, affordable and enables active and sustainable travel.

Objectives

- Establish a long-term strategy and detailed delivery plan for an integrated transport system
- Deliver an integrated transport system to enable the GM population to switch to active/public transport
- Support the transition to electric mobility
- Deliver policies and programmes that make sustainable transport and travel as attractive as possible
- Engage with and support communities to adopt more sustainable travel habits

Note: can we quantify any of the above and turn them into "Increase by x"? TfGM to send through

The Challenge

In Greater Manchester, surface transport is responsible for about 31% of greenhouse gas emissions, and most of that (98%) comes from the internal combustion engines of cars, vans, heavy goods vehicles (HGVs) and a relatively small amount from buses. The replacement of fossil fuelled buses with Zero Emission Buses (ZEBs) in Greater Manchester will reduce emissions from buses to zero at the exhaust and eventually zero carbon as the national grid and local generation decarbonises. Rail and Metrolink trips account for a fraction of the total (<2%) due to high (or full) levels of electrification with Metrolink trips being the most carbon efficient public transport mode.

There has been a slow decrease in transport carbon emissions compared to other high emission sectors. There has also been steady progress in manufacturers improving vehicle efficiency; however, this is offset by continually increasing vehicle mileage (particularly vans), increasing market share of larger, heavier vehicles and only marginal shifts to low emission modes. A relatively slower than expected rate of electric vehicle adoption has also contributed to relatively static transport emissions since 1990, despite in 2024 there being over 2000 public EV Connectors available across the city region.

In 2023 the total number of trips made by GM residents across all types of travel was 5.6m per day, slightly down from the 5.7m per day over the period 2017-2019. In 2023, each GM resident made 2.0 trips per day, which while down on the 2.3 trips per day between 2017-2019, represented a continued recovery from the record lows at the height of the pandemic. As the total GM resident population continues to increase, the total number of trips made by GM residents will exceed the 5.7m per day between 2017-2019, with a lower number of trips per person per day than was the case between 2017-2019. Early indications for 2024 indicate that the total trips made per day per GM resident will exceed the 2.0 recorded in 2023.

The number of daily car or van driver trips by GM residents in 2023 was broadly in line with the period 2017-19 (**2.2m daily car or van driver trips**). The mean length of car or van driver trips by GM residents has increased to 8.5km in 2023, **up 5%** from the 8.1km over the 2017-2019 period. This has led to GM resident car or van driver person kms over 2023 reaching 103% of the 2017-2019 level (TfGM, GM TRADS 2017-19, 2023) i.e. since 2019. There is no clear evidence to suggest that the total daily car or van driver person kms associated with GM residents is about to decline.

To meet GM's ambition of reaching carbon neutrality by 2038, we need a fundamental shift in attitudes towards car journeys, alongside a major shift to sustainable transport modes, as both are essential to reduce the number and use of fossil fuel vehicles. As well as delivering a major shift to

electric vehicles, which will need to use electricity from renewable sources, we also need viable options besides private cars to enable the required shift from high carbon transport modes to more sustainable modes. We need to plan for growth in a way that minimises reliance on the car by ensuring that communities have easy and local access to amenities such as education, food, healthcare etc. while encouraging, where possible, telecommuting and remote work to reduce the need to travel unsustainably.

Actions Required

9) Establish a long-term strategy and detailed delivery plan for an integrated transport system - Our Local Transport Plan (LTP) is a statutory document that sets out our long-term ambitions for transport. Greater Manchester's current LTP consists of the Greater Manchester Transport Strategy 2040 (a document setting out our ambitions, policies and interventions to support delivery of a vision for transport in 2040) and our Five-Year Transport Delivery Plan 2021-2026 (which sets out more detailed delivery proposals, a spending plan and monitoring of the performance of transport delivery programmes). A refresh of the GM Transport Strategy 2040 and a new Delivery Plan for 2027-2032 is underway. The latter will be the mechanism by which limited funding for transport initiatives will be prioritised.

10) Deliver an integrated transport system to enable the GM population to switch to active/public transport - A major part of achieving a carbon neutral city region by 2038 and reducing our operational carbon footprint, will be moving to a public transport fleet with zero emissions from tailpipes, such as buses, trams, and public maintenance vehicles. GMTS 2040 sets out our ambition for a world-class integrated transport network and covers such topics as how we will:

- improve walking, wheeling, cycling and public transport;
- support the transition to electric mobility;
- manage traffic and parking;
- work with developers to integrate new developments into the sustainable transport network;
- support economic growth and social inclusion; and
- reduce air pollution and greenhouse gas emissions.

11) Support the transition to electric mobility - One of the key strategies to decarbonise transport is to promote the switch to electric vehicles (EVs), enabled by the deployment of electric charge points across the region. Electric charge points are essential to support the growth of EVs and to ensure that drivers have convenient and reliable access to charging facilities. Lack of charging points was cited as a key barrier for businesses and individuals in switching to an electric vehicle (GM Clean Air Plan Conversation May/June 2019). Therefore, an acceleration of the transition to EVs is more likely to be delivered if vehicle owners are confident that they will have access to an electric vehicle charging infrastructure (EVCI).

Since the early 2010's there has been a series of projects to electrify rail lines in Greater Manchester, which allows the conversion of diesel traction to electric. The government plans to phase out diesel only trains by 2040, the expectation is this will drive investment in new train fleets that utilise alternative technologies such as battery, hydrogen, and bi-mode capability to operate on non-electrified lines.

Rail Operators have plans for the replacement of the old diesel trains used on local services which are between 30-40 years old, and both Northern and TransPennine Express are looking for new bi-mode trains. Some freight operators are introducing bi-mode and tri-mode locomotives, but the lack of full electrification is a barrier to faster adoption of sustainable traction. GM will continue to

encourage the rail industry to decarbonise its fleet through investment in electrification, replacing diesel trains through bi- or tri-mode trains and removing diesel operation under electrified lines. Note: Need a target here from Network Rail – MA/MB

12) Deliver policies and programmes that make sustainable transport and travel as attractive as possible - Achieving carbon reduction in the transport sector will require a major shift in attitudes towards car use, and improved options for public transport and active travel that enable permanent changes in travel choices. The GMTS 2040 seeks to enact this shift by creating and delivering policies that make sustainable transport and travel as attractive as possible, such as improving infrastructure and services. Improved **travel choices** also cover public awareness and educational or training programmes that enable individuals to adopt more sustainable travel habits such as cycling, walking, using public transport and car-pooling.

13) Engage with and support communities to adopt more sustainable travel habits - As part of our vision for transport we have set a 'Right Mix' target to reduce the share of total trips made by car to no more than 50%, with the remaining 50% made by public transport, walking and cycling. This will mean approximately one million more trips each day using sustainable transport modes in Greater Manchester by 2040 enabling us to deliver a healthier, greener and more productive city-region. Listening and responding to what communities and business feel about and need from sustainable transport modes is a key part of enabling the required levels of behaviour change.

Links to other 5YEP Aims

Transport and transport infrastructure require energy to process and transport people, goods and materials and to construct and run facilities and assets. Carbon associated with transport infrastructure can be mitigated through intelligent design, selection of sustainable materials and improving the efficiency of construction and operational processes. Additionally, risk of flooding can be reduced by embedding sustainable urban drainage into its design. Green infrastructure and biodiversity can also be increased through measures such greening walk routes and cycleways.

Co-benefits (e.g. health, cost saving etc.)

Our transport system has a major impact on people's health. Our network provides access to healthcare and other services, to visit friends and family and reduce social isolation, and links them with green spaces. Transport interventions can improve the health of Greater Manchester's residents by:

- Increasing levels of physical activity
- Reducing pollution from motor vehicles
- Reducing road traffic collisions
- Improving access to health care and reducing social isolation.

The transport system also plays a vital role in creating a fairer and more prosperous GM. For those without access to a car, the availability of public transport or active travel may determine whether they can access jobs or training or attend medical appointments without having to use more costly individual travel options. This can be a particular issue for people working in the night-time economy. An improved, more accessible, inclusive and affordable public transport network can support social mobility for everyone in Greater Manchester, encouraging those with cars to make more sustainable travel choices and providing sustainable access to increased opportunities for those without.

Co-enablers (factors that will enable delivery e.g. finance, skills, national government)

Achieving carbon reduction in the transport sector will not be easy and will require:

- Stable and sufficient funding to support the planning, implementation and maintenance of transport infrastructure and services.
- Coordination and collaboration among different transport stakeholders to align their goals, interests and expectations and resolve potential conflicts.
- Innovation and adoption of new technologies and practices that can enhance the efficiency, reliability, safety and sustainability of transport systems, such as smart mobility, low-carbon vehicles, digital platforms and data analytics.
- Capacity building and skills development for the transport workforce and users, to enable them to adapt to changing transport needs and demands, and to foster a culture of active travel and social inclusion.

Nationally the UK has a 2050 net zero goal, some studies estimate that even with optimistically high levels of electric vehicle uptake, the number of vehicle kilometres travelled will still need to be 20% lower in 2030 (in line with Scotland's strategy) if the transport sector is to meet the Committee on Climate Changes (CCC) 6th carbon budget.[1] Making a "fair" contribution to delivering on the Paris commitments would require even greater reductions in vehicle kilometres.

To date, the government has not set any targets or policies to reduce car dependency and car journeys, additionally, there are few policy levers to incentivise sustained modal shift.

Note: Some of the above text to move to Section 2 and form part of transport timeline

[1] Marsden, G. 2023. Reverse gear: The reality and implications of national transport emission reduction policies. Centre for Research into Energy Demand Solutions. Oxford, UK. ISBN: 978-1-913299-17-0

Aim 4: Our natural environment is enhanced providing benefits for people and nature.

Objectives

- Expand and enhance our best spaces for nature
- Better connect our best spaces for nature by creating and restoring habitats
- Reduce pressures on the natural environment – water land and nature
- More existing spaces (parks, verges, gardens etc) better managed for nature
- More green and resilient transport routes, streets and highways
- More green and resilient new infrastructure, regeneration and development.
- More community-led action and better connection to nature

Note: can we quantify any of the above and turn them into "Increase by x"?

The Challenge

Greater Manchester is facing a biodiversity emergency. Individual bird species have declined by up to 40% over the last 40 years and populations of common mammals have dropped by between 20-40% since 1995, mirroring national declines. Despite providing important refuges for wildlife, areas designated and protected for nature only cover 11% of the city-region's land area. These spaces are fragmented and not in as good a condition as they could be. This means nature is confined to smaller parts of Greater Manchester and does not have the space to recover. It also means people have fewer opportunities to connect with nature.

Nature is also under increasing pressure. Over 80% of our waterbodies have been changed by human activities – being buried or built over and now running below our streets – and there are over 1000 barriers to fish movements along them. None of our waterbodies are in good ecological condition, despite improvements made over the past 40 years. Invasive species are also causing problems along the banks of our rivers, streams and canals. Nearly 800 combined sewer overflows (CSOs) cause water pollution when they spill; run-off from our roads and agricultural land also adds to these problems. Unavoidable climate change will exacerbate these issues and add to these pressures.

Many Greater Manchester residents lack access to high quality green spaces and an estimated third do not live within 15 minutes of green space (a national standard for green space access). There is also a disparity in access with people who experience multiple inequalities tending to live in areas with less greenspace, making it harder from them to benefit from nature. Redressing these disparities will lead to more health and wellbeing benefits from nature in the communities that most need them.

There are opportunities to create more space for nature, which at the same time can bring benefits to residents and our economy. This includes the following:

- 32% of land is used for agriculture, including land used for growing food. Uptake of nature-friendly farming grants is lower here than elsewhere in the country, indicating the opportunity to better integrate nature and, at the same time, diversify sources of income.
- 19% of land is used for amenity purposes – including parks and green spaces, playing fields and golf courses. Integrating nature here provides opportunities to connect more people with nature, bringing more health and wellbeing benefits.
- 15% of land is made-up of residential gardens, although half of this space is estimated to be hard standing (i.e. paved or concreted over), which as well as being bad for wildlife, leads to rainfall running more quickly into the sewer system. Making gardens (and also balconies, alleyways and window ledges) more wildlife friendly and able to store water has benefits for nature and reduces the risk of flooding nearby.

- 13% of land forms transport routes, like train/Metrolink lines and streets. These provide opportunities to integrate nature alongside new and existing infrastructure, and to use nature to help us adapt to climate change by storing water through Sustainable Drainage Systems or provide shading through street trees, making them better places to walk and cycle.

Note: too much detail – replace with a table??

Integrating nature in these ways will deliver benefits for people and businesses, making Greater Manchester a fairer and more prosperous city-region. Similarly, businesses can benefit from integrating nature into their strategies and business models but may not be aware of this or what action to take. 4% of GM land is made up of commercial premises and therefore provide a potentially significant space for nature recovery on and around their premises, including gardens, green walls and green roofs. The benefits of bringing nature into businesses and closer to employees are well-documented, including reducing absences, increasing staff retention and boosting productivity.

Bringing nature into all these spaces is the scale of change required to halt and reverse the decline in biodiversity and safeguard the benefits our residents and businesses get from the natural environment.

Actions Required

14) Expand and enhance our best spaces for nature – the 11% of our city-region that is designated in some way due to its value for nature needs to continue to be protected and the condition of these areas further enhanced. These sites provide vital refuges for wildlife and are the core of Greater Manchester's Nature Network.

15) Better connect the best spaces for nature by creating and restoring habitats – these sites also need joining up to one another, through corridors or stepping stones for nature. Restoring and creating habitats where they are most needed to do will provide more space for nature and build the resilience of our Nature Network.

16) Reduce pressures on the natural environment – water, land, nature – our natural environment is being placed under increasing pressure, particularly from pollution, agricultural intensification and invasive species, all exacerbated by the increasing impacts of climate change.

17) More existing green and blue spaces (parks, verges, gardens etc) better managed for nature – existing spaces that are managed for other reasons (e.g. for recreation or food production) can be managed in a way that makes them more nature-friendly, whilst still allowing them to perform their primary purpose.

18) More green and resilient transport routes, streets & highways – streets provide routes to bring nature into our cities and towns and bring nature closer to people. Features like street trees and Sustainable Urban Drainage Systems also help adapt our streets to the impact of climate change, particularly flooding and extreme heat.

19) More green and resilient new infrastructure, regeneration and development – integrating nature into how we grow and develop our city-region and provide homes and employment sites with well-planned, functional green spaces will bring benefits for residents and the economy, as well as nature.

20) More community-led action and better connection to nature – supporting communities to lead and drive change in their neighborhoods will bring benefits for residents' health and wellbeing, as well as improving people's connection with the natural environment.

Links to other 5YEP Aims

Nature based solutions can facilitate the carbon capture and sequestration of carbon from the air, improve air quality through removal of particulates and increase our resilience to climate change through reducing the risk of flooding and increasing shade.

Co-benefits (e.g. health, cost saving etc.)

A healthy natural environment underpins our ambitions for a more prosperous and fairer city-region. Greater Manchester's natural environment is estimated to already provide us with over £1bn of co-benefits each year. Those that are particularly important are the physical and mental health and wellbeing benefits to our residents of access to green and blue spaces, the role of these spaces in improving our adaptation to climate change and other benefits such as providing us with food and clean air and water. Greener neighbourhoods and town and city centres also have economic advantages, creating better places for people to live and work. Integrating nature into how we grow our city-region

Co-enablers (factors that will enable delivery e.g. finance, skills, national government)

Delivering these actions requires several co-enablers. Broadening the sources of funding into improvements to our natural environment is key, as these actions cannot be achieved with public funding alone. Action from government to support the development of nature markets is required to support this, facilitating the growth in investments in the natural environment. Delivering improvements will also require skills across a range of professions, from on the ground skills (e.g. in habitat creation and maintenance) to integrating nature into other professions (e.g. engineering) and in supporting sectors (e.g. legal, financial).

Note: Some of the above text to move to Section 2 and form part of NE timeline

Aim 5: Our city region transitions to a circular economy and our waste is reduced, reused, recycled or recovered.

Objectives

- Reduce use of raw materials through the increasing use of recyclable materials in products
- Reduction in Greenhouse Gas emissions
- Reduce the amount of waste in every waste stream by reducing consumption and increasing reuse, repair and redistribution
- Increase in quality and quantity of recycling

Note: can we quantify any more of the above and turn them into "Increase by x"?

The Challenge

Sustainable Production - The current economic model is heavily based on the continued extraction and consumption of natural resources. This linear economy requires the extraction, transportation, processing and consumption of energy and natural resources, often for only brief periods of use, before being discarded. This results in considerable environmental damage and is a contributing factor to the climate and biodiversity emergencies. We are currently extracting 3 times the number of natural resources than we did 30 years ago, and this figure is expected to more than double by 2060. Research shows that 80% of the damage done to our environment by excessive amounts of waste could be avoided if more sustainable decisions were made at the design and production stage of products.

To address this, we need to enable and adopt new business models that minimise the use of finite materials, use recycled resources, and ensure that products are durable, repairable and can be easily recycled. Our industry needs to innovate by designing new products which are lighter, made from recycled materials, and designed for easy repair and disassembly. We need to move from the sale of products to the provision of a function or service e.g. how music has moved from CD ownership to streaming, or new car ownership to leasing.

Sustainable Consumption – Our businesses need to support and adopt new business models through procurement mechanisms and strategies, that consider the full life cycle of products and consider new service models which encourage reuse and repair of goods to protect natural resources.

Our residents need to actively align their purchasing habits to sustainability principles and be willing to consider moving from buying new products to repairing and purchasing used items and prioritising quality over quantity.

Valuing end of Life Resources - To tackle these issues at scale we need our waste regulatory system to expand to include producer responsibility across a wider range of products. This will provide the drivers and financial resources needed to create an infrastructure which supports the above, maximises the value of recyclates and ensures reusability. A simple and consistent waste management collection system in Greater Manchester is essential, whether you are business or a household, but this can only be achieved, if the Government imposes uniform requirements on both.

Action Required

21) Reduce use of raw materials through the increasing of recyclable materials in products - by adopting the waste hierarchy procurement principles and reviewing manufacturing processes to

reduce raw material consumption to reduce the environmental impact of their products and seek, through innovation, new processes and business opportunities to grow a zero-waste economy.

22) Reduction in Greenhouse Gas emissions – by supporting the local economy (including green tech/services sector) and developing and implementing carbon reduction plans both in the workplace and within our lifestyles.

23) Reduce the amount of waste in every waste stream by reducing consumption and increasing reuse, repair and redistribution - by offering consumers sustainable alternatives to purchasing, supporting package reduction through 'refillable' products and taking a full lifecycle approach particularly within the food system.

24) Increase in quality and quantity of recycling **-** by first establishing a baseline sector wide and then improving the simplicity and efficiency of the waste collection system and infrastructure. Our areas of focus will include: encouraging circular economy models (including research & innovation) particularly in Textiles, Plastics and the Building sector; adopting the waste hierarchy; reducing household and business waste (particularly food waste).

Links to other 5YEP Aims

Valuing resources and reducing consumption supports all aspects of the 5YEP; by taking a sector approach to move businesses to circular economy business models, businesses will reduce carbon emissions. Additionally, residents taking more sustainable actions by reducing consumption and adopting more sustainable lifestyles, such as switching to active travel rather than using/owning a car, reducing food waste and home/community growing of food can contribute to increasing our resilience to climate change and reduce our carbon emissions.

Co-benefits (e.g. health, cost saving etc.)

Moving to more sustainable practices within the home and workplace can improve both health and financial well-being. Reducing waste, particularly food and energy waste, can save an average of £730 and £1300 per family per year respectively. Reducing utility bills can have positive health benefits including on nutrition e.g. how well a family can afford to eat and mental well-being through less stress over the financial burdens of household bills and expenses. The economic benefits include developing new business opportunities in repairing, upcycling and renting products. Moving to circular economy business practices can also reduce production costs as waste is minimised. In addition, continued dependency on sourcing goods and materials through complex multinational supply chains creates risk to security of supply for our businesses and our economy.

Co-enablers (factors that will enable delivery e.g. finance, skills, national government)

Transitioning to a circular economy will require sufficient funding to support the planning, implementation and maintenance of waste collection systems and infrastructure to maximise recovery, reuse, repair and recycling. Local capacity building and skills development in the green sector will also be needed to meet the changing needs and demands and support innovation. Government policy and regulatory support will be required to encourage the adoption of new practices, increase the sustainability of products throughout their lifecycle and encourage the innovation and adoption of new technologies and practices to increase waste minimisation.

Note: check that circular economy principles are embedded into retrofit and new build actions

Aim 6: Our city-region is better adapted and more resilient to the increasing impacts of climate change.

Objectives

- The risks from, and vulnerability to, climate change impacts are managed and reduced
- The adaptive capacity and resilience of our communities and organisations is increased, with a focus on the most vulnerable.
- Nature-based solutions are prioritised in delivering resilient, well-adapted ecosystems and communities.
- The groundwork is laid to enable longer-term and more transformative adaptation actions.

Note: can we quantify any of the above and turn them into "Increase by x"?

The Challenge

Greater Manchester is already experiencing the impacts of climate change and the likelihood of extreme weather events will continue to increase. The consequences of these events will be felt across all aspects of society, damaging infrastructure, the natural environment, and impacting the health and wellbeing of residents, particularly those already experiencing multiple inequalities. There needs to be improved preparedness for the impacts of climate change, with Greater Manchester becoming a resilient and well-adapted city-region.

The climate in Greater Manchester has already changed; 5 of the warmest years on record have occurred since 2006, and the most recent decade (2012 to 2021) has been on average 1.0°C warmer than the 1961 to 1990 average. Seasonal rainfall has also changed significantly, with decreasing summer rainfall and increasing winter rainfall. These changes are already having an impact in Greater Manchester: the flooding and extreme heat events experienced over recent years, such as the 2015 Boxing Day floods, and the July 2022 extreme heatwave, have been made more likely because of climate change. These events are projected to become more frequent and intense over the coming decades.

Climate projections show that, for Greater Manchester, we can expect to see:

- Warmer, wetter autumns and winters
- Hotter and drier summers
- More frequent and intense extreme weather events, including extreme rainfall and extreme heat events
- More severe drought events
- Impact on our supply chains as a result of global climate change.

Note: possibly add infographic depending on space).

Action Required

25) Risks from and vulnerability to climate change impacts are managed and reduced – given the impacts climate change is already having on our city-region, and will continue to have in the future, action is needed to manage and reduce the risks these pose, particularly where the city-region is most vulnerable to them e.g. flooding.

26) The adaptive capacity and resilience of our communities and organisations is increased, with a focus on the most vulnerable – in order to reduce the risks where we are most vulnerable, we need to increase the potential of our communities and organisations to the impacts of climate change, helping us to better cope with a more extreme and variable climate.

27) Nature-based solutions are prioritised in delivering resilient, well-adapted ecosystems and communities – to tackle the climate and biodiversity emergencies together, nature-based solutions can provide multiple benefits to help adapt our communities and infrastructure to the impacts of climate change.

28) The groundwork is laid to enable longer-term and more transformative adaptation actions – following the publication of a Greater Manchester Climate Change Risk Assessment in 2024, the next steps are to produce a Climate Adaptation Strategy and Implementation Plan. This will support strategies and planning at a local authority and organisation level to deliver action.

Links to other 5YEP Aims

Progress in other areas of the plan, particularly natural environment, can form part of climate mitigation/ adaption i.e. SUDS reducing flooding impact and tree cover reducing localised air temps during heat waves.

Co-benefits (e.g. health, cost saving etc.)

There is a strong body of evidence to suggest that there are potentially high economic benefits from further adaptation for many climate-related risks and opportunities, with many early adaptation investments delivering high value for money[2]. This includes investments in heatwave alerts and plans, surveillance and monitoring for pests and diseases, early warning systems, climate smart agriculture, climate resilient infrastructure, and upland peatland restoration

Importantly, there are often significant co-benefits from adaptation actions, such as through generating direct economic gains, or through driving wider social or environmental benefits, for example through reducing risks to health from over-heating, or reducing the significant impacts (both physical and mental) experienced by communities during and after a flood event.
Note: potentially insert a graph if space- Benefit to Cost ratios for adaptation for selected climate risks.

Co-enablers (factors that will enable delivery e.g. finance, skills, national government)

Financing adaptation is a challenge. Broadening the sources of funding is key, as these actions cannot be achieved with public funding alone. Action from business and government to support the development of adaptation measures is required to support this, facilitating the growth in investments in nature based and mechanical solutions. Delivering improvements will also require skills development across a range of professions, from on the ground skills (e.g. in SuDs creation and maintenance) to integrating adaptation into other professions (e.g. engineering) and in supporting sectors (e.g. legal, financial).
Note: need to be more specific

[2] Watkiss P, Cimato F and Hunt A (2021) Monetary Valuation of Risks and Opportunities in CCRA3. UK Climate Risk

Aim 7: Our air quality enhances the health, well-being and quality of life of the city region.

Objectives

- Reduce emissions that contribute to poor air quality
- Engage with communities and business to encourage to adopt behaviours that contribute to improving Air Quality

Note: TfGM to confirm targets in outcomes framework

The Challenge

Poor air quality is the largest environmental risk to the public's health[3]. Taking action to improve air quality is crucial to improve the health of the general population. Whilst air quality has been generally improving over time, particular pollutants remain a serious concern in many urban areas, including across Greater Manchester. There are areas in our city region where the NO_2 levels exceed the legal limit, especially near busy roads.

Our air quality affects the health and well-being of our residents, especially vulnerable groups such as children, elderly, and people with chronic conditions. It also reduces the attractiveness and competitiveness of our city region as a place to live, work, and visit. Improving the air quality in our city region is therefore a priority for our local authorities and stakeholders.

In our city region, the main sources of air pollution are road transport, industry and domestic heating. It is also influenced by weather patterns and atmospheric circulation, which can transport pollutants over long distances and across borders e.g. dust storms. Similarly, ozone and aerosols from urban and industrial sources can travel across oceans and affect the climate and health of distant populations.

Road transport accounts for 32% of NO and around 12% of PM_{10} and 14% of $PM_{2.5}$ (particulate matter)[4]. 51% of GM residents' trips are less than 2km in distance, 34% of GM residents' car (driver or passenger) trips are less than 2km in distance. Trips of 2km or less have the most potential to be completed by sustainable modes and therefore the greatest potential to more immediately reduce local air pollution.

Industrial combustion account for approximately 10% of NOx, 10% of PM2.5 and 5% of PM2.5 (Particulate matter)[5]. Considerable decreases in emissions from some sectors have been largely offset by increases in emissions from solid fuel burning by industry (particularly the burning of biomass). Industrial combustion of biomass based-fuels contributed less than 1 per cent of total PM2.5 emissions in the years prior to 2009 but has since risen to represent 6 per cent of total PM2.5 emissions in 2022. Industrial processes contribute 16% $PM_{2.5}$ 38% of PM_{10} in 2022.

In addition, the use of old poorly maintained NRNM (Non-Road Mobile Equipment) can have an adverse impact on air quality. NRMM does not have to meet the strict emission limits that road going equipment does.

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[3] Health matters: air pollution - GOV.UK (www.gov.uk)
[4] Transport and environment statistics: 2023 - GOV.UK (www.gov.uk)
[5] Emissions of air pollutants in the UK – Particulate matter (PM10 and PM2.5) - GOV.UK (www.gov.uk)

Domestic combustion covers households burning a variety of fuels including wood, coal, solid smokeless fuels, and fuels derived from waste such as coffee logs. This was a major source of PM emissions in 2022, as it contributed 29 per cent of total PM2.5 emissions and contributed 15 per cent of total PM10 emissions. Most emissions from this source come from households burning wood in stoves and open fires. The use of wood as a fuel contributed 75 per cent of both total PM2.5 and PM10 emissions from domestic combustion in 2022. Domestic combustion of wood contributed 22 per cent of overall PM2.5 emissions and contributed 11 per cent of overall PM10 emissions in 2022. Emissions of PM2.5 and PM10 from domestic wood burning increased by 56 per cent between 2012 and 2022.[6]

Air pollutants can also arise from agriculture. Nitrogen-containing compounds (NO_2, NO, NH_3, N_2O). In the case of ammonia (NH_3) and nitrous oxide (N_2O), agricultural sources are the main contributors, comprising 88% and 68% respectively of annual UK emissions in 2016. The main impacts of ammonia arise through its contribution to (1) formation of particulate matter (PM).[7] The majority of agricultural nitrous oxide emissions come from soils, particularly as a result of nitrogen fertiliser application, manure and leaching/run off[8].

The WHO recognise that their 2021 air quality guideline levels are challenging to meet immediately and have provided interim targets 1-4 to aim for in achieving them. Defra took into consideration the WHO guideline levels when setting the 2022 PM2.5 targets for England and acknowledged that the guideline value of 5 µg/m^3 is below the background level which is affected by natural sources and pollution from other countries[9]. In working towards the guideline values, Greater Manchester will need to concentrate on reducing particulate matter and nitrogen dioxide. Currently GM is attaining the interim target level 4 for both PM2.5 and PM10 particulate matter, but at interim level 1 for NO_2 (nitrogen dioxide). GM will continue to work with government to achieve the new England target levels for PM2.5 of 10µg/m^3 and exposure reduction of 35% by 2040.

Greater Manchester is committed to delivering compliance with nitrogen dioxide through an investment-led, non-charging Greater Manchester Clean Air Plan that cleans up the air without harming livelihoods, jobs and businesses. In 2022, in GM, car was the dominant mode of transport, accounting for 60% of all trips, 15% of all car trips were 1km or less, equating to 150 million annual car journeys which could have been walked in less than 15 minutes or cycled in around 4 minutes[10]. To help reduce air pollution from travel, residents and businesses should chose public transport or active travel over a private car, especially for short journeys.

Action Required

29) Reduce emissions that contribute to poor air quality

Greater Manchester, as a Breathe Life City, has stated our intention work towards the WHO air quality guidelines. 9 of the 10 local authorities have adopted them in the Places for Everyone Plan. The government expects local authorities to support the delivery of the national PM2.5 targets by

[6] Emissions of air pollutants in the UK – Particulate matter (PM10 and PM2.5) - GOV.UK (www.gov.uk)
[7] 2800829_Agricultural_emissions_vfinal2.pdf (defra.gov.uk)
[8] Agri-climate report 2023 - GOV.UK (www.gov.uk)
[9] Bolton: Dangerously high air pollution in nearly all areas | The Bolton News

[10] Greater Manchester Travel Diary Surveys | Bee Network | Powered by TfGM

taking action to reduce emissions from sources within their control, such as domestic burning, transport, and industry. Actions which will help reduce the emissions of PM2.5 include:

- avoid burning solid fuel unless necessary. If it is necessary, ensure that it is burnt in a compliant stove and that restrictions imposed by smoke control area legislation are complied with.
- don't burn garden waste, but rather use the green waste facility provided by your local authority
- Keep smoke to a minimum when BBQing and opt for a gas/electric BBQ if possible. Avoid using Chimineas.

30) Engage with communities and business to encourage to adopt behaviours that contribute to improving Air Quality - With regards to indoor air pollution, there are many sources of PM, NOx and VOC's, from within the home, which can contribute to impacts on health and affect the quality of the air within your home and outside including burning candles, plug in air fresheners, sprays, smoking and vaping, solvents from furnishings paints, in addition to combustion sources such as solid fuel stoves and gas ovens, hobs and fires – reducing the use of these sources will improve indoor air quality.

Links to other 5YEP Aims

Natural environment enhancements can reduce poor air quality through redesigning spaces prone to pollution from roads i.e. with green barriers etc

Co-benefits (e.g. health, cost saving etc.)

Between 2017 and 2025, the total cost of PM2.5 and NO_2 combined to our health service is estimated to be £1.6 billion in models used in PHE's cost of air pollution project. The Environment Audit Committee has estimated that total health costs as a result of air pollution range between £8.5 billion and £20.2 billion a year. Poor air quality can also have an economic impact by reducing productivity among people of working age. Defra estimated that in 2012, poor air quality cost the economy £2.7 billion through productivity loss. As with the evidence of harm the exact figures should be seen as estimates; what they demonstrate is that there are potently significant economic benefits as well as health benefits to set against costs [11].

Co-enablers (factors that will enable delivery e.g. finance, skills, national government)

Deliver significant improvements in air quality will require a strong and inclusive partnership between the public, private sectors and academic community; one that can foster innovation, collaboration, engagement with residents and co-creation of solutions to address specific challenges and opportunities. A robust and reliable financing mechanism that can support the implementation of low-emission technologies and infrastructure, such as electric vehicles, public transport, renewable energy, and green spaces will also be needed, together with a skilled and trained workforce that can design, install, operate, and maintain the low-emission solutions and adapt to the changing needs and demands of the market and the environment. National government can also support local efforts by creating a supportive and coherent national policy framework that sets clear and ambitious targets and standards for air quality and emissions reduction and provides incentives and guidance for local and regional authorities to achieve them.

[11] Health Matters: Air pollution – sources, impacts and actions – UK Health Security Agency (blog.gov.uk)

Aim 8: Our economy will grow sustainably because of the interventions we make, benefiting our residents and businesses

Objectives

- Businesses are more resource efficient, reducing their operating costs and carbon emissions and sustainably innovating their products and services.
- Businesses have resilient supply chains, managing and mitigating risks from a changing climate.
- GM's Environment & Low Carbon sector grows and is more productive, creating secure, good quality jobs for our residents
- Residents have the skills needed to work in the green economy.

Note: can we quantify any of the above and turn them into "Increase by x".

The Challenge

Our transition to a sustainable, carbon neutral city region will require significant long term investment by our businesses, public bodies and residents. Our Local Area Energy Plans suggest that, for carbon reduction alone, £64bn of investment will be needed to transform our infrastructure from what we have today to what will be required to get to carbon neutrality (70% of this would be invested under business as usual). This level of investment is without precedent in modern times in terms of scale, scope and duration. This investment will create new industries, grow and diversify existing ones and challenge those businesses who's traditional markets increasingly cease to exist.
Note: need to breakdown the private/public sector investment and BAU enablers and forms of external private investment, new mechanisms etc

Greater Manchester's Low Carbon Environment Goods and Services (LCEGS) Sector generated sales of over £8.6Bn in 2022. It comprised 3,144 companies employing 58,736 full time equivalent employees. The LCEGS sector represents 14.5% of the business base (based on GVA) and 3.2% of Greater Manchester's employment. Greater Manchester green sector is a national leader in carbon capture & storage, energy management and renewable energy consultancy and ranks second in the UK (behind London) for alternative fuel vehicles and carbon finance. The fastest growing sub-sectors by sales are Carbon Capture & Storage, Building Technologies, Alternative Fuel Vehicles and Wind. The fastest growing sub-sectors by employees are Geothermal, Carbon Capture & Storage, Alternative Fuel Vehicles and Wind. Some of the sub-sectors identified as expecting to see future growth include Building Technologies (Low Carbon), Geothermal and Wind (Renewable Energy) with high forecast sales growth rates. The opportunity for the Greater Manchester sector to grow is now.

These seismic changes will not be limited to the low carbon and environmental goods and services (LCEGS) sector, all Greater Manchester companies and organisations will need to become more energy and resource efficient which may require new business models. Across all of this Plan's Aims, there is a need for innovative products, services and business models, which enable the rapid adoption of the actions we need to take, together with a suitably sized and skilled workforce to deliver them.

The requirement for a larger, suitably qualified workforce has been identified in several of the Aims of this plan as a required co-enabler. This will require both upskilling of the existing workforce and encouraging more people into the sector for a wide spectrum of roles from entry level to post graduate. The transition creates a real opportunity to better connect learners with work (e.g. traineeships, apprenticeships). Those without university degrees have been disproportionately affected by the move away from a manufacturing economy. This highlights the importance of

formalised pathways such as the Manchester Baccalaureate (MBacc) to support a wider range of learners, but also the need to align the qualification with policies that will support the renewal and green shift of the manufacturing sector.

Action Required

31) Businesses are more resource efficient, reducing their operating costs and carbon emissions and sustainably innovating their products and services - Scaling up the business support activity already available through the Bee Net Zero programme and Energy Innovation Agency will afford more GM businesses a supportive ecosystem to decarbonise their activities and innovate their goods and services. As part of the North West Industrial Cluster, Greater Manchester will need to work with neighbouring authorities and industrial partners to support the journey to net zero, and to maximise the opportunities for growth and jobs locally.

32) Businesses have resilient supply chains, managing and mitigating risks from a changing climate **-** analyse and align the local manufacturing landscape for diversification into the green economy, encourage more green sector companies to locate in GM and grow local supply chains.

33) GM's Environment and Low Carbon sector grows and is more productive, creating secure, good quality jobs for our residents - Working through the existing Green Growth sector development programme to support GM's green sector to improve the cost/quality of their products, bid for and win new contracts, working alongside local Government and academia to accelerate delivery of net zero solutions, join together assets and specialisms.

34) Residents have the skills needed to work in the green economy – create formalised pathways such as the MBacc, BTEC and apprenticeships to support a wider range of learners into green sector jobs, aligning the courses and qualifications with the skills required to meet projected future vacancies and support `on the job' training through continuous professional development.

Links to other 5YEP Aims

The growth of the green economy in Greater Manchester will stimulate demand for a larger skilled workforce to support delivery of all the Aims in this Plan.

Co-benefits (e.g. health, cost saving etc.)

Securing well paid jobs which come with such focused economic growth have the opportunity to transform the lives of those who hold them for the better. Being innovative will enable us to move faster at less cost and gain broader and deeper local benefits from the actions we take. To achieve this, we need to be open to the idea of doing things differently, quickly assessing what works and what is scalable and then take them forward as fast and as far as we can. This approach has the added benefit of stimulating and supporting innovative organisations who can then grow and flourish. This will require our Universities, our Businesses and Public our institutions to collaborate, and as residents, we will need to be welcoming of change.

Co-enablers (factors that will enable delivery e.g. finance, skills, national government)

Whilst many of the actions needed to achieve these aims are tried and tested, with solutions, finance and local supply chains in place, for others this is not the case. These actions need to be paid for, so we will need access to a broad spectrum of financial products and services which encourage and enable all of us to turn our plans into reality. The final key component to realising our plans is to have a suitably sized and skilled local supply chain, to ensure we can undertake the work that needs to be done. If we want to maximise the environmental and economic benefits this transition can

deliver, ideally that supply chain should be local, training people for and employing them in good well paid secure jobs. If managed correctly, the investment needed for this transformation also can transform the lives of our residents. To achieve this, we need to give local businesses, training providers and our residents, the certainty they require in terms of what transitions will happen and when, to give them confidence to invest in growing their careers and their businesses respectively. Another co-enabler to driving growth in the LCEGS sector in GM would be funding for local anchor assets/institutions that would help bring things together, e.g., a National Retrofit Centre

5.0 Progress since 2019

Since 2019 significant progress has been made to deliver our long-term environmental vision while recognising that there needs to be accelerated action to ensure the city region meets the target of carbon neutral by 2038. Our progress so far includes:

Natural environment:

- A Local Nature Recovery Strategy has been produced, setting out how we can create a greener Greater Manchester, enhancing green spaces for nature and for people.
- A Tree and Woodland Strategy – All Our Trees – has been published by City of Trees, setting out where planting trees can have the greatest benefit. in planting. Over 750,000 trees have been planted to date.
- Through the IGNITION project, a Living Lab has been established at Salford University to explore and engage businesses and residents on the benefits of nature-based solutions – including for biodiversity, water management and people on campus.
- In 2020 the Greater Manchester Environment Fund was launched to deploy funding to enhance and create new green spaces for nature and people. It has directed over £4.5m of funding into environmental projects across the city-region, including through the Green Spaces Fund. Through the GMEF, new business models are being developed to capitalise on the opportunities for private investment into the environment, which will come from demand from biodiversity net gain units and voluntary carbon offsetting.
- The Green Social Prescribing Pilot delivered activities to connect people with nature improving people's mental health and wellbeing and the natural environment at the same time.
- Through the Greater Manchester Natural Capital Investment Plan priorities for investment in the natural environment have been identified.
- Through four rounds of the Green Spaces Fund £2.6m has been allocated to 86 community-led projects that increase the amount and quality of accessible, nature-rich green space across Greater Manchester particularly in the areas most in need.
- The Natural Course programme has worked collaboratively to design projects to better the barriers preventing the achievement of 'good ecological status'.

Circular Economy including Waste

- In 2022 the Sustainable Consumption and Production Plan was launched providing the framework for Greater Manchester's key activities in 4 priority areas: Moving to a Circular Economy, Managing Waste Sustainably, Reducing Food Waste, and Moving to Sustainable Lifestyles.
- The Recycle for Greater Manchester Community Fund, launched in 2021, has funded creative solutions to recycling, repairing and reusing household waste in Greater Manchester. So far 47 projects have been funded including cooking classes, repair cafes and educational workshops.
- The Renew Hub and Shops were launched to help build Greater Manchester's circular economy by reusing and repurposing items donated by residents, which are then sold in the three Renew shops, which has generated income in excess of £1million
- Recycle for Greater Manchester are supporting households to reduce food waste through innovative campaigns including 'Buy, Eat, Keep, Repeat' and 'Plan Your Scran'.
- There has been work to reduce the use of avoidable single-use plastics including the Plastic Free GM campaign, GM Refill campaign, Public Sector Plastic Pact, and Academia Plastic Pledge.

- 10 schools are trialling being Eco-Refill Shops and Greater Manchester has become a Refill Destination.
- In 2022 the Textiles Circular Economy Business to Business Platform launched to develop a circular economy roadmap for textiles.
- In 2021 Bee Net Zero was launched, a collaborative Greater Manchester programme to support organisations on their journey to becoming net zero.
- A Schools Climate Action Planner has been launched to provide schools with a free, online, action planning tool to reduce their carbon footprint and environmental impact. Helping students and staff to understand the issues surrounding the climate crisis, learn and build skills for the future.
- A Northwest Net Zero Youth Network has been established as a commitment taken by NW regional Mayors from COP26, with the first public event on 1st October 2022.
- Three phases of behaviour insights research have been completed to understand residents' opinions on climate change and the barriers and challenges that prevent them from acting.

Buildings

- In July 2021 the Greater Manchester Retrofit Taskforce was launched to lead the way on a 3-year programme to explore innovative finance solutions and building the supply and demand for the skills needed to grow the supply chain. In March 2022 the Retrofit Action Plan was launched which sets out the programme and delivery targets.
- Several programmes are being delivered to support domestic retrofit including:
    - **Your Home Better**, an independent service delivered by retrofit experts, providing advice, planning and support, to homeowners.
    - The **ECO4** programme that focuses on retrofitting the least energy efficient housing occupied by low income and vulnerable residents.
    - The **Local Energy Advice Demonstrator** that provides in person retrofit advice to residents.
    - The completed **Green Homes Grant Local Authority Delivery scheme** spent £11.5m on retrofitting 1,785 fuel poor homes. It supported residents with EPC rated homes D-G and a household income of less than £30,000 per annum to retrofit their homes.
    - The **Truly Affordable Net Zero** homes taskforce was launched to deliver 30,000 net zero social homes.
    - £112m of funding has been secured from the **Social Housing Decarbonisation Fund** and social housing providers to retrofit 6,125 social homes.
    - Over £100m has been secured through the **Public Sector Decarbonisation Scheme** to retrofit 10% of GM's public sector buildings.

Energy

- Greater Manchester is the first and largest City Region to develop smart Local Area Energy Plans that provide a geospatial plan for where energy generation, retrofit, low carbon heat and electric vehicle infrastructure should be installed/placed.
- The Go Neutral Smart Energy framework has been launched to support decarbonising the public sector estate. An 80MW pipeline of low carbon energy opportunities on land, car parks, and building assets across Greater Manchester is being delivered.
- GMCA and LAs are supporting schools to deliver solar PV to their buildings.
- We have been supporting community focused energy projects through Net Zero NW and ENW's community energy programmes.

- GMCA in partnership with Bruntwood, Hitachi, MMU, SSE, UoM and UoS has set up an Energy Innovation Agency (EIA) that aims to deliver innovative technological solutions to help the transition to carbon neutrality. EIA now supporting over 100 innovators to commercialise and deploy their technologies across GM to accelerate decarbonisation and fill gaps not met by mature solutions.
- The Hydrogen and Fuel Cell Centre at Manchester Metropolitan University is the UK's first Fuel Cell Centre of Excellence.
- The Hydrogen Electrolyser (at up to 200MW) at Trafford Energy Park will be the UK's largest Green Hydrogen production facility and the Cryo-Battery on the same site is a world 1st using liquid air at a commercial scale.
- Energy House 2 at Salford is the world's first environmentally controllable chamber where full sized terraced houses can be constructed and tested.
- Signing MoU's with SSE, Daikin and Panasonic to support the demonstration, testing and deployment of new technologies.

Transport

- Greater Manchester is the first city region in England outside of London to take buses back under local control after nearly 40 years of deregulation. Working on behalf of Greater Manchester Combined Authority (GMCA), Transport for Greater Manchester (TfGM) is delivering a bus franchising scheme for local services across all ten districts in GM.
- The first franchised buses are now operating as part of the Bee Network, helping to fulfill GM's ambition for a fully integrated transport system joining together journeys by bus, tram, active travel (walking, cycling and wheeling) and local rail services. From January 2025, buses across GM will be part of the Bee Network.
- With a distinctive yellow colour scheme and bee logo, the Bee Network has committed to providing people with a sustainable service, enabling them to reduce their own carbon footprint.
- Progress in delivering the Bee Network includes:
    - 100km of new cycling infrastructure in the Bee Active Network.
    - Introduction of a bike hire scheme, known now as Starling Bank Bikes, and over 1,500 bikes are now available to hire.
    - More than 100 zero emission buses now operate in GM, the GM Bus Strategy aims for the full electrification of Greater Manchester's bus fleets (and supporting infrastructure) by 2032, with 50% of the fleet to be zero emission by 2027.
    - Metrolink runs on renewable energy making it one the most carbon efficient modes of transport per passenger. It has expanded to become the largest light rail network in the UK with services running on seven lines to 93 stops covering nearly 60 miles.
    - The launch of the Bee Network app to make it easier for residents of and visitors to Greater Manchester to use sustainable modes of transport to get around. With almost half a million downloads since launching in late 2023, the app is helping to transform access to the network alongside low, affordable flat bus fares introduced here in GM before anywhere else in the country.
- Through GM's Streets for All Strategy approach highway design proposals are being developed to ensure the integration of green and biodiverse assets, particularly Sustainable Urban Drainage (SuDS) into our streets, so they support nature recovery and climate adaptation as well as active travel.
- There are now over 2000 publicly available EV connectors in Greater Manchester. There are 11,000 privately owned Electric Vehicles, and a similar number of home charging devices.

Note: can we turn this into an infographic

6.0 Emissions Pathway

In 2018, GMCA commissioned research Setting City Area Targets and Trajectories for Emissions Reductions (SCATTER)[12] to understand potential carbon reduction pathways for Greater Manchester (Figure 1). Five years on, and GMCA has commissioned further work to understand emissions projections given the progress, and challenges we've experienced over the last five years. Figure 1 sets out the pathway projections developed for the 2024-2029 plan. This work has set out what a 'no further action' (baseline) pathway for GM would be following committed national policies, and what the additional impact of the actions proposed within this plan (modelled policies pathway) would mean for GMs emissions.

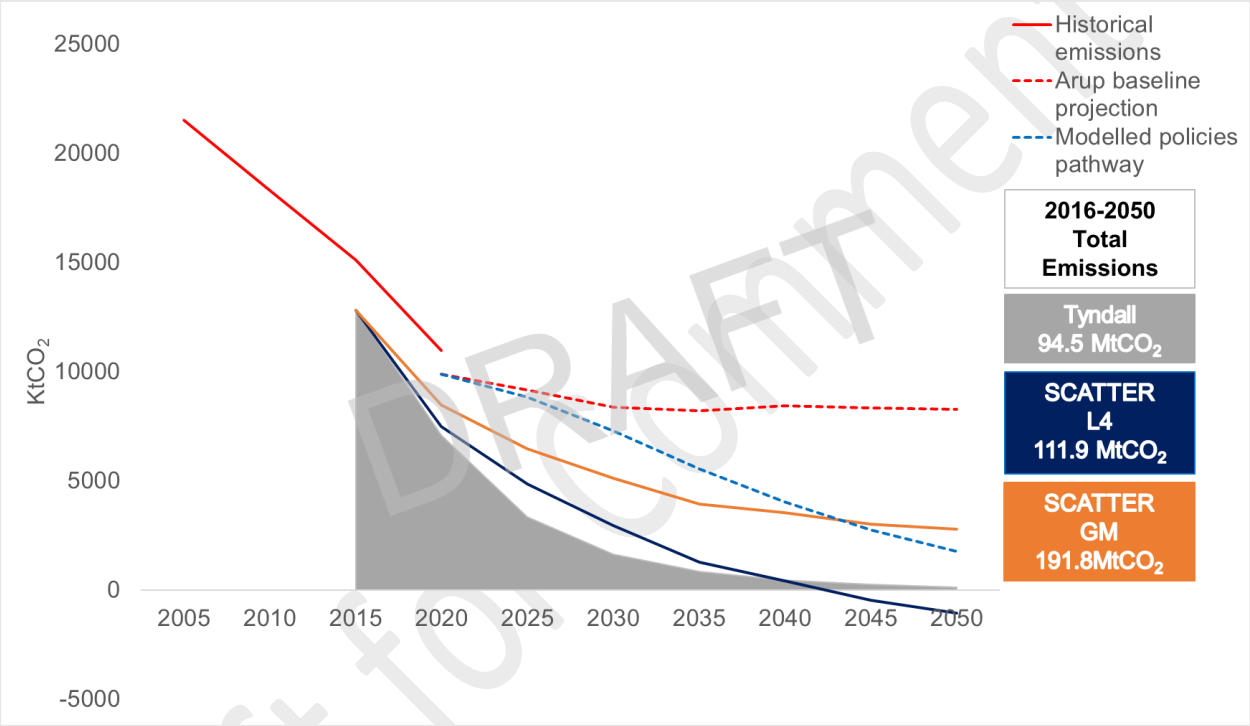

Figure 1. Potential carbon reduction pathways for Greater Manchester, as identified in the 2019-2024 plan, and the 2024-2029 plan.

The work helps understand what GMs emissions reductions are likely to be over the duration of this plan, accounting for both national action and local action. The baseline projection assumes emission reductions in GM occur only as a result of UK Government policy and action, and no additional activity is undertaken within GM. In other words, this is the projection without considering the impacts of policies proposed in this plan, but does consider anticipated growth in future energy demand, and decarbonisation of the wider energy system.

Figure 2 shows the projected pathways from now through to 2038. The Arup modelling shows that through the actions identified in this plan:

- GMs emissions will reduce to 7.4MtCO2 by **2029**
- GMs emissions will reduce to 4.6MtCO2 by **2038.**

[12] https://www.anthesisgroup.com/scatter-carbon-footprint-reduction-tool

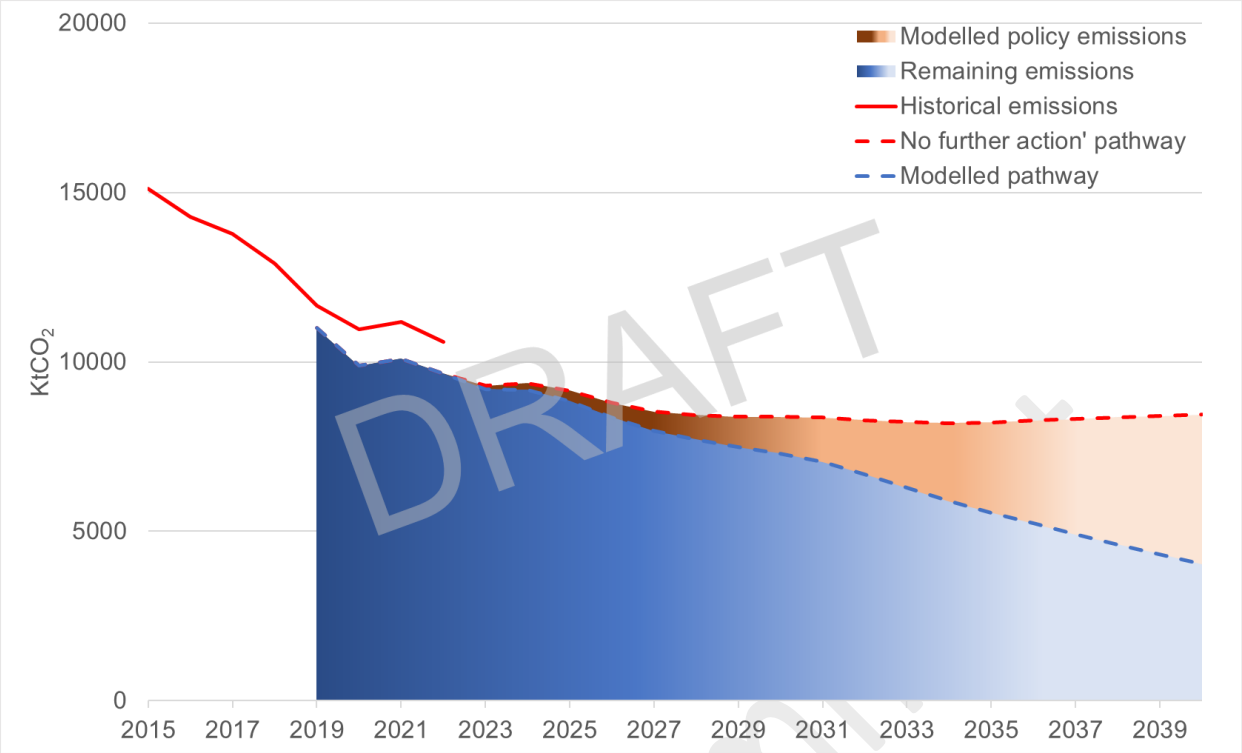

Figure 2. Summary emissions projections for Greater Manchester.

Figure 4 shows the breakdown of emissions savings that results from the actions proposed in this plan based on emissions category (as reported in the DESNZ Local Authority emissions estimates annual dataset), as well as by the actor(s) responsible for those emissions. The emissions saved through actions proposed in the plan occur mostly from residential buildings and transport, with some contribution from commercial and public sector buildings.

Note: to be updated

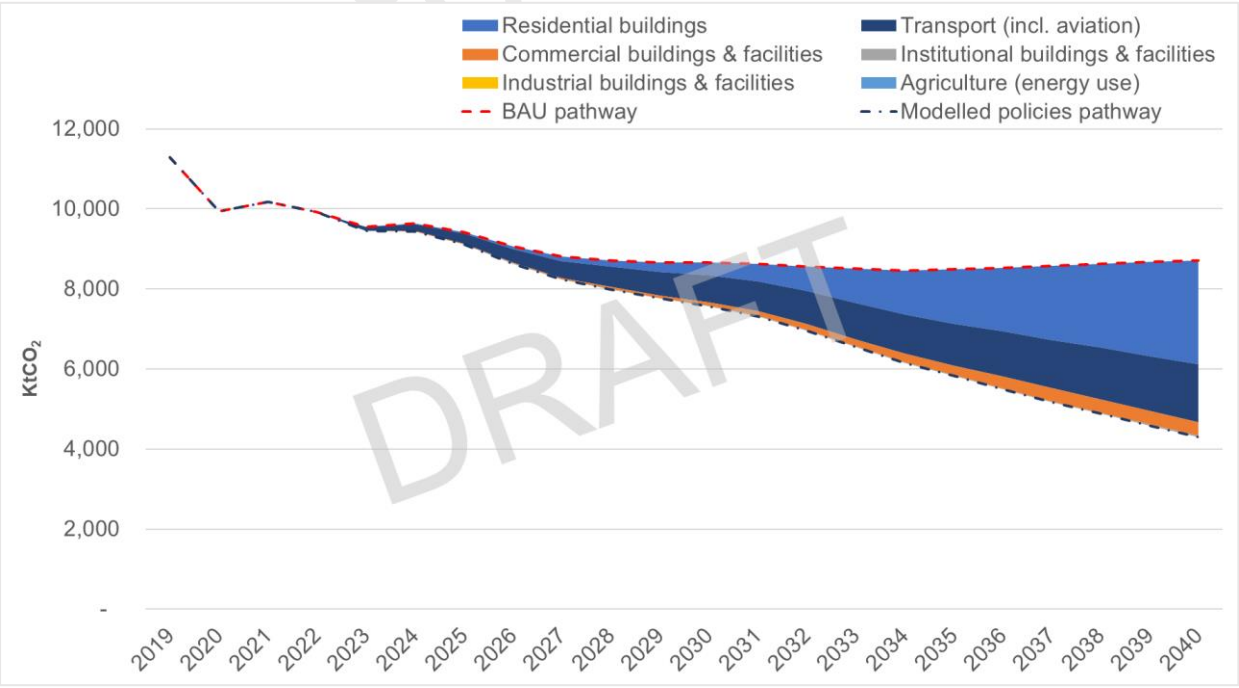

Figure 3. Emissions reductions resulting from the modelled pathway, by DESNZ emissions sector.

Responsibility for delivering the actions within the plan lies across several different actors. Whilst GM citizens have a responsibility for delivering some emissions reductions, National Government, Businesses and Transport for Greater Manchester also have a role to deliver these reductions.

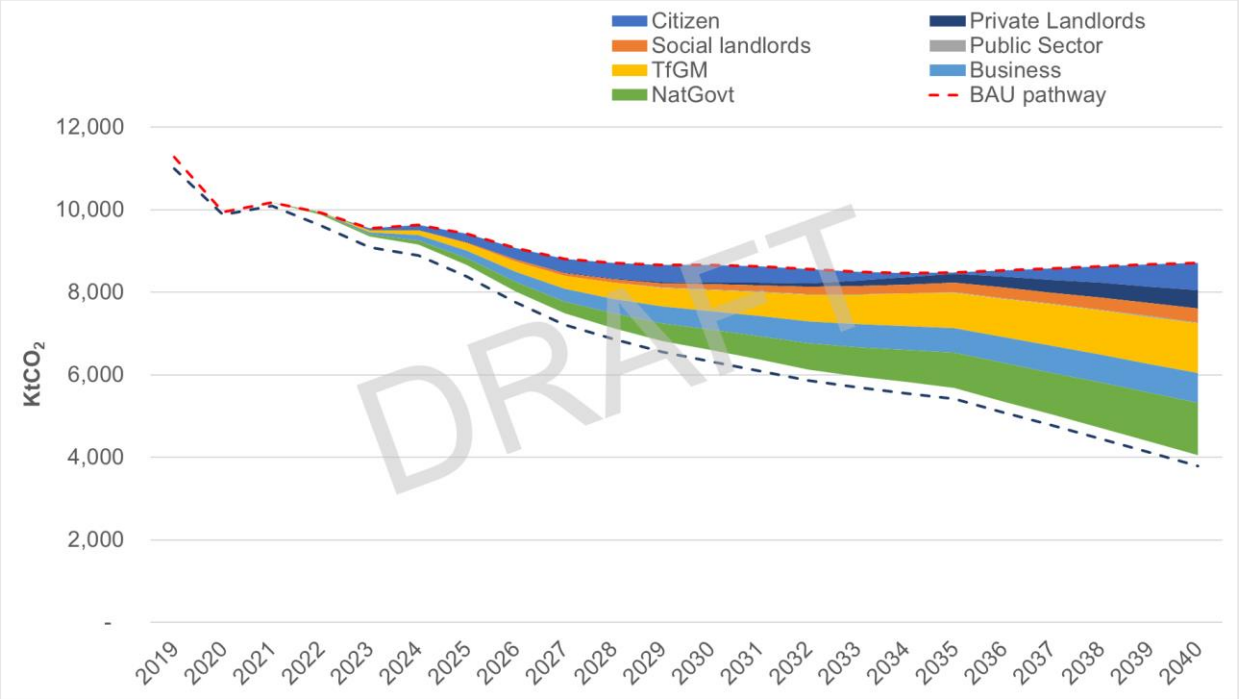

Figure 4. Emissions reductions resulting from the modelled pathway, by responsibility

Note: Further work needed to fully understand what proportion of the residual emissions different actors have responsibility for.

7.0 Governance and Performance Monitoring

Mission Based Approach

In 2019, Greater Manchester trialled a Mission Based Approach to delivering our first Five Year Environment Plan. This involved establishing several cross-sectoral Challenge Groups, each tasked with the role of identifying and delivering solutions to the issues identified in the first 5 Year Environment Plan. The Challenge Group Structure has been largely successful over the last five years, however progress in some areas has plateaued in the final year.

The overall Governance Structure for the GM Green City Region portfolio is shown in Figure 6. The Challenge Groups report into the Green City Region Partnership who, in turn report into GMCA. There is also a Green City Region Board, comprised only of elected Members of the 10 GM Local Authorities, which considers issues of specific interest to local government, all of which have independently declared Climate Emergencies.

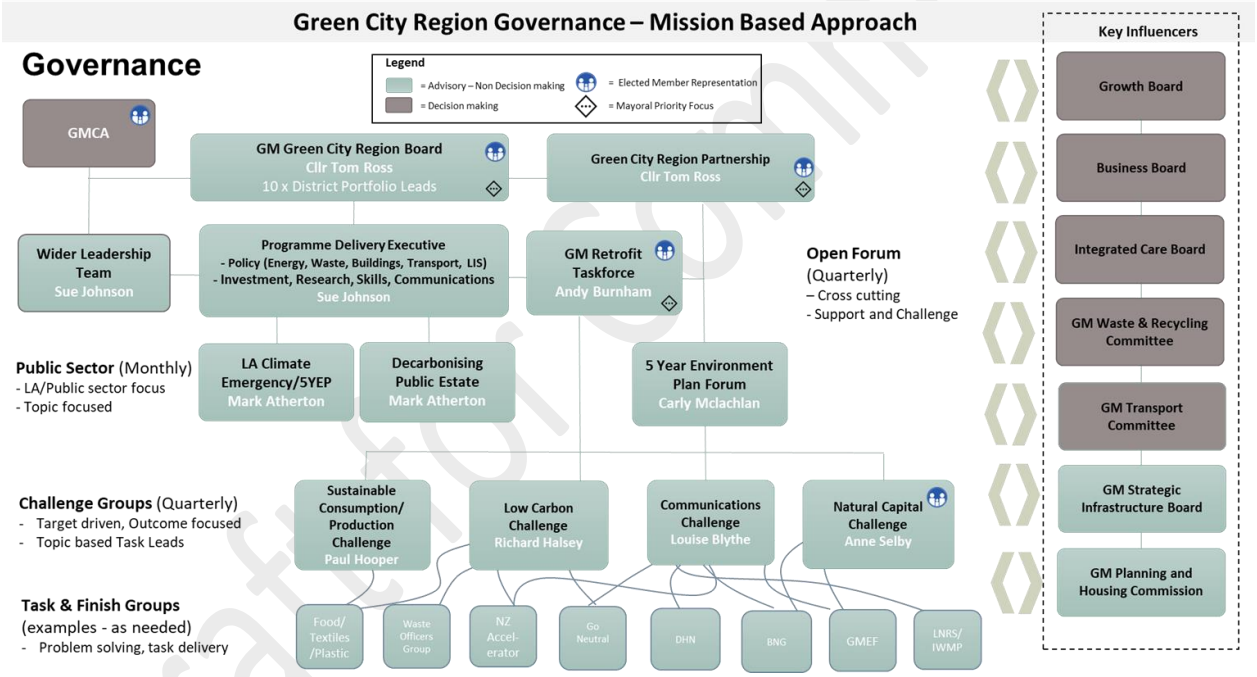

Figure 6 – diagram of the GM Green City Region Governance Structure

It is proposed that the existing governance structure is largely maintained, however we intend to experiment with different ways to deliver the Mission Based Approach to allow more and diverse voices to be heard and to attract more partners with the skills and capacity to support delivery of the new 5 Year Environment Plan. Note: be clearer on future governance options

Performance Monitoring

Quarterly Performance Monitoring reports are provided to the Green City Region Partnership and Board every quarter. The purpose of these reports is to support the Partnership and Board i.e. to provide strategic oversight of the delivery of the Greater Manchester 5 Year Environment Plan and the development and implementation of delivery programmes which contribute to achievement of Greater Manchester's environmental priorities. An on-line dashboard, which can be filtered by local

authority area, infrastructure type and KPI has also been produced to aid clarity and communication of progress.

Carbon Emissions
To ensure progress on achieving our carbon reduction pathway, GM needs to track several indicators and metrics that will accurately reflect the impact of the Plans objectives and actions, particularly for energy generation, storage and energy efficiency.

- Reduction in emissions [by sector]
- Uptake of EVs
- Uptake of retrofit etc?

(Note: to be completed once targets set and emissions pathway work is completed.)

Air Quality (Note: potentially move some of this to front)
The Convention on Long Range Transboundary Air Pollution's amended Gothenburg Protocol (CLRTAP) and the National Emission Ceilings Regulations (2018) (NECR) require the UK to reduce emissions of PM2.5 by 30 per cent compared to emissions in 2005 by 2020 and to stay below this level in each subsequent year until 2029. The NECR also requires the UK to reduce emissions by 46 per cent compared to emissions in 2005 by 2030. In the UK PM2.5 emissions decreased by 41 per cent between 2005 and 2022. Therefore, in 2022, the UK did meet the 30 per cent emission reduction commitment required between 2020 to 2029 as set out in the NECR[13].

Greater Manchester became the UK's first WHO and UN Environment Breathe Life region in 2017, showing its commitment to tackle air quality. The campaign calls for governments to achieve the WHO air quality guidelines by 2030, which would halve the number of air pollution related deaths by then. Since signing up to this commitment the WHO guidelines have been revised. The UK government has not committed to achieving the new WHO guidelines, instead in 2023 it introduced new legislation[14] for fine particulate matter (PM2.5), which sets an annual mean concentration target of 10µg/m^3 by 2040, and a population exposure reduction target of 35% by 2040. The government has considered the WHO guidelines and the transboundary sources of PM2.5, which are estimated to contribute more than 60% of the PM2.5 levels in southern England.

The Places for Everyone Plan is a framework for the future development of Greater Manchester setting out the vision and policies for housing, transport, environment, and economy in the region. During the Public Hearings following representations a modification was made by the Planning Inspector to include the 2021 WHO targets for PM2.5 (5µg/m^3 by 2030), instead of the previous 10µg/m^3. The plan aims to reduce the emissions of PM2.5 from various sources, such as wood burning stoves, road transport, and industry. The plan also promotes the use of green infrastructure, public transport, and active travel to improve the quality of life and health of the residents.

UK's two legal air quality regimes: The UK has two sets of air quality regulations, one at the national level and one at the local level. The national regulations follow the EU standards and set limits for several pollutants, such as nitrogen dioxide (NO_2) and particulate matter (PM).

[13] Emissions of air pollutants in the UK – Particulate matter (PM10 and PM2.5) - GOV.UK (www.gov.uk)
[14] The Environmental Targets (Fine Particulate Matter) (England) Regulations 2023

The UK is compliant with all the national limits except for NO_2, which is mainly caused by road traffic. It is for this reason following legal action by Client Earth that Greater Manchester has been directed by the government to bring NO_2 levels within the legal limit in the shortest possible time and by 2026 at the latest.

The local regulations require local authorities to monitor and manage the air quality in their areas and declare air quality management areas (AQMAs) if the limits are exceeded.

PM2.5 targets come under the national-level regime and although not part of the Local Air Quality Management framework, local authorities are expected to support delivery of the national PM2.5 targets by taking action to reduce emissions from sources within their control.

GM's AQ management area was declared in 2016 for nitrogen dioxide and based on a modelled area with an upper limit of 35µg/$m^{3,}$. Since that date all 10 GM authorities have been served with a direction to reduce roadside exceedances to below the legal limit of 40µg/m^3 in the shortest possible time and by 2026 at the latest. GM has, subject to government feedback, committed to deliver compliance with NO2 through an investment-led, non-charging Greater Manchester Clean Air Plan that cleans up the air without harming livelihoods, jobs and businesses.

Ozone (O3) is a pollutant gas which is not emitted directly from any source in significant quantities but is produced by complex chemical reactions between other pollutants such as nitrogen oxides and volatile organic compounds (NOx & VOC's) in the presence of sunlight. O3 is higher in the summer months and can travel long distances. NOx and VOC's occur from both natural and manmade sources such as transport, combustion process, solvent processes and the overall trend in the rural indicator is a long-term decrease likely driven by reductions in global emissions of NOx and VOC's[15]. In working towards the WHO guideline air quality values GM local authorities should continue to enforce industrial pollution control legislation that controls the emissions of particulate matter and volatile organic compounds, amongst other pollutants, and clean air legislation that controls the emissions of smoke from domestic and commercial activities.

GM will continue to work with government to achieve the new England target levels for PM2.5 of 10µg/m^3 and exposure reduction of 35% by 2040. For the first time in 2023 the external air quality monitoring stations across GM measured an annual mean of less than 10 µg/m^3 and needs to work hard to ensure that this improvement is maintained. It is important that everyone is conscious of their contribution to the particulate matter burden in GM. Activities that contribute to the emissions of fine particulate matter to the external air include solid fuel burning stoves, garden bonfires, charcoal BBQ's and Chimineas. According to Defra[16] in 2022 domestic combustion contributed to 29% of the total PM2.4 emissions with the majority coming from domestic wood burning.

Each year TfGM collates, on behalf of the 10 GM authorities, an Annual Status Report (ASR) which is submitted to Defra at the end of June and details the actions taken to improve the quality of the air across the region. GM has submitted a combined ASR since 2015, detailing the improvements made in AQ. Details can be found at Data Hub | Clean Air Greater Manchester (cleanairgm.com).

[15] Ozone (O3) - GOV.UK (www.gov.uk)
[16] Emissions of air pollutants in the UK – Particulate matter (PM10 and PM2.5) - GOV.UK (www.gov.uk)

Transport

To ensure progress on achieving a transport system that is reliable, integrated, inclusive, affordable and enables active and sustainable travel, GM needs to track several indicators and metrics that reflect the impact of its objectives and actions.

We need to know whether our policies and measures are having the desired effect and helping to deliver the GMTS 2040, including by making meaningful progress towards our "Right Mix" target, with more trips being made by active travel and public transport.

The GMTS 2040 measures performance through a series of key performance indicators (KPIs), that can be found in the Appendix of the latest GMTS 2040 Progress Report (LTP Supporting Documents) Indicators of particular interest for the five-year environment plan include (note all indicators measured annually):

- % trips accounted for by public transport – aim to increase
- % trips accounted for by active travel (cycling / walking) – aim to increase
- % perception of Public Transport affordability – aim to increase
- % population active or fairly active – aim to increase
- % of housing stock without off-street parking who do not have a publicly accessible charger within XX – aim to decrease
- % GM population with access to bus and Metrolink – aim to increase
- % GM population with access to a Bee Active Network route – aim to increase
- (Long-term target) 50% of all journeys in Greater Manchester being made by public transport or active travel by 2040, with no net-growth in motor vehicle traffic over that period.

Natural Environment and Climate Adaptation

- Reduction in water use and water waste
- Increase in community/home growing of fruit and vegetables
- Increase people's connection to nature

Note: To be completed

Circular Economy & Waste

- Reduction in household waste
- Increase in quality and quantity of household recycling
- Increase in people wanting a sustainable diet

Note: To be completed

Economic Growth

Note: To be completed

8.0 Education and Awareness

This 5 Year Environment Plan (2025-2030) creates a framework for all decision makers to take the next actions required to progress towards our long-term environmental vision. It is the decisions that we all take as residents, businesses, communities, investors, home and car owners that will determine whether we will achieve our shared goals.

Therefore, one of the most important and cross-cutting objectives arising from this Plan is the need for better communication with these decision makers to inform, educate and encourage positive action. We know from behavioural insights research that people's attitudes towards the environment vary considerably, from desperate concern to apathy. We also know that this Plan is more likely to be read by policy makers and programme developers than by individuals or business leaders. We are therefore committed to producing additional resources, both printed and web based, which are specific to their intended audience, utilising language and arguments which are most appropriate to them (see Figures 7 & 8).

Fig. 7 Impacts of moving to sustainable lifestyles

Fig.8 Mechanisms to track sustainable business practices

We will continue to use specific campaigns to promote offers and incentives that will enable decision makers to reach environmentally positive changes e.g. "Feel the benefit". We will also continue to maintain the GM Green City website as a central repository for all the environmental actions and initiatives being undertaken in Greater Manchester.

It is likely that monitoring progress on the impacts of our educational and awareness raising activities will be more difficult. In addition to evaluating specific campaigns, we will also commit to running bi-annual surveys to assess whether attitudes on environmental issues have/are shifting.

Additionally, we recognise that delivery of this plan is predicated on sectors, businesses, communities and individuals taking specific actions therefore we will also look to gain further insights into the barriers and drivers to enable those actions and where policy interventions and initiatives could be used to accelerate change.

Note: need to add how we will keep people informed of progress

9.0 Conclusion

To be completed after the Plan is finalised

Annex 1: Abbreviations and Acronyms

SuDs	Sustainable Urban Drainage Systems
NRNM	Non-Road Mobile Equipment
NO2	Nitrogen Dioxide
WHO	World Health Organisation
NH_3	Ammonia
GM	Greater Manchester
PV	Photovoltaic
UoS	University of Salford
MBacc	Manchester Baccalaureate
LAs	Local Authorities
GMEF	Greater Manchester Environment Fund
UoM	University of Manchester
MMU	Manchester Metropolitan University

Annex 2: Case Studies

Case Study 1 of Existing Project - Go Neutral

Since the launch of the first Five Year Environment Plan, Greater Manchester's public sector has been determined to take a leading role in our green revolution, including changing how they produce and consume energy locally to benefit their communities.

The Unlocking Clean Energy in Greater Manchester (UCEGM) Project was conceived of as part of this vision. Five local authorities – Manchester, Rochdale, Stockport, Salford and Wigan, secured £8.6m from European Regional Development Funding and leveraged a further £8.6m of match funding to deliver the UCEGM project. This resulted in 10MW of new renewable solar energy capacity and flexible battery storage on local authority owned buildings, car parks and land assets. This includes GM's first public sector owned solar farms in Rochdale and Salford, which were energised in early 2024.

The three-year, £17.2m project has delivered a significant contribution towards GM's environmental goals, including 22% of the 45 MW renewable energy generation target.

Figure x Rochdale Council's 5.5MW Chamber House Solar Farm will provide enough electricity that could power 2,000 homes.

Renewable and flexible energy supplies are the critical infrastructure that will unlock new models for using, selling and purchasing energy. The pioneering project has identified new business models and routes to market to maximise the value from the electricity generated. This provides a blueprint that can be replicated across GM and nationally.

Case Study 2 of Existing Project – Social Housing Retrofit

A major milestone was passed at the end of 2023, as energy saving home upgrades were completed to over 1,000 social homes across Greater Manchester, helping make them warmer, cheaper to heat and less harmful to the environment.

The 1,000th home to receive improvements was managed by Six Town Housing in Bury. The property is now benefiting from a variety of measures, including cavity wall insultation, loft insultation and an insulated loft hatch, smart ventilation to tackle damp and mould, LED lighting, roof-mounted solar PV, and battery storage, all helping ensure residents have a warm and comfortable home.

Over 6,300 social homes in total across Greater Manchester are receiving energy efficiency improvements through the Social Housing Decarbonisation Fund, after the city-region was granted £45m from the first two waves of the fund. The Government funding – granted by the Department for Energy Security and Net Zero – is in addition to a further £68m match funding from partners.

These works will lead to estimated benefits including:

- Annual energy savings of 30,973,737 kWh for the city-region
- Average annual bill saving of £276.78 per home
- Over 3,500 jobs and 60 apprentices supported in Greater Manchester

Fig x. Six Town Housing Retrofit

Six Town Housing are one of 19 Housing Provider partners of the GMCA-led consortium working on the Social Housing Decarbonisation programme. All homes will be completed by September 2025, with improvements being made to social housing in every district of Greater Manchester.

Case Study 3 of Existing Project – Mayors Green Spaces Fund

Awarded £13,000 in Round One of the Greater Manchester Green Spaces Fund, the Ardwick Stepping Stones Project has shown the power of local communities in greening their neighbourhoods and the benefits this can bring.

Ardwick is one of the most deprived areas in the country, and according to the project, has seen a loss of around 65% of its local biodiversity. Ardwick Climate Action's aims are to regenerate and rewild areas for the community, offering a series of green spaces that serve to educate and engage local people.

Ardwick Stepping Stones has established connected green spaces between the city centre and the University of Manchester, creating new and improved habits for nature and people. The project has seen residents and local groups engaged in a series of events which also highlight wider environmental concerns and raise awareness of the climate emergency.

In total, around 11 sites have benefited from the grant, with interventions including:

- Communal composting stations at each site – providing material for growing and also helping mitigate travel emissions incurred by taking waste off site.
- A tool hire shop, allowing the community to get involved in nature by eliminating a key hurdle to local participation.
- Wildflower meadows at various points in Ardwick and Brunswick.
- Bird and bat boxes in the shape of iconic Manchester buildings will be placed at all sites to encourage wildlife, further boosting local biodiversity. This will be done with advice from the Eden Project, helping ensure these sites are utilised year on year.

- Working with City of Trees and Festival Manchester to plant trees that will have a great impact on biodiversity and climate change through providing shade and habitats for all.
- Raised vegetable and fruit beds showcasing tailored, seasonal produce that can be collected once mature.
- Regenerating the St. Saviour's Church site with support from the Museum of Manchester's botany department, utilising planting that illustrates the warming of the planet, with a focus on foliage that would not have survived as little as a decade ago.
- A world record attempt for most bulbs planted and most people gathered to plant bulbs, all working to create beautiful spaces that generations will be able to enjoy.
- Digitally interactive and educational signage, including signs that illustrate what has been planted and the effects on local biodiversity.

Case Study 4 of Existing Project – Sustainable Urban Drainage Systems to support climate adaptation and resilience

Natural Course was a significant project that aimed to understand and overcome the barriers to achieving "good ecological status" under the EU Water Framework Directive across the Northwest England River Basin District. It brought together Greater Manchester Combined Authority, Salford City Council, Environment Agency, Natural England, United Utilities, and the charitable network of River Trusts across Northwest England, to work on over 50 actions in more than 100 waterbodies across North-West England.

One such project made use of Nature based Solutions (actions that help both people and nature by protecting, managing, and restoring natural and modified ecosystems) to deliver multiple benefits and help reduce impacts from flooding in Dales Brow, Salford.

This **Sustainable Urban Drainage System (SuDS) project** utilised informal green space which is vulnerable to flooding and transformed the area with the installation of two swales (a sunken, marshy ditch), the creation of a new 64sqm wetland area, a 40m long beech hedge, as well as Partners City of Trees, Salford City Council, Environment Agency, United Utilities, and University of Salford planting of a wildflower meadow, wetland plants, and 15 new trees.

Main swale and check dam flow control feature, showing wetland planting and boulders placed to remove energy from circulating flows.

The system is designed to intercept rainwater that runs off the Dales Brow and Folly Lane Road surfaces, diverting it away from highways drainage and combined sewers into the swales. In heavy rainfall events the rainwater travels along the swales and into a temporary wetland area, providing emergency storage. Water moving around the swale system is slowed by a series of check-dams, cleaned by biofiltration, before being allowed to return to the Deans Brook via a pipe connection. The swales and the wetland area now contain a variety of different vegetation types able to cope with wet conditions. Microbes in the soil and vegetation will trap and help to break down pollutants into harmless compounds.

The project has been designed to deliver a number of benefits. It not only helps to reduce surface water flooding at a local level, but it also eases pressure on the sewer infrastructure - as well as providing costs savings with respect to water treatment and reduces the likelihood of pollution incidents in watercourses from overflowing sewers.

Alongside these nature-based interventions, other measures include a new footpath, tree planting, and the creation of low maintenance 'biodiverse' planting areas which greatly enhance the site for the benefit of both residents and wildlife.

Case Study 5 of Existing Projects - Greater Manchester Domestic Burning Campaign

Greater Manchester is playing a leading role in tackling air pollution due to the increasing popularity of domestic burning, including use of open fires, woodburning stoves and garden bonfires.
The smoke from solid fuel contains fine particulate matter (PM2.5) which poses significant health risks, including respiratory conditions and more severe ailments.

In a collaborative effort coordinated by Transport for Greater Manchester, the region's 10 local authorities have partnered with the University of Manchester to investigate the use of log burners and solid fuel fires and their consequent impact on air pollution. Funded by a Defra Air Quality Grant, this initiative aims to uncover the reasons behind the prevalence of solid fuel burning in homes and gardens.

The research not only seeks to enhance community knowledge but also strives to alter behaviours that adversely affect public health. The University's study will inform a public health campaign geared towards raising awareness about the harmful effects of domestic burning. Greater Manchester has also launched an Information Hub on the Green City website to educate residents about health impacts and regulations. Additionally, over 40 air quality monitors are being installed across the region to closely monitor the connection between domestic burning and PM2.5 pollution.

Case Study 6 of Existing Projects – Bee Network

Greater Manchester is rolling out the Bee Network – a joined up, sustainable transport network helping people rethink the way they travel. By better connecting people with places, we're reducing congestion and carbon emissions, improving air quality, health and well-being – and supported the local economy.

Since January 2025, all buses in Greater Manchester are under local control as part of the Bee Network. Journeys by bus, tram and active travel – walking, wheeling and cycling – are already much better connected. And we're running more zero and low emission buses across Greater Manchester, with plans for a zero-emission bus fleet by 2030.

Key local rail services are set to join the Bee Network by 2028, while Metrolink trams run to 99 stops, carry millions of people every month and emitting no local air pollution. We're also building the largest active travel network in the UK to make walking and cycling the first choice for shorter journeys, with a growing bike hire scheme.

Fig. X – Bee Network ULEV

By making it easier for people to reduce car use, Greater Manchester is aiming for 50% of trips to be made by public transport, walking and cycling by 2040. That's around one million more trips each day using sustainable transport on the Bee Network.

Note: SCP Case Study to be input – Renew Hubs - SM

Note: Adaptation Case Study to be input - SE

Annex 3: Actions tables

Aim 1: Our **energy infrastructure** is smart, flexible and fit for a low carbon, sustainable future

Direct Action	Lead	Enabling Actions	Lead
1) Increase renewable energy generation and energy storage installed			
Increase the capacity of local energy generation and storage across all domestic tenures	Social landlords	Regional solar PV and battery offers deployed for all non social housing settings and marketed to all	GMCA, LAs
		Develop financial mechanism and models to support the uptake of low carbon technology across social housing stock	GMCA, Social landlords, National Govt.
		Remain aware of technological developments for all renewable energy sources.	GMCA
Increase the capacity of large scale renewable energy generation and storage including Solar PV and onshore wind.	ENWL, GMCA, LAs, Businesses	Undertake a rapid review of local bottlenecks for the deployment of low carbon technologies e.g. grid capacity and connections	National government, GMCA, LAs
		Review opportunities for large scale grid connected renewable energy deployment and suitable delivery models	GMCA
		In those areas where onshore wind is viable engage the public and landowners on its benefits	GMCA, LAs
Consider maximisation of onsite renewable energy generation and storage	Businesses NGOs	Further roll out and awareness of the Bee Net Zero and Community Energy Funding programmes	GMCA
Increase the retention of renewable energy generation profits in the region.	Businesses NGOs	Further capacity, technical and coordination support required on community energy projects providing more understanding, facilitation and exemplars	GMCA, LAs
2) Increased capacity and provision of Green Hydrogen			
Support the generation, distribution and usage of low carbon hydrogen, following the 'hydrogen use hierarchy'	Businesses, GMCA, LAs	Support the development of a pipeline of hydrogen demand for Phase 1 of Trafford Energy Park	GMCA, LAs
		Investigate, identify and support the development of suitable test sites for green hydrogen off-take usage	GMCA, Businesses, LAs
		Promote, support and encourage the roll out of hydrogen infrastructure and supply, subject to viability tests	GMCA, LAs

		Investigate and support feasibility pilots for hydrogen fuel cell deployment on suitable sites and assess the feasibility for wider roll out.	GMCA, Businesses, Universities, MIDAS
3) Increase the capacity and flexibility of the energy network			
Embed Local Area Energy Plans into all relevant Local Plans, aligning to Climate Action Strategies/Plans	GMCA, LAs	Test the integration of Local Area Energy Plans into Local Plans and use learning to develop guidance for LAs on developing a Local Area Energy delivery plan	GMCA
Ensure that the electricity grid is able to meet the increasing demands resulting from electrification and increasing renewables, in a timely and transparent way	ENWL	Once established work with the Regional Energy System Plan, National Energy System Operator and GB Energy to align action across multiple energy vectors	NESO, ENWL, GMCA, Ofgem
		Invest in the electricity network & procure flexible services to ensure ENWL network has capacity to enable low carbon technologies, such as heat pumps, EV chargers, Solar PV & batteries to be connected	ENWL
		Increase stakeholder engagement and collaboration across Growth and Investment Zones, Net Zero Accelerator asset deployment and Places for Everyone to ensure that opportunities to embed low carbon growth and co-benefits are maximised	GMCA, LAs, ENWL, NESO
Promote the development of a connected, smart energy system with demand-side response	GMCA	Improve the connectivity of homes to enable participation in a smart energy system, for example through the roll out of local public/private networks	GMCA, LAs, Businesses, Social Landlords
Inform and support residents to reduce costs by energy load shifting and exporting electricity at times when the local or national grid needs consumers to use more/less	ENWL	Procure 'flexible services' to incentivise households and businesses to use or export their electricity at times when the local electricity networks need less / more electricity to balance supply & demand	ENWL
		Raise awareness to residents of energy tariffs that can take advantage of energy load shifting	GMCA, LAs
Support and enable the creation and rapid adoption of innovative solutions and technologies to accelerate decarbonisation.	Businesses, GMCA, LAs	Promote the Energy Innovation Agency to raise awareness and the grow end user pool, encouraging public and private stakeholders to use their assets to support trials and commercialisation	Public/Private Stakeholder
4) Increased number, generation capacity and level of operational heat networks			
	National Govt,	Work with Government to include Heat Networks within the devolution agreement	GMCA, National govt.

Finalise heat network zoning policy approach and agree local GM delivery method for this.	GMCA, LAs	Review and implement the heat zoning policy once finalised by central Government, putting in place the resource/team needed to deliver the Zone Coordinator role	GMCA
Facilitate and support the development of the heat network pipeline and delivery of heat network schemes.	GMCA, LAs	Conduct concept/ feasibility studies to identify the potential for heat networks. Identify and progress suitable delivery models to deliver priority schemes	GMCA, LAs
Heat intensive industries need to consider use of their waste heat for utilisation in heat networks	Businesses	Identify and support the integration of waste heat sources as part of heat network infrastructure development	Government, LAs and Businesses

Note: Check with ENWL - DG

Aim 2: Our **buildings** are smart, flexible and energy efficient

Direct Action	Lead	Enabling Action	Lead
5) Increase the number of homes retrofitted			
Improve the energy performance of social housing focusing on the worst performing	Social landlords	Work with social landlords to access government finance for retrofitting social homes	GMCA, LAs
		Establish grant schemes from a devolved single-settlement fund for retrofit.	GMCA
		Support RPs to agree a uniform specification for key technologies, underpinning the potential for collaborative or forward procurement exercises	GMCA, LAs
		Complete research into how EPC data can be improved	Academia
		Support large-scale housing retrofit projects to connect to the network	ENWL
		Expand the Feel the Benefit Portal and online advice to include procured and quality assured retrofit delivery partners	GMCA
		Support residents to invest in properties by expanding 'Willing to Pay' retrofit service	GMCA, LAs
All residents should consider investing in actions which enable fossil fuel free heating systems to be economic	Residents	Work with employers to promote and support their staff to reduce their home energy bills, incorporating it into wider staff benefit schemes.	Businesses, LAs, GMCA
		Deliver warm home prescriptions to households most in need.	NGOs
		Ongoing consumer research into household preferences and choices	Academia, GMCA
		Upskill retrofit assessors and installers to provide enough supply to meet demand	Colleges
		National planning policy to adopt whole life carbon assessment - ensuring new homes don't add to our retrofit backlog	National govt.
All residents should consider upgrading to more energy efficient products when replacing household appliances.	Residents	Raise awareness and deliver marketing to educate residents on energy efficient appliances	Businesses
Support the creation of a range of retrofit finance offers to support residents to retrofit their homes.	GMCA, LAs	Pilot projects to develop or trial green finance support mechanisms with willing public and private stakeholders and roll out more widely if feasible	GMCA, LAs
		Work with Government, GB Energy, and High Street and institutional lenders to identify and support private investment	National govt., GMCA
Improve the energy efficiency of the private rented sector	GMCA, LAs,	Establish the ability for setting higher Minimum Energy Efficiency Standards	National govt., GMCA

	Private landlords		
6) Increase the number of public and commercial buildings retrofitted			
Remove fossil fuel heating systems from the public estate	GMCA, LAs, GMP, GMFRS,	Pilot the creation of a costed estates wide plan to decarbonise all assets under direct GMCA control	GMCA, LAs
		Pilot the creation of a costed plan for replacing any fossil fuel heating systems which are approaching their end-of-life with a low carbon system, for owned public buildings	GMCA, LAs
		Facilitate willing public bodes to adopt and implement estate wide decarbonisation plans committing to operational carbon neutral by 2030	GMCA, LAs
		Pilot the creation of a costed plan for implementing enabling works to prepare for a future low carbon heating system (for buildings whose boilers are not end of life)	GMCA, LAs
All public building with an EPC/DEC below a C to consider energy efficiency improvements by 2028	GMCA, LAs, GMP, GMFRS,	Research and develop an approach to retrofitting LA-controlled schools of DEC/ EPC of D or below, considering existing frameworks and approaches	National govt.
		Establish a GM-wide Retrofit Framework for procurement to the delivery of public sector building retrofit measures considering inclusion of smaller suppliers	GMCA, LAs
All new buildings should have low carbon heating systems installed	GMCA/LAs	Prior to the Future Buildings Standard being implemented, establish a plan for no more fossil fuel heating systems to be installed in all new LA buildings and for all new development to consider a connection to a heat network."	GMCA, LAs
All building retrofit activity should be designed to avoid future over-heating risks	GMCA/LAs	Consider cooling (passive and active solutions) as part of all building retrofit works to avoid future over-heating risks	GMCA, LAs
All commercial buildings with an EPC/DEC below a C to consider energy efficiency improvements by 2028	Businesses	Provide support through the Bee Net Zero programme	Business Board, Growth Company
		Develop a cohort of willing public bodies, to commit to transition their leased estate to buildings being DEC/EPC C and above from 2028	GMCA, LAs
Work with existing and new Business Improvement Districts to sign up to a voluntary improvement standard (e.g. NABOR).	Businesses	In areas where there is need and viability to require development to enhance environmental and low carbon building standard, establish voluntary enhanced building standards to be signed up to as part of Business improvement Districts	GMCA, LAs

Facilitate the creation of financial models to enable buildings to be retrofitted	Businesses	Embed the requirements for commercial sector and public sector buildings into the financial and delivery models of the net zero accelerator	GMCA, National govt., private sector
7) Increase the number of low carbon heating systems installed			
All residents with fossil fuel heating systems should consider replacement with a heat pump or low carbon heating system.	Residents	Promote national govt. incentives, such as the Boiler Upgrade Scheme	GMCA
		Consider the impact of the Clean Heat Market Mechanism, if implemented in April 2025, and work with market actors to promote heat pump deployment.	GMCA, LAs, Businesses
		Provide support and guidance for householders on ASHP installations and for Environmental Health Officers to use in Planning Permission/Permitted Development.	GMCA
		Work with willing social landlords and LAs with social housing stock to agree an immediate policy shift away from the installation of fossil fuel heating in social homes	GMCA/RPs/LAs
All landlords providing social rented property develop and implement plans to move towards only replacing high carbon heating sources with low carbon heating sources.	Social landlords	Support those LAs and landlords who are currently not willing move away from fossil fuel heating systems, to catalyses this move using the learning from those that have to adopted low carbon heating, including lived experience of residents.	GMCA, LAs
		Continue to build and develop new heat pump, Solar and battery market offerings to make the technology more attractive.	GMCA
Where feasible, replace end of life heating systems in schools with low carbon heating.	LAs, Schools	Create forward replacement plans and identify funding streams to cover additional cost where needed, including potential devolved funding.	LAs, Schools, GMCA
		Promotion of national gov. incentives, such as the Boiler Upgrade Scheme	GMCA
8) Ensure all new developments are enabled towards net zero			
Use the Planning and Building Control system to accelerate the adoption of high standards for new and refurbished buildings.	LAs, GMCA	Where necessary, produce additional guidance to support planners and developers	GMCA, LAs
		Use our influence and lead by example in our growth priority areas through working with developers to adopt higher standards.	GMCA, LAs
		Continue to develop proposals for truly affordable net zero homes (TANZ) subject to additional support from central government	GMCA, LAs
		Explore the potential to incorporate PAS2080 standards and other environmental standards into all public investment	GMCA, LAs

Aim 3: Our **transport** system is reliable, integrated, inclusive, affordable and enables active and sustainable **travel.**

Direct Action	Lead	Enabling Action	Lead
9) Establish a long-term strategy and detailed delivery plan for an integrated transport system			
Develop an updated Greater Manchester Local Transport Plan (LTP) and supporting strategies	TfGM	Refresh the GM Local Transport Plan (LTP) (including Transport Strategy 2040)	TfGM, LAs
		Develop the next LTP Transport Delivery Plan (2027-2032)	TfGM, LAs
		Develop GM plan for Northern Powerhouse Rail and high-speed rail	TfGM
		Develop Rapid Transit Strategy (Local Transport Plan sub-strategy).	TfGM
		Develop School Travel Strategy.	TfGM
Secure funding to support the planning, implementation and maintenance of transport infrastructure and services	TfGM	Secure funding (through the Trailblazer Devolution Deal and Single Settlement)	TfGM
		Secure City Region Sustainable Transport Settlements (CRSTS) development funding	TfGM
		Prepare infrastructure pipeline proposals for the 2027-2032 investment period	TfGM
Lobby government for national policies that generate change	TfGM/LA's	Develop national policies that introduce economic incentives for businesses and individuals to reduce their carbon emissions	National Government
10) Deliver an integrated transport system to enable the GM population to switch to active / public transport			
Grow the Bee Network so that more people in GM have access to quality public transport and active travel	TfGM	Extend Metrolink Trafford Park line service	TfGM
		Deliver Nighttime transport pilot	TfGM
		Produce Bike Hire development and expansion plan.	TfGM
		Deliver Bee Active Routes, Bee Network crossings and walking and wheeling improvements at junctions	TfGM, LAs
Improve the Bee Network	TfGM	Add passenger information displays to interchanges and bus stops and audio-visual announcements on buses.	TfGM
		Implement multi modal fare capping, flattened fares and hopper fares.	TfGM
		Integration of Active Travel in the Bee Network app.	TfGM
		Deliver Metrolink Improvement Package and Shelter and Lift Renewals and upgrades	TfGM
		Provide journey planning tools and information to encourage mode shift in order to make the most efficient use of available capacity (particularly during peak periods).	TfGM
		Complete Metrolink city centre track renewals, tram management system server renewal, and fibre optic network renewal.	TfGM
		Deliver highways works that will improve bus performance.	TfGM

		Deliver bus stop enhancements programme to improve waiting facilities at stops	TfGM
		Integrate TravelSafe Support and Enforcement Officers (TSEO) across Bee Network.	TfGM
Work with GM local authorities and partners to improve local rail stations and services	TfGM	Deliver two accessible rail stations.	TfGM
		Incorporate agreed commuter lines into the Bee Network, introduce Pay-As-You-Go capabilities along some rail routes, co-branding GM rail stations.	TfGM
11) Support the transition to electric mobility			
Make the switch to electric vehicles (EVs)	TfGM	Develop a fleet decarbonisation plan	GMCA, GMFRS, GMP, LAs
		Work with electricity suppliers and network operators to assess demand and capacity	TfGM
		Aim for 100% of company cars to be EVs	Business
Increase deployment of electric charge points (ECPs) across the region	TfGM	Deliver LEVI programme for publicly accessibly EV chargers, on-street charging	TfGM/LAs
		Install EV chargers in all company car parks	Business
12) Deliver policies and programmes that make sustainable transport and travel as attractive as possible			
Make our streets safe and accessible for all	TfGM	Vision Zero Strategy Published (approach to road danger reduction)	TfGM
		Vision Zero Action Plan developed. (approach to road danger reduction)	TfGM
		Investigate enhanced roadworks permit scheme for greater coordination and control	TfGM, LA's
		Develop highway design through our Streets for All Strategy to ensure the integration of green and biodiverse assets into our streets	TfGM, GMCA
Work with GM logistics companies, businesses and other organisations to reduce the environmental impact of logistics.	TfGM	Advocate, support and facilitate GM logistics move to zero emissions fleets.	large orgs and retailers
		Consider consolidating deliveries/trips to reduce distance travelled and to switch to cleaner vehicles for last mile deliveries, keeping HGV's out of the regional centre	Businesses
Work with businesses to enable and encourage their consumers and employees to use sustainable transport modes.	TfGM	Encourage cycle to work scheme take up and improve active travel facilities	Businesses
		Prioritise access and parking points for those using sustainable modes	Businesses
		Reduce business travel by using online opportunities wherever possible	Businesses
13) Engage with and support communities and business to adopt more sustainable travel habits			
Individuals to adopt more sustainable travel habits	GMCA	Ensure communities are aware of the changes they can make to adopt sustainable lifestyle choices	GMCA, TfGM
	Business	Support messaging around sustainable travel benefits on leisure journeys.	TfGM

Businesses to enable and encourage their consumers and employees to use sustainable transport modes.		Promote the use of cleaner travel by employees, by subsidising the cost of or promoting public transport and active travel.	Businesses
		Reward customers/members who travel sustainably through ticket prices, perks (e.g. fast track entry) or conversely charge for parking when alternatives are available.	Businesses
Improve our understanding of GM residents, visitors and businesses needs from an integrated transport system and support efforts to reduce transport inequality in our diverse communities	TfGM	Gather data and feedback from and enable diverse communities to co-design and influence the transport system.	TfGM, LAs
		Address the barriers that may make it hard to participate	TfGM, LAs
		Conduct research and evaluation activity and share insight from these to develop our integrated transport system	TfGM

Note: Needs to be reformatted to highlight the actions for decision makers under the `Direct' column

Aim 4: Our **natural environment** is enhanced, providing benefits for nature and people.

Direct Action	Lead	Enabling Action	Lead
14) Expand and enhance our best spaces for nature			
Increase the area of Greater Manchester that is protected and designated for nature	LAs, Natural England, Landowners	Work with landowners and partnerships to support more land being protected and designated for nature (e.g. the proposals for a new National Nature Reserve in the mosslands)	GMCA, LAs, GMEU, Natural England
Improve the condition of land protected and designated for nature, by bringing sites into active management and implementing management plans	LAs, Natural England, Landowners	Work with landowners and partnerships to support bringing land into active management and implementing management plans	GMCA, LAs, GMEU, Natural England, NGOs
15) Better connect the best spaces for nature by creating and restoring habitats			
Protect and restore peatland habitats for nature and carbon sequestration	Landowners	Support LAs to develop policy positions to halt peat extraction across the region.	GMCA
		Work with partners to enact peatland restoration initiatives	GMCA
Restore and create new areas of habitat for nature, through funding routes such as Biodiversity Net Gain and Environmental Land Management Schemes	Landowners	Support the growth of a local market for Biodiversity Net Gain	GMCA, LAs
		Support the increased uptake of Environmental Land Management Schemes	GMCA, LAs
		Work with districts to ensure the Local Nature Recovery Strategy is reflected in all relevant Plans, Polices and decisions making tools.	GMCA, LAs
16) Reduce pressures on the natural environment - water, land and nature			
Encourage public and private organisations to assess, report and reduce direct and indirect impacts on nature.	Businesses, GMCA	Promote the uptake of UK Sustainability Disclosure Standards, once published	GMCA
		Work with United Utilities and key stakeholders to support water saving messaging to residents and business	UU, GMCA, LAs
Reduce the impact of wastewater on GM's watercourses by reducing Combined Sewage Overflow spills by x% by 2030	United Utilities	Work with United Utilities to deliver this, particularly in supporting the £250m of investment in rainwater management through United Utilities' Advanced WINEP.	GMCA, LAs, EA, Landowners
Through the Integrated Water Management Plan, deliver improvements in the sustainable management of water	GMCA, EA, United Utilities		
17) More existing spaces (parks, verges, gardens etc.) better managed for nature			
	Residents	Engage with horticulture bodies to promote more sustainable ways of gardening	GMCA

Residents should use their outdoor space (garden, yard or balcony) in a way that benefit nature and increase resilience.		Engage with and provide advice to residents about how to make their gardens more friendly for wildlife, use less water and manage water in their gardens	NGOs, businesses
		Continue to raise awareness and support residents to use less water and manage water in their gardens	United Utilities
		Provide advice to customers on how to garden in a wildlife friendly way	Garden Centers, LWT
		Implement a voluntary phase out of peat compost in absence/advance of any national ban	Garden centers
		Implement a voluntary phase out of the sale of and use of astro-turf in domestic gardens and promotion of alternatives	Garden centers
Manage shared gardens and spaces in a way that's nature-friendly, uses less water and manages water sustainably.	Social Landlords, Buildings Managers	Continue to engage with and provide advice and guidance to social and private landlords about how to make their gardens more friendly for wildlife, use less water and manage water in their gardens.	NGOs
Manage areas of parks and green spaces for nature for example through wildflower meadows, tree planting and woodland management and ponds	LAs	Support local authorities with funding and capacity to assess planting opportunities and bring sites forward.	GMCA/City of Trees
Manage areas outside of parks and existing green space to ensure benefits for wildlife	LAs	Review and update Planning Policy guidance to ensure new developments maximise the biodiversity and resilience benefits	GMCA, National govt
18) More green and resilient transport routes, streets and highways			
Manage areas alongside transport routes for nature, for example through wildflower areas on verges and tree planting	LAs, Network Rail, National Highways	Support local authorities with funding and capacity to assess planting opportunities and bring sites forward.	GMCA, City of Trees
Implementing green and blue infrastructure in all transport schemes	TfGM, LAs	Support the use of the SuDS Design Guide, part of Streets for All	GMCA, TfGM
19) More green and resilient new infrastructure, regeneration and development			
		Integrate greening into regeneration projects, to bring nature into town centres	LAs

Further integrate nature into the way land is used and managed, using grants and other sources of funding and investment to do so	Landowners, land managers, businesses	Work with businesses to encourage and incentivise the creation and enhancement of nature-based solutions on and around buildings.	United utilities, LA, EA, Business
		Work with businesses to embed nature-based solutions into business plans	GMCA, Growth Company
		Consider setting a mandatory level of green cover through new development from 2026, following the publication and implementation of the Future Homes Standard, including BNG and tree cover as part of Places for Everyone	GMCA, LAs
20) More community-led action and better connection to nature			
Support projects in the local area (e.g. funding or corporate volunteering initiatives) that create or enhance green spaces and access to them.	Businesses	Provide opportunities for local businesses to donate and participate in projects that enhance the natural environment, and link to business objectives (e.g. social value)	NGOs
Encourage local volunteering initiatives that improve the local natural environment	Residents	Provide funding to community groups to create or improve green spaces, including through the Green Spaces Fund	GMCA, LAs
Grow the number of referrals to and uptake of green social prescribing activities	GPs, GM ICP, NGOs	Support the GM extension to the national GSP programme, particularly in addressing gaps and barriers to the mainstreaming of GSP in GM.	GMCA, LAs, ICP, NGOs
Support community food growing initiatives to increase local food production	LAs, NGOs	Work with local communities to remove the barriers to food growing initiatives	LAs

Note: Need to engage with UU/EA/Garden Centres on their proposed actions - SE

Aim 5: Our city region transitions to a **circular economy** and our **waste** is reduced, reused, recycled or recovered.

Direct Action	Lead	Enabling Action	Lead
21) Reduce use of raw materials and increase use of recyclable materials in products			
Reduce the weight of raw materials used in production, through lightweighting and the use of innovative materials	Manufacturing	Innovation/Sustainable alternative and business support on CE/Resource efficiency	Academia, Businesses
Encourage businesses to adopt waste hierarchy, focusing on high impact	GMCA	Identify and promote local exemplars of companies who are doing this e.g. Manchester Airport	GMCA, Business Board
Incorporate environmental considerations into procurement strategies	Businesses, Public Sector	Provide support to business on how to use procurement to drive forward their environmental agendas.	GMCA, LAs, Business Board
		Investigate how small business can access municipal waste recycling infrastructure	GMCA
		Ensure no food waste is produced and avoidable food waste is redistributed	Hospitality sector
		Develop and implement a food waste action plan	GMCA, LAs
Reduce the use of single use items where appropriate	Businesses	Lobby Government to include more single use plastics covered by the Extended Produce Responsibility regulations	National Government
Increase the consumption of recycled materials	LAs	Provide guidance, support and an evidence base for the inclusion of circular economy planning principles, with an aim to include in Local Plans and procurement	GMCA, LAs
		Incorporate minimum levels of recycled content (up to 100%) in tender specifications and reward higher level content in the scoring system.	GMCA, LAs
22) Reduce greenhouse gas emissions (direct and embedded)			
Help residents understand how they cause carbon emissions and what they can do to reduce them	Public Restore, Businesses, National Govt.	Lobby Government to implement Carbon emission labelling	GMCA, LAs
		Support the uptake of carbon literacy training by public and private organisations	GMCA, LAs
		Use behavioural insights to create effective engagement strategies which increase positive environmental behaviours	GMCA
		Provide businesses with support and incentives to transition to a circular economy business model	GMCA, LAs, Business Board
		Use procurement to encourage and incentivise companies to take action	GMCA, LAs

Use public sector procurement to incentivise business to reduce carbon emissions and wider environmental impacts	GMCA, LAs, NHS	Explore a GMCA-led approach to introducing a mandate for including carbon assessment in public procurement for major schemes over £1m in value from 2025 onwards, based on LA backing, with clear guidance over exactly what to ask for in such an assessment.	GMCA, LAs
23) Reduce the amount of waste in every waste stream through reducing consumption and increasing reuse, repair and redistribution			
Reduce the amount of waste created by offering alternatives to purchasing products such as hire/lease	Businesses	Provide guidance and support on 'Library of Things' offer to assist community-led delivery of such schemes	GMCA, LAs
Support the uptake and use of "refillable" to reduce packaging and other single use waste	Businesses	Work with retailers and hospitality venues to encourage the use of innovative reusable solutions	GMCA, Marketing Manchester
		Continue to support residents through education awareness programmes and communication campaigns	GMCA, LAs
Reduce food waste throughout the value chain	GMCA, LAs, Businesses	Develop and implement a food waste action plan	GMCA
		Implement actions arising from the food waste action plan	Businesses and Hospitality
		Promote redistribution of surplus food to ensure no food is wasted	GMCA, LAs
		Optimise production processes to minimise food waste in hospitality and enact food distribution channels.	Hospitality sector
		Reduce the amount of food wasted in the home through discouraging multi-buy deals	Retail sector
Encourage the formation and growth of a less linear buy-use-throw away-buy again economy	Residents, Hospitality	Continue to support through promoting/creating repair cafes and reuse shops within communities.	GMCA, LAs
		Explore feasibility of Food Redistribution Hub/App to ensure no food is wasted	GMCA, LAs
24) Increase in quality and quantity of recycling			
Improve the quality, consistency and amount of recycled materials	GMCA, LAs	Instigate a programme of pilot resource management projects to improve the quality and rate of recycles with willing Local Authorities and roll out more widely when feasible	GMCA

		Continue to support residents through education awareness programmes and communication campaigns	GMCA, LAs
		Harmonise bin infrastructure across the UK to support more consistent household messaging and behaviours	National govt.
		Enable the development of a GM Zero Waste Strategy	GMCA, LAs
Make it easier for residents and businesses to recycle	Businesses	Change planning policy to mandate sufficient storage room for communal recycling facilities in new build apartment blocks	GMCA, LAs
		Work with businesses to ensure they have waste collections services for all recyclable materials	Business Board, LAs
Improve the efficiency of waste collection system and infrastructure of municipal, commercial and industrial waste.	Businesses, Waste Industry	Review waste infrastructure for reduce direct carbon emissions and from direct and indirect fossil fuel displacement	GMCA
		Promote services and support businesses	GMCA, LAs
		Instigate a programme of pilot resource management projects to improve the quality and rate of recycles with willing LAs and roll out more widely when feasible	GMCA, LAs
		Continue to support residents through education awareness programmes and communication campaigns	GMCA, LAs

Note: Check with Waste Cos, Retail & Hospitality providers

Aim 6: Our city-region is better **adapted** and more **resilient** to the increasing impacts of climate change we can't adapt to.

Direct Action	Lead	Enabling Action	Lead
25) Risks from and vulnerability to climate change impacts are managed and reduced			
Greater Manchester reflects a coherent set of policy and planning requirements which meet the adaptation and resilience needs of the city region	GMCA, LAs	Support the creation of a GM Climate Change Adaptation Plan, reflecting the actions and recommendations in LA planning	GMCA, LAs
		Convene an Extreme Heat Strategic Group, similar in scope to better understand how to address extreme heat risks strategically throughout GM.	GMCA, LAs
		Greater Manchester reflects a coherent set of policy and planning requirements which meet the adaptation and resilience needs of the city region	GMCA, LAs
		Commitment for spatial planning policy and building standards to consider over-heating risks in new and existing homes	GMCA, LAs
		Commitment for urban planning designs to make good use of outdoor cooling measures such as green and blue infrastructure	GMCA, LAs
Avoid future over-heating risks in new and retrofitted residential buildings through the development of spatial planning policy, retrofit and district heat network guidance.	GMCA, LAs	Better coordination between decarbonisation and adaptation policies and strategies for homes to understand over-heating risk	GMCA, LAs
		Develop guidance/policy to encourage use of Nature based Solutions to reduce flood risk in residential properties and secure biodiversity gains	GMCA, LAs
Reduce risk of all types of flooding in new developments and redevelopments	Developers	Understand how new developments built in flood at-risk areas are being made safe and resilient, for all new properties in high risk locations. This information should be made publicly available and should include whether properties are being protected by flood defences and property flood resilience.	GMCA, LAs
Make our Health and Social Care infrastructure resilient to the increased frequency extreme weather	NHS, Businesses	Health and Social Care services to develop organisational Climate Change Risk Assessments and action plans	GMCA, LAs, NHS
		Supply-chain risks are identified and managed	GMCA, LAs, NHS
		Scenario planning for extreme weather events	GMCA, LAs, NHS
		Incorporating risks into risk registers and management programmes, and including supply chain partners in risk assessment, planning, and communication.	GMCA, LAs, NHS

Develop an integrated cascading risk management plan for the region's infrastructure	Infrastructure providers	Interdependent / cascading risks included in climate change risk assessments and action plans for all key infrastructure providers	Infrastructure providers
		Research to better understand thresholds that affect energy supply	Energy providers
Ensure that existing infrastructure climate change adaptation plans have an inclusive whole system approach	Infrastructure providers, GMCA, LAs GMCA, GMRU	Increase the evidence base on the risk and vulnerability of digital assets, recognising that digital infrastructure underpins the operation of most other forms of infrastructure, and therefore there is high potential for significant cascading impacts	Academia, Infrastructure providers
		ICT infrastructure owners including data centres, base stations and network connections, to develop comprehensive climate change risk assessments and climate adaptation plans	Infrastructure providers
		Engage with current strategic flooding groups and voluntary and community groups	LFRs
Develop sustainable soil policy initiatives through further research and comprehensive monitoring of soils	GMCA, LAs	Complete research projects on current soil condition and future monitoring to help inform future sustainable soil policies	Academia
26) The adaptive capacity and resilience of our communities and organisations is increased, with a focus on the most vulnerable			
Develop guidance and recommended actions for care homes to take during heat periods to reduce heat risk for residents and staff	GMCA	Literature review to support development of evidence-based guidance	GMCA
		Undertake an audit of a select number of care homes and their risk to over-heating in GM to support evidence base	Academia
Identify and prioritise adaptation actions for vulnerable populations	GMCA, LAs	Vulnerable populations identified using existing indices where appropriate (i.e. Climate Just from UoM), or new indices developed if needed	GMCA
		Public awareness campaigns on climate risks, their unequal impacts on vulnerable populations, and adaptation actions they can take at home and in their communities	GMCA, LAs
		Resilience in communities to extreme heat events is increased via stronger engagement with the VCSE sector, mirroring the use of local VCSE groups in times of flood events	GMCA, GMRU, LAs
Support residents to prepare, respond and recover from extreme weather events	GMCA, LAs	Awareness campaigns aimed at residents to better understand their personal need for flood insurance, and to increase its uptake. Awareness campaigns on the availability of Property Flood Resilience Installations and how to access these.	GMCA, LAs

		Awareness campaigns aimed at residents to better understand effective actions to take to reduce risks from over-heating in their homes	GMCA, LAs
Produce information and guidance for businesses and employees on risks around over-heating at work during extreme heat periods	GM NHS	Behavioural campaigns aimed at businesses and employees to raise awareness of how to manage building temperatures, and the associated benefits this can bring to employee health and productivity	GM NHS
Develop comprehensive climate risk assessments, in particular: Regional and local NHS Trusts, infrastructure providers, large businesses, local authorities	Public and private sector orgs	Dissemination of the GM Climate Change Risk Assessment to key groups and partners, with support/guidance to help organisations develop their own Climate Change Risk Assessments	GMCA
Increase in number of businesses and organisations that offer Cool Spaces in time of extreme heat, in a similar way to the offer of warm spaces in extreme cold events.	Businesses	Work closely with key partners including the GM Ageing Hub and GM Business Board to encourage roll-out of Cool Spaces	GMCA, GM Business Board
27) Nature based solutions are prioritised in delivering resilient, well-adapted ecosystems and communities			
Where viable, embed nature based solutions into infrastructure planning and design	Developers	Where necessary, set out design principles to raise awareness (e.g. Sustainable Urban Drainage Design Guide)	GMCA, TfGM, LAs
28) The groundwork is laid to enable longer-term and more transformative adaptation actions			
Using learnings from response to flood events, develop a similar approach suitable for extreme heat events	GMCA, LAs	Develop Heatwave Plans	GMCA, GMRU, LAs
Climate change adaptation and future climate projections data are mainstreamed into the planning and design of new infrastructure assets and the renewal/upgrading of existing assets, to avoid the need for future retrofitting	GMCA, LAs	Embed adaptation and climate resilience into the governance process within every infrastructure project	Infrastructure providers, GMCA

Aim 7: Our **air quality** enhances the health, well-being and quality of life of the city region.

Direct Action	Lead	Enabling Action	Lead
29) Reduce emissions that contribute to poor air quality			
Reduce emissions from domestic heating	Residents, Businesses	Do not burn solid fuel unless absolutely necessary and if necessary.	Residents
		If necessary, only burn authorised fuel in an authorised appliance	Residents
		Compost rather than burning garden waste.	Residents
		Comply with smoke control legislation.	Residents
		Support LAs with the resources to enforce existing legislation.	National Govt.
		Enforce the existing smoke control legislation	LAs
		Support LAs with health messaging around domestic solid fuel burning	UKHSA
		Report on the impact of domestic solid fuel burning on the AQ in GM, using outputs of DEFRA funded particulate campaign (to 2025)	LAs
		Comply with the supply of fuels legislation for smoke control areas.	Businesses
		Do not supply unauthorised appliances to those living in a smoke control area	Businesses
Reduce emissions from industry / business / construction	Businesses	Utilise buying power (procurement) to influence the supply chain and emissions associated with services, materials and equipment including fleet. Business can use this motivate suppliers to switch fleet to zero emission / cleanest vehicles.	Public and private sector
		When renewing or replacing NRMM choose either battery powered/gas powered/or the latest engine standard available.	Construction Industry
		Support tools and develop clear guidelines for businesses to calculate their impact and ensure transparency for customers.	Government
		Care with methods of work can help reduce emissions to the air from plant and equipment to the use of extraction equipment to capture emissions.	Businesses
		Look to substitute products used within the manufacturing process to reduce emissions to the air and use the Best Available Techniques to reduce emissions.	Businesses
		Review manufacturing process to understand where efficiencies can be made, or processes changed to less polluting methods and ensure compliance (plus) with pollution emission legislation.	Businesses

Reduce emissions from transport	TfGM, Businesses	Choose plugin refrigeration units for HGV's or if necessary, those which run off LPG rather than diesel.	Businesses
		Switch fleet to zero emission / cleanest vehicles where possible.	Businesses
		Don't idle, turn engines off when not in use. Including the School run	All vehicle owners/drivers
		Consolidate deliveries to reduce distance travelled and use zero emission vehicles where logistically possible.	Businesses
		Deliver compliance with NO_2 through an investment-led, non-charging Greater Manchester Clean Air Plan that cleans up the air without harming livelihoods, jobs and businesses	TfGM
30) Enable individuals to adopt behaviours that contribute to improving Air Quality			
Encourage residents to make sustainable lifestyle choices.	GMCA, TfGM	Remind residents of the legislative requirements regarding domestic burning and the health impacts of not doing so.	National Government, LAs
		Accelerate air pollution reduction by choosing to use public transport, active travel such as walking, cycling and wheeling or by car-sharing rather than relying on their own personal transport.	Residents
		If there are no other alternatives to choose a less polluting car such as an EV, or hybrid vehicle.	Residents
		Sign up for the Daily Air Quality Index (DAQI) that tells you about forecast of expected air quality, that provides recommended actions and health advice https://cleanairgm.com/data-hub/forecast-and-alerts/	Residents
		Consider how you buy online and look to reduce the number of deliveries received, or through better decisions the number of returned packages.	Residents

Aim 8: Our **economy** will grow as a result of the interventions we make to benefit both our residents and businesses.

Direct Action	Lead	Enabling Action	Lead
31) Businesses are more resource efficient, reducing their operating costs and carbon emissions and sustainably innovating their products and services.			
Set a target date to become carbon neutral, develop and deliver a plan for achievement	Business	Engage with all GM businesses to support them to become carbon neutral through expanding existing support programmes e.g. Bee Net Zero	GM Business Board, Growth Company
		Regularly engage with place based business (e.g. Trafford Park, Atom Valley) to enable peer-peer support and direct businesses to available resources	GMCA, LAs
		Identify and make available to Industry support from investors, national programmes and initiatives from other city regions (e.g. through NW Industrial Cluster Programme)	GMCA
Assess the potential for innovation in products and service models	Business	Provide businesses with advice and access to innovative technology solutions	Growth Co
		Support GM environmental technology business to accelerate the commercialisation of their innovative products and services	Energy Innovation Agency
		Signpost GM businesses to innovation funding (from public sector programmes) and finance (from private sector) to support uptake of renewable energy solutions, energy management and efficiency solutions, retrofit solutions, etc	Growth Co GMCA
32) Businesses have resilient supply chains, managing and mitigating risks from a changing climate.			
Undertake a climate change risk assessment to understand the implication and exposure to climate change risks to supply chains, customers, and place of business and commence mitigation activity for the highest identified risks	Business	Produce information and guidance on low and medium-cost measures and other practical advice (uptake of flood protection insurance, raising awareness of flood warnings, etc.) to increase resilience to flood events	Green Economy
		Large-scale event organisers and venues are engaged on the need for risk assessments to include over-heating risks for events in the summer months	Events industry
		Interdependencies and cascading risk failure identified and managed, including assets for the GM 2040 Infrastructure Plan. Relevant actors work together to address the potential interacting/cascading risks	Infrastructure providers, GMCA, LAs

		Research to understand which critical infrastructure sectors would have the most cascading impacts if they were to fail, and prioritise improving their resilience to bring wider benefits from the avoidance of such cascading impacts	GMCA
		Common formalised standards of resilience (i.e. ISO 14091) are used across different infrastructure sectors to build systemic resilience.	Infrastructure providers
33) GM's Environment & Low Carbon sector grows and is more productive, creating secure, good quality jobs for our residents			
Create good well paid jobs in the Green Economy	GMCA, LAs, NHS	Support the Environmental Goods and Services sector to grow, through targeted intervention and procurement opportunities.	Growth Company
		Create demand for GM Low Carbon Goods and Services providers through the creation of robust and certain pipelines of delivery projects	GMCA, LAs
More GM based green economy companies developed and/or supported to relocate to GM.	Business MIDAS	Create a conducive environment and support services to encourage Low Carbon & Environment businesses to locate in GM	MIDAS
		Use Good Employment Charter to promote good employment practices across the green economy	GMCA Growth Co
		Utilise existing academic infrastructure and assets to encourage more University spinouts to develop new products and services here.	Academia, EIA
34) Residents have the skills needed to work in the green economy			
Support skills development for a low carbon economy	GMCA	Create a clear and solid pipeline of investable projects to encourage low carbon businesses to grow and create demand for upskilling	Public and Private sector
		Provide suitable adult skills courses and training to train new entrants and retrain people from other sectors to join the Green Economy	Universities and Colleges, Training Providers
		Support the development of MBacc and alternative qualification routes to access to the job market for young people	GMCA
		Connect major employers in the region to schools and colleges to streamline routes to work	Major Employers GMCA
		Test innovative models of upskilling and training utilising enhanced devolution powers.	GMCA

Note: need to reconcile overlap with SCP and Adaptation Actions