

Green City Action Plan

Tbilisi

2017 – 2030



September 2017



თბილისის მერია
TBILISI CITY HALL



European Bank
for Reconstruction and Development

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This Report has been funded by the Government of the Czech Republic.

FOREWORD



The Tbilisi Green City Action Plan (GCAP) document was developed with financial support of the European Bank for Reconstruction and Development (EBRD). The GCAP presents trends in the city's environment, strategic directions and priority measures.

The City is grateful for the consultancy assistance provided by two Czech consultancy companies, EMPRESS and ENVIROS and a team of local experts. The report is the result of the joint cooperation between the representatives of Tbilisi City Hall and the expert team. The GCAP document was created as a strategic document that will help the city overcome the existing challenges.

Tbilisi City Hall is actively working on improving city's infrastructure and environment. The transport, green spaces, waste management, air and water quality, energy efficiency and industry - these are integral part of city's welfare and the Green City Action Plan provides recommendations implementation of which will ensure city's sustainable development.

Finally, we believe that the measures identified by GCAP will become integral part of Tbilisi's urban and environmental planning process, which will ensure meeting needs of growing population and effective city governance for our future welfare.

David Narmania

Mayor

EXECUTIVE SUMMARY

We at Tbilisi City Hall are proud to present this **Green City Action Plan (GCAP)** for our City. It has been prepared using the methodology developed by the European Bank for Reconstruction and Development (EBRD) as part of its Green Economy Transition Policy Dialogue Framework. The consultancy assistance required to develop the GCAP has been funded by the Government of the Czech Republic, to whom we wish to express our thanks.

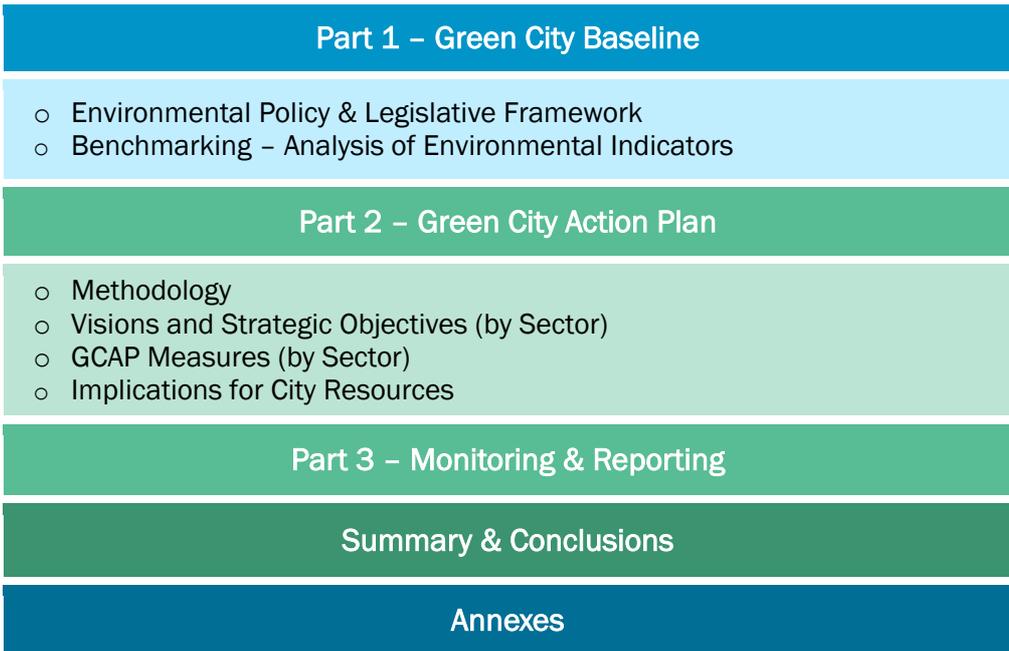
Introduction

Cities are dynamic and vital parts of society and are the main engines of social, economic and technological development. According to the UN, around half of the world's population now lives in urban areas, and by 2030 this is likely to exceed 60 per cent of the global population.

In order to provide their populations with the myriad of demanded services, cities need inputs of large quantities of resources. As such, cities are a source of significant environmental impacts. Furthermore, major environmental concerns for cities range from the quality of air and traffic congestion to pressure on limited green space, land and water resources. Urban activities, and how they are organised deeply affect the environment, and the overall quality of life of urban populations.

It is in response to this context that EBRD has initiated the development of Green City Action Plans, one of the first of which has been prepared for the City of Tbilisi. The Methodology was developed by the OECD and ICLEI for the EBRD and is designed to guide our City through the main steps of the development and implementation of a GCAP. These steps include establishing a **Green City Baseline**, developing a **Vision and Strategic Objectives**, developing a set of **Key Programmes and Measures** to improve the environmental situation, implementing these Measures and systematically **Monitoring** progress.

The diagram below illustrates the structure of the GCAP document and the interaction between the key sections.



Throughout this process the GCAP has entailed extensive consultation not only within the City but also with our partners, local and international experts and other stakeholders (see Annex 1).

The GCAP takes account of three main aspects to improve the overall environmental situation:

- The adoption of national strategies, development of new legislation and standards;
- Improving public awareness and engagement in environmental issues;
- Investment in technical measures.

Within Tbilisi City Hall there is enthusiasm and determination to improve the environmental performance of the City in all areas. We have a good understanding of what needs to be done, but implementation of the plans to date has been hampered by the limited financial and human resources available. The GCAP will help Tbilisi to achieve its environmental objectives based on a thorough understanding of current environmental performance, prioritising actions, identifying potential investment opportunities and providing access to additional finance.

Environmental Policy & Legislative Framework

Much of the existing environmental legislation in Georgia is obsolete, with inconsistencies and gaps that cause problems with compliance. In 2014, Georgia signed an Association Agreement (AA) with the EU and roadmaps for moving towards EU standards in the environmental and climate change fields have been adopted. As a result, many pieces of new environmental legislation are being adopted or are in preparation.

The Georgia National Environmental Action Programme (NEAP 2012-2016) sets out clear objectives for improving the environmental situation but does not create any new policies or legislation. A new NEAP for 2017-2021 is being prepared, led by the Ministry of Environment and Natural Resources Protection. In addition a National Energy Efficiency Action Plan (NEEAP) is in the final stages of preparation and will be adopted later in 2017. This will cover a number of topics which are relevant to the GCAP.

There are already many strategies and plans relating to the environment in Tbilisi and/or Georgia that highlight the priority areas to address. The GCAP will build on and complement these earlier efforts. Our review of the policy and legislative framework in Tbilisi supports and reinforces our initial view of our main environmental challenges:

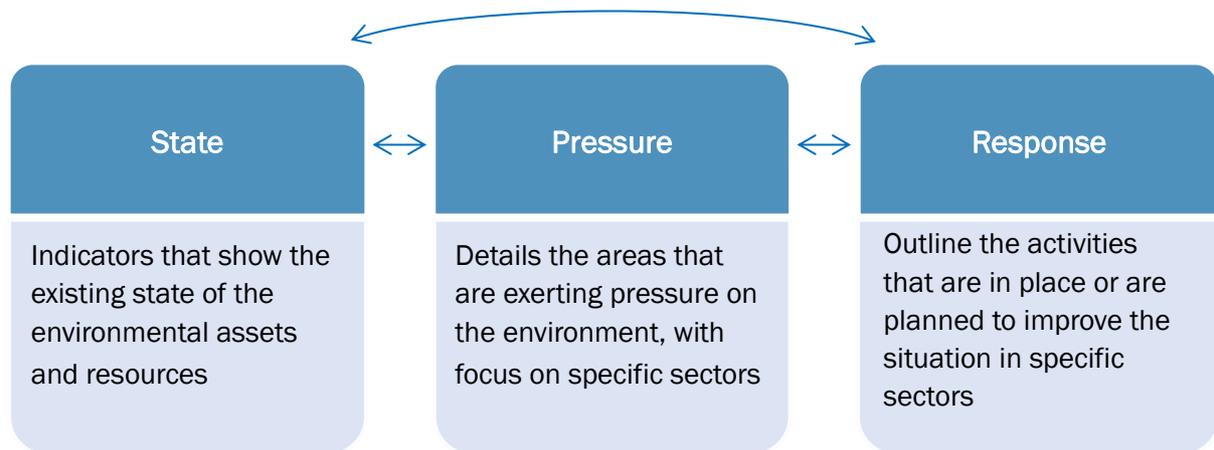
Existing Priorities	
Transport and its impact on air pollution and congestion	Transport
Improving energy efficiency in buildings (though industry also merits attention)	Buildings / Industry
Improvement of green spaces (which should include remediation of brownfield and contaminated sites).	Land Use & Biodiversity

Additional areas of concern	
Increasing the use of small-scale renewable energy schemes for both electricity and heat	Energy / Buildings
Improving the water treatment systems to comply with EU standards	Water
Improving our waste collection systems in parallel with building the new waste treatment plant.	Waste

Environmental Benchmarking

The GCAP Methodology developed by EBRD details a means of assessing the environmental situation through ‘State’, ‘Pressure’ and ‘Response’ (SPR) Indicators. These indicators seek to provide a holistic assessment of urban environmental performance, with the understanding that performance in one area (e.g. ‘State’) is influenced by performance in another (e.g. ‘Response’).

GCAP Pressure State Response Framework



The Methodology uses a ‘traffic light’ system to provide an initial impression of where our environmental performance is poor (red), where some improvement is needed (amber) and where it already meets international standards (green). We have also tracked trends in performance where we have the data.

The results of the analysis show that the ‘State’ indicators where we have the biggest environmental challenges are:

Main areas of concern – ‘State’	
Total Suspended Particles (TSP) including concentrations of PM _{2.5} and PM ₁₀	Air
Ammonia concentrations in the Mtkvari River	Water
Green space per head of population	Land Use
Economic damage from floods and earthquakes	Resilience

The main areas responsible for putting ‘Pressure’ on the environment are:

Main areas of concern – ‘Pressure’	
The age of the vehicle fleet (especially private cars) coupled with the lack of fuel standards, the numbers of vehicles per household and the low presence of bus and cycle lanes	Transport
The high levels of energy consumption in buildings together with the absence of green building standards and other environmental certifications;	Buildings
Water consumption per capita (which is closely linked to leakage on the water supply network – non-revenue water)	Water
Low levels of recycling or composting of municipal waste	Waste
The absence of any recycling of industrial waste or use of ‘grey’ water in industry	Industry

The areas where our **‘Response’** to the challenges are absent or need significant improvement are:

Main areas of concern – ‘Response’	
Promoting the use of public transport through awareness campaigns and measures such as ‘smart’ traffic management systems	Transport
Introducing building standards for energy efficiency	Buildings
Introducing regulations and standards in industry for energy efficiency of processes and equipment, waste recycling and reuse, and use of ‘grey’ water	Water
Introducing incentives and awareness campaigns to promote the use of small-scale renewable energy technologies	Energy
Improving recycling of solid waste through technology investments and awareness campaigns	Waste
Promoting mixed-use developments to improve land use and resilience to flooding in the City	Land Use

In general the indicators analysis supported our initial view of the priority areas we need to address.

This detailed analysis together with extensive consultation has allowed us to develop a GCAP that is realistically achievable over the next five years given the resource constraints of the City, but which will have maximum positive impacts on the City’s environment, economic development and social inclusion. The outcomes of this process are presented in the main document with a separate section for each sector.

Vision, Strategic Objectives and Priority Measures

Once we had agreed a Vision and Strategic Objectives for each sector, we then considered the potential Measures that are needed to achieve them. Our analysis of the Measures included the following considerations:

- The type of measure (regulation; technical assistance, investment, ‘soft’ measures);
- The level of priority for the City (high, medium);

- Additional benefits (economic, social, environmental);
- Implementation timescale;
- Difficulty of Implementation (political, financial, social);
- Capital and Operational Costs (high, medium, low);
- Main Actors and Potential Funding Sources.

This process enabled us to select the most appropriate Measures for each sector. The results of this analysis are presented in a series of tables at the end of each section which show the selected Green City Measures, Relevant Strategic Objectives, Mid-term Targets, timescales, and potential funding sources for each sector. More detailed information on costs and impacts of the Measures is provided in [Annex 6](#).

The Measures we intend to implement are summarised for each sector in the following table.

Transport
<ul style="list-style-type: none"> ○ Development of Sustainable Urban Mobility Plan ○ Bus Fleet Renewal (low/zero emission buses) ○ Bus Network Restructuring ○ Surface Transport Network Feasibility Studies ○ Development of Traffic Management System ○ Regulation of Taxis
Buildings
<ul style="list-style-type: none"> ○ National Energy Efficiency Action Plan for Buildings Sector ○ Minimum Technical Requirements for Buildings ○ Rehabilitation of Municipal Buildings ○ Promote the Use of Renewable Energy in Buildings ○ Municipal Energy Management System
Industry
<ul style="list-style-type: none"> ○ Environmental Support Programme for Businesses ○ Support Programme for Environmental Accreditation ○ Market Support Programme for the Environmental Goods & Services Sector ○ Hazardous Waste Treatment Facility ○ Improved Construction Waste Management
Energy
<ul style="list-style-type: none"> ○ National Energy Efficiency Action Plan for Energy Sector ○ Promotion of Urban Scale Renewables ○ Street Lighting Modernisation
Water
<ul style="list-style-type: none"> ○ Modernisation of Central Waste Water Treatment Plant ○ Extension of the Existing Sewerage System ○ Repair and Maintenance of Water Distribution System ○ Reduction of Water Consumption by Consumers

- Wastewater Discharge Limits for Industrial & Commercial Premises

Solid Waste

- Improvement of Regulatory and Planning Capacity of the City
- Construction of New Waste Treatment Facility
- Modernisation of Waste Collection Equipment
- Awareness Raising Campaign for General Public
- Closure & Remediation of Illegal Dumpsites
- Utilisation of Landfill Gas for Electricity Generation

Land Use & Biodiversity

- Implementation of a Sustainable Urban Planning System
- Computer Based System for Land Use in the City
- Development of New Green Spaces in the Urban Area of the City
- Biodiversity Strategy and Green Corridors to Promote Biodiversity
- Field Investigation on Landslide Prevention and Flood Risk Mitigation

Resilience

- Measures to be developed under the “100 Resilient Cities” project

Implications for City Resources

We are conscious that the above package of measures represents a big challenge for the City in terms of both financial and other resources.

The main resource required to implement the GCAP apart from finance is people to plan, develop and implement the individual measures and to work with our partners. For some measures (e.g. for IT projects) we will need to engage specialist assistance but in most cases our own staff should be able to handle the workload.

Monitoring & Reporting

The main purpose of our Monitoring Plan (MP) is to establish how the measures included in the GCAP for each sector impact on the quality of environmental assets as well as the adaptation to natural events such as flooding or earthquakes. Information can also be used for education activities aiming at raising awareness on “green behaviour” and facilitating support for the implementation of “green” measures.

We have developed the MP for the period 2017–2025. It includes a results-based Progress Monitoring Plan and an Impact Monitoring Plan. We will carry out a mid-term review to assess progress against targets and the social and economic benefits arising from actions we have taken in all of the sectors.

Capacity building of key staff involved in the monitoring process will be part of the GCAP implementation. No additional staff are envisaged at this stage, though some investment in IT systems may be required for efficient flow of information.

Monitoring of environmental indicators will rely as much as possible on existing technologies,

available data sources and current procedures. Investments in additional equipment that may be required will be justified by the additional benefits of improved information.

Conclusions and Next Steps

The systematic application of the EBRD methodology for developing our Green City Action Plan has resulted in a set of measures that encompass all areas that have an impact on the City's environment. By prioritising these measures, we have been able to develop a plan that will have the maximum impact on our environmental assets as well as producing other social and economic benefits for the City. Whilst the Plan is challenging, we believe that it will be possible to implement the measures over the next five years within the capacity of the City budget and other resources, though recognising that further actions will be necessary after this period if we are to achieve our long-term Vision for 2030.

In developing the GCAP, we have carried out extensive consultation with a wide range of stakeholders so that the views of the City, its citizens, businesses and institutions have been fully taken into account. We recognise that we will need the help and cooperation of all of these groups as well as other partners and, in some cases, the assistance of international financial institutions and donors to provide some of the funding needed.

The Measures will have a positive impact on our main areas of concern such as:

- Emissions to air (particularly PM_{2.5}, PM₁₀ and total suspended particulates);
- Energy use in buildings;
- Improving the environmental performance of our businesses;
- Increased use of renewable energy;
- Reducing water leakage in the distribution network;
- Improving wastewater quality;
- Improving waste management and treatment;
- Developing more and better quality green spaces in the City;
- Improving the Resilience of the City to natural events such as flooding and earthquakes.

We estimate that, taken together, the Measures will produce savings in CO₂ emissions of around **450,000 tonnes per year** and water savings of around **55 million m³ per year**. In addition, the Measures will have significant positive impacts on economic growth, job creation, public health and safety, and improved access to public amenities and green spaces.

Realising the GCAP aims and objectives demands action in the short term across all sectors and we intend to commence implementation as soon as possible, and certainly by the beginning of 2018. We look forward to working with Tbilisi's many stakeholders to achieve the Vision set out in this **Green City Action Plan**.

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1 Background to the Green City Action Plan

We at Tbilisi City Hall are proud to present this Green City Action Plan (GCAP) for our City. It has been prepared using the methodology developed by the European Bank for Reconstruction and Development (EBRD) as part of its Green Economy Transition Policy Dialogue Framework. The consultancy assistance required to develop the GCAP has been funded by the Government of the Czech Republic, to whom we wish to express our thanks.

1.1 Project Context

Cities are dynamic and vital parts of society and are the main engines of social, economic and technological development. According to the UN, around half of the world's population now lives in urban areas, and by 2030 this is likely to exceed 60 per cent of the global population.

In order to provide their populations with the myriad of demanded services, cities need inputs of large quantities of resources. As such, cities are a source of significant environmental impacts. Major environmental concerns for cities range from the quality of air and traffic congestion to pressure on limited green space, land and water resources. Urban activities, and how they are organised deeply affect the environment, and the overall quality of life of urban populations.

For the sustainable development of green cities, it is critical to recognise the relationship between environmental aspects and economic and social issues. This thinking is very much in line with the UN's 2030 Agenda for Sustainable Development and the Sustainable Development Goals (UN 2015) and particularly the Goal 11 calling for governments to make cities and human settlements inclusive, safe, resilient and sustainable.

Governments, civil society, businesses and the donor community have many actions underway to attempt to address the worst of these many urban issues. However, these actions have generally been undertaken in an ad hoc manner. It is critical for the quality of life of urban populations that these multiple urban issues are addressed in a systematic way. Taking a broader strategic view of urban environmental challenges has a number of benefits including:

- Providing input to optimising the allocation of a City's limited financial and personnel capacity to those issues with the greatest environmental benefits
- Enhancing the possibilities to attract finance and support when it is clear how a specific project fits into the broader priorities and road map for environmental improvement in the City.

It is in response to this context that EBRD has initiated the development of Green City Action Plans, one of the first of which has been prepared for the City of Tbilisi. The Methodology was designed to guide our City through the main steps of the development and implementation of a GCAP – from establishing a **Green City Baseline**, developing a **Vision** and **Strategic Objectives**,

developing a set of **Key Programmes and Measures** to improve the environmental situation, implementing these Measures and systematically **Monitoring** progress.

1.2 Green City Action Plan Methodology

The Green City Action Plan (GCAP) methodology has been developed by EBRD based on work by the OECD and the International Council for Local Environmental Initiatives (ICLEI). The GCAP presents the results of benchmarking and prioritisation exercises and defines the long-term Green City vision – within a timeframe of 10-15 years – and strategic objectives for each priority area. It focuses on the priority environmental dimensions, using relevant indicators and time-related targets and measures for cities' operations. The GCAP also outlines the scope of actions, the targets set and the major actions developed, and the initial steps of implementing the Plan for a period of 1-5 years. It is an overarching strategic document, which contains the guiding principles providing orientation for our decision-making and our implementation work in the medium-term, i.e. within 3-10 years.

The four main stages of a GCAP are:

Green City Baseline:

This aims to inform policy and strategic decision-making at the start of the process and provide the reference scenario for the business-as-usual against the Green City approach and action. The prioritisation of green city challenges is included in this step.

Green City Action Plan:

This aims to compile and present the agreed development vision and objectives for a period of 10-15 years, the targets to work towards in a period of 3-10 years, and the scope of actions and targets proposed. This step includes the prioritisation of green city *actions*.

Green City Implementation:

This aims to operationalise and implement the Green City Action Plan, break it down into concrete tasks, allocate budget, time and staff, and monitor the contribution of each measure to the objectives and targets established in the GCAP. This stage also links to provisions made in municipal budgets, and formally establish the reference base for mayors, councillors, and administrative decision makers with regard to further development & investment decisions.

Green City Reporting:

This aims to analyse the successes and failures of the implementation period, provide the basis for taking further political decisions and inform city officials, stakeholders and the public on what the city has done and achieved.

Although detailed implementation is beyond the scope of this document, the implications for the City's financial and other resources is discussed. We have also provided details of the Monitoring Plan we will use to report progress on implementation.

1.3 How to Use This Document

The remainder of this document is set out in the following sections, which describe the key activities and outcomes of the main phases of the GCAP methodology.

Part 1 – Green City Baseline
<ul style="list-style-type: none">o Environmental Policy & Legislative Frameworko Benchmarking – Analysis of Environmental Indicators
Part 2 – Green City Action Plan
<ul style="list-style-type: none">o Methodologyo Visions and Strategic Objectives (by Sector)o GCAP Measures (by Sector)o Implications for City Resources
Part 3 – Monitoring & Reporting
Summary & Conclusions
Annexes

The Visions, Strategic Objectives and GCAP Measures are described for each sector in turn. Further details relating to each Section are provided in the Annexes (Annex 2 to Annex 6).

1.4 Contributors to the GCAP

Development of the GCAP project has been overseen by our Economic Development Office, which is also leading on the “100 Resilient Cities” project. This department does not have in-depth environmental expertise but its role in these projects recognises that improving the environment can also lead to economic and social benefits and the creation of many new jobs. The GCAP can eventually capitalise on these opportunities by following the “Green Growth” strategies from other cities and regions.

Several other City Hall Departments have also been involved in developing the GCAP including the Departments of:

- o Ecology and Green Spaces
- o International Relations

Green City Action Plan

- Architectural Services
- Municipal Property
- Transport
- Municipal Improvement
- Finance

and also our arms-length companies:

- Tbilisi Transport Company
- TbilService Group (for Solid Waste).

We have also consulted a wide range of other stakeholders including National Ministries and Agencies, Universities, business support organisations, our water and wastewater service provider, Georgia Water & Power, the City's energy distribution company, TELASI, and several other private organisations. The full list of contributors is included as [Annex 1](#).

Consultancy support was provided by two Czech consultancy companies, EMPRESS and ENVIROS, assisted by a team of local experts, all of whom were guided by a team from EBRD. The City is grateful for the assistance provided by these organisations.

GREEN CITY BASELINE

2 Environmental Policy & Legislative Framework

This Section provides a profile of the City from an environmental perspective, outlines the Environmental Policy and Legislative Framework that underpins the GCAP and provides details of existing Strategies and Plans aimed at improving environmental performance in Georgia and Tbilisi.

2.1 City Profile

Tbilisi is the capital city of Georgia and is the political, economic, financial, cultural and educational centre of the country. The City covers an area of 720 km², is divided into ten district municipalities and has a population of around 1.2 million people. Although Georgia was part of the former Soviet Union and is geographically close to Russia, Turkey and Azerbaijan, we have close ties with the USA and the EU, of which it has been an associate partner since 2013.

Tbilisi is situated on both banks of the Mtkvari River and is surrounded by hills on three sides. Because of these boundaries it has developed in a linear fashion. Our City boundaries were extended in 2009 to encompass several villages and significant areas of forested land. Just outside the City boundaries to the north-east is the Tbilisi Sea which is mainly a recreational area but is also the main reservoir for the City's water supply.

Our City has a well-preserved historical centre but much of the architecture elsewhere stems from the Soviet period and many of the buildings suffer from poor construction standards and low levels of energy efficiency.

Georgia experienced a period of economic decline after becoming independent in 1991. This decline has since been reversed but it has led to the abandonment of many industrial sites which are now brownfield (and in some cases contaminated) areas. We estimate that about 30% of the Tbilisi City area is classed as brownfield. Whilst this is a challenge it is also a development opportunity. We have very few large industries left in Tbilisi and most of the industry that is left is small-scale enterprises, mainly food production and engineering companies.

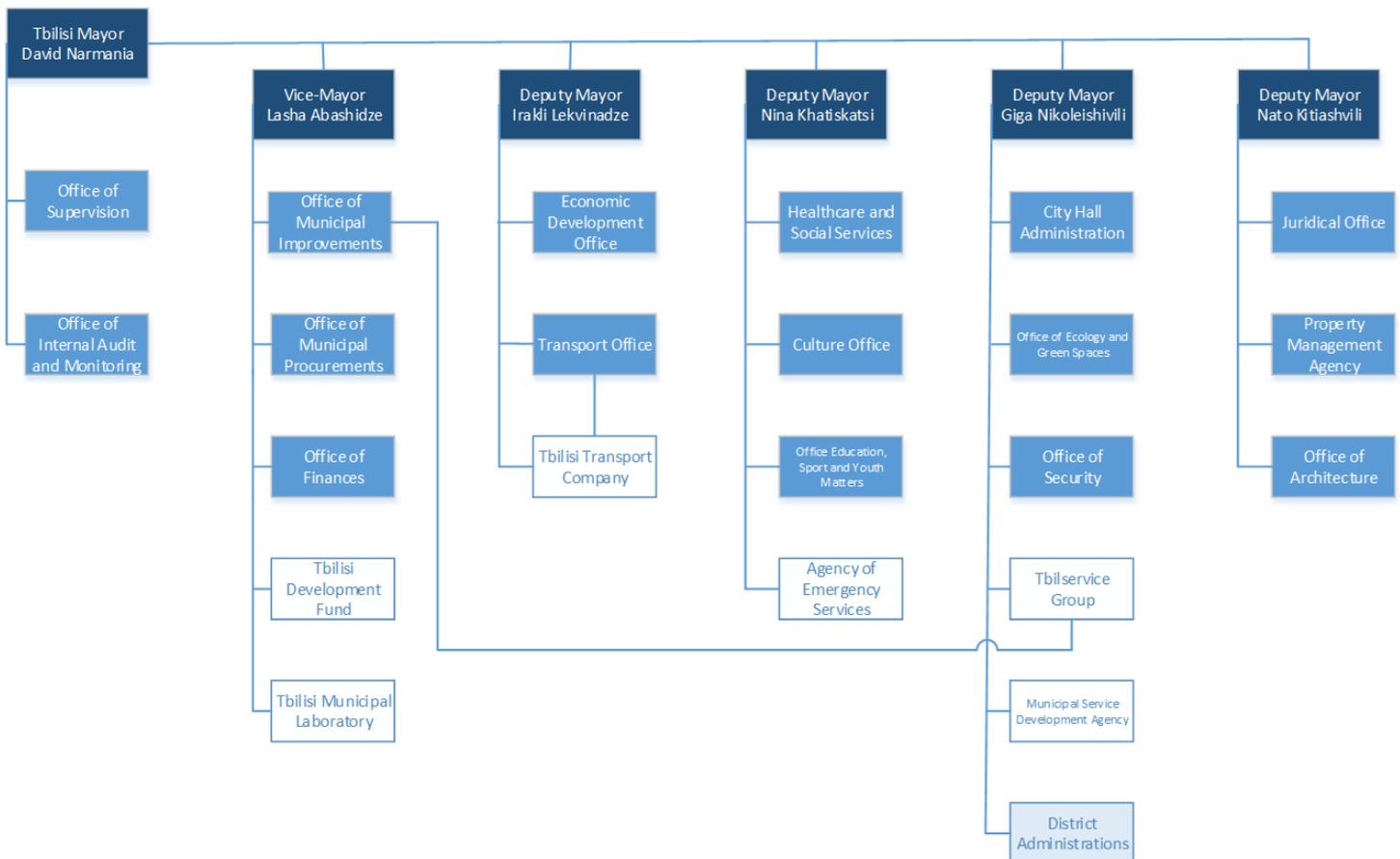
Although our public transport system includes buses and a metro system, many journeys in the City are made by private cars, many of which are old and in a poor state of repair. This leads to congestion and pollution in the City centre.

We are very keen to improve the environmental situation and are open to new ideas. Before the start of the GCAP process we stated our main priorities for improving the environment in the City to be: **Transport** (both emissions and congestion), **Energy Efficiency in Buildings** and the improvement of **Green Spaces**. Waste management is also a priority but will be partly addressed by the construction of a new treatment plant for processing municipal solid waste. In parallel with the GCAP we have also joined the “100 Resilient Cities” programme, which will help us to improve our resilience to natural events such as flooding and earthquakes. We are keen to avoid a repeat of the flooding in 2015 in which 19 people died and 160 homes were severely damaged.

Our close links with the EU have led to a determination by the national governments and ourselves to harmonize and implement the relevant environmental regulation and standards. This has led to the production of a number of strategies and plans over the last few years but implementation of the recommendations has been hampered by a lack of finance and available human resources within the City government.

2.2 Environmental Governance

Tbilisi City Hall activities are supervised by a Mayor and five Deputy Mayors, each of whom manages several departments. Currently there is no Deputy Mayor that has overall responsibility for environmental issues, and hence no separate budget. The City’s organisation chart is shown below.



Within the Department of Ecology and Green Spaces our activities are currently focused mainly on increasing green areas and biodiversity rather than wider environmental issues. However, our Environmental Strategy¹ for 2015-2020 addressed the following key challenges:

- Recommendations for addressing the environmental problems of Tbilisi;
- Strengthening environmental governance and institutional management;
- Promoting environmental education;
- Raising public awareness and strengthening public participation in the decision-making process.

The Strategy also made recommendations in the areas of Air, Water, Solid Waste, Energy and Resilience. However, it also recognised the limitations of City resources (both financial and human) to implement the Strategy. Nevertheless it is an important document in setting out the environmental challenges for the City and the direction in which we would like to move. The GCAP has been developed from this useful framework.

Our overall management of environmental issues in Tbilisi is further compromised because the City Hall does not have direct control or influence over several areas that affect environmental performance, e.g.

- The Ministry of Environment and Natural Resources Protection supported by the National Environmental Protection Agency is responsible for environmental permitting, monitoring and regulatory control;
- The water supply and sanitation infrastructure is owned and managed by a private company, Georgia Water & Power, who also supply electricity to the national grid;
- Electricity distribution in Tbilisi is managed by another private company, TELASI.

We recognised from the outset that the GCAP must take account of a number of other major stakeholders, including those above, to cover the full range of environmental issues.

2.3 Environmental Policy and Legislative Framework

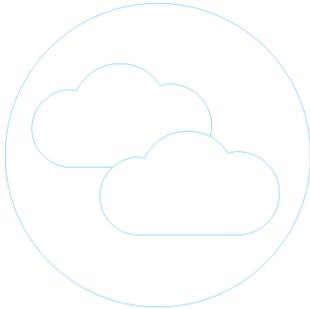
This section outlines the current state of policies and legislation in each of the main environmental areas. The Georgia National Environmental Action Programme (NEAP 2012-2016) sets out clear objectives for improving the environmental situation but does not create any new policies or legislation. A new NEAP for 2017-2021 is being prepared, led by the Ministry of Environment and Natural Resources Protection.

In addition a National Energy Efficiency Action Plan (NEEAP) is in the final stages of preparation and will be adopted later in 2017. This will cover a number of topics, which are relevant to the GCAP.

Much of the environmental legislation in Georgia is obsolete, with inconsistencies and gaps that cause problems with compliance. In 2014, Georgia signed an Association Agreement (AA) with the EU and roadmaps for moving towards EU standards in the environmental and climate change fields have been adopted. These also cover some actions, which are not directly required by the

¹ "Tbilisi Environmental Strategy 2015-2020" – Municipality of the Tbilisi City

AA, but will be useful for the implementation of the agreement. As a result, many new pieces of environmental legislation are being adopted or are in preparation.



2.3.1 Air

Current Situation

Historical data on air pollution levels in the City is unreliable because monitoring was based on old Soviet standards, though the data suggests very high levels of pollutants. More accurate data has been available since September 2016 when we installed three automated monitoring stations in the City. These early results again show levels of air pollution that exceed EU limit values.

We estimate that around 90% of the air pollution in Tbilisi comes from transport. Some measures have been implemented or are planned shortly to improve the situation including:

- Promoting the import of new low emission vehicles by reducing import taxes;
- Reinstating the scheme for annual vehicle inspections from January 2018;
- Building Park & Ride parking lots around the City to reduce the number of private cars entering the City centre;
- Extending the metro system;
- Purchasing CNG-fuelled buses (using a loan from EBRD).

Relevant Stakeholders

Monitoring of the ambient air quality in Tbilisi is the responsibility of the National Environmental Agency, which is part of the Ministry of Environment and Natural Resources Protection.

In common with other cities elsewhere in the world, solving emissions problems from transport is difficult because much of the pollution comes from private cars. Improving public awareness is therefore one strand for addressing the situation. The public transport system is operated by the Tbilisi Transport Company, which is directly owned by the City. We therefore have direct influence over public transport operations. Minibuses operated by a private company² represent 38 % of public transport journeys and the quality of their vehicle fleet is higher than that of the buses.

Relevant Legislation & Policies

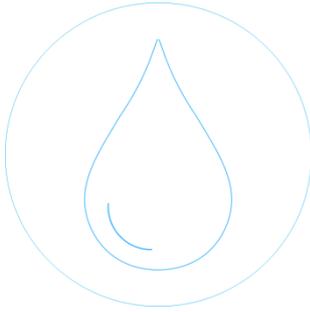
No specific national strategy or policy document focused on air protection currently exists in Georgia, though drafting of a new national Act on Air Protection is in progress. However, at an international ministerial conference³ in 2016 the Georgian Government adopted recommendations from the Ministry of Environment and Natural Resources for actions to improve the situation. These include commitments to:

- Develop new ambient air quality standards and improve existing air quality monitoring and assessment system;

² Tbilisi Microbuses Limited Liability Company

³ Eighth Environment for Europe Ministerial Conference (Batumi, Georgia, from 8 to 10 June 2016).

- Develop electronic air pollution reporting system from point sources;
- Reduce sulphur content in liquid fuels by establishing new fuel quality standards;
- Improve and renovate public transport in Tbilisi;
- Develop and publish a periodical report on national emissions into ambient air from different sectors;
- Provide on-line data on ambient air quality from automatic monitoring stations and quarterly reports on results of passive sampling campaigns;
- Promotion of electric vehicles and green driving techniques.



2.3.2 Water

Current Situation

A clean water supply is available to 100% of the population of Tbilisi. All commercial enterprises are metered but around 75% of households are not – these premises are charged on the basis of numbers of occupants. The distribution pipework is very old and losses are high – around 50%. Plans are in place to reduce these losses to 30% by the end of 2018 through a programme of pipework replacement and refurbishment.

There is only one waste-water treatment works operating for Tbilisi. This is situated on the Mtkvari River downstream of the City. However it has only first stage (mechanical) treatment though there are plans to upgrade to chemical treatment by 2018 and biological treatment by 2023.

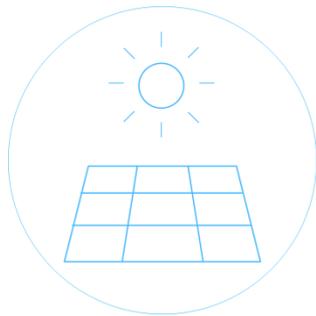
All domestic and commercial premises are connected to the main sewerage system but currently there is no treatment of industrial effluent, which is generally discharged directly to small rivers and water courses in the City. The Mtkvari River also has high levels of other pollutants caused by surface water run-off from roads, industrial sites and agricultural land around the City.

Relevant Stakeholders

Water supply, drainage and water treatment in Tbilisi is the responsibility of Georgia Water & Power (GWP). GWP is a private company and so is not directly controlled by Tbilisi City Hall.

Relevant Legislation & Policies

There is no national water policy document in Georgia and as a result, the current water management system lacks clear vision and consistency. The lack of comprehensive and harmonised legislation means that Georgia's water-related legislation is fragmented through a number of legal acts. However, a draft Water Resource Management Law is undergoing internal revision within the Government and is expected to be submitted to the Parliament for approval later this year.



2.3.3 Climate Change & Energy

Current Situation

Energy Supply

Electricity is supplied to around 524,000 premises in Tbilisi (including residential, commercial and industrial sites). All residents have access to a mains electricity supply. Currently around 65% comes from hydro sources and the remaining 35% from gas fired power stations, with the gas being imported mainly from Azerbaijan and Russia.

Around 85% of the City's heat energy is provided by natural gas with a smaller amount coming from electricity, wood and oil. Gas consumption rose by 76% from 2009-14, mainly due to the increased customer network, higher heating levels and reduced dependence on wood and oil for heating. Only 23% of homes have central heating systems from individual gas fired boilers – most buildings have individual room heaters and water heaters.

There is no district heating in Tbilisi as the system was dismantled after the Soviet era.

Energy Efficiency

Buildings energy efficiency standards in Georgia are low in comparison to EU standards, though there is a great deal of current activity by ourselves and others on improving this situation. As well as reducing energy bills. Better insulation standards in buildings will also contribute to the City's resilience by combatting stresses from hot and cold weather episodes. There is little or no information about energy efficiency in industry. This sector accounts for around 15% of energy use in the City, mainly from small and medium sized enterprises (SMEs).

Renewables

Although some 65% of electricity comes from renewable sources (hydro) we have virtually no small-scale renewable electricity installations – only two solar PV systems and one small hydro installation have been registered within the City. We believe that there is considerable scope for more solar PV and (probably) more small hydro.

Similarly we have very few renewable heat installations, though several demonstration solar thermal systems have been installed recently. We have scope for more solar thermal, biomass (using wood from forestry management) and possibly geothermal.

Relevant Stakeholders

Electricity generation and supply is the responsibility of private companies, primarily Georgia Water & Power (GWP), Enguri HPP and Energo-Pro Georgia. These companies operate three hydro power stations situated outside of the Tbilisi boundaries supplying the national electricity grid. GWP is looking to modernise another hydro power plant and increase the share of electricity generated from hydro. Electricity distribution in Tbilisi is managed by TELASI, a joint-stock company whose major shareholder is Inter RAO-UES JSC of the Russian Federation.

KaztransgasTbilisi is the City's main gas supplier, with over 95% of domestic and non-domestic customers. They also provide gas to a number of smaller companies for onward distribution.

Relevant Legislation & Policies

Our primary strategy document dealing with Climate Change and Energy in Tbilisi is the Sustainable Energy Action Plan (SEAP). This was completed in 2011 under the auspices of the Covenant of Mayors programme and was aimed at reducing CO₂ emissions in the City. The SEAP covers three main areas – Transport, Buildings and Municipal Infrastructure.

We have had two reviews of progress on the SEAP, in 2014 and 2016. They concentrate mainly on tracking changes in CO₂ emissions which, since the original SEAP show a significant (40%) increase in emissions, caused mainly by extension to the gas supply network (leading to higher use of gas for heating) and the increased use of private cars.

There are no updated national standards for buildings energy performance nor financial incentives to improve energy efficiency. However, in December 2015 the Georgian Ministry of Energy and the Danish Ministry of Foreign Affairs (DANIDA) signed a cooperation agreement on “Support for Energy Efficiency and Sustainable Energy in Georgia”. New energy standards for buildings covering both new construction and renovation of existing buildings will be developed under this project, which runs until 2020. It is anticipated that the forthcoming NEEAP will also cover these topics.

In addition several programmes are encouraging energy efficiency investments from the private sector. For example EBRD recently launched a project with the City that runs parallel to the GCAP - “Energy Efficiency Refurbishment of Public Buildings in Tbilisi” - this includes an overview of the situation and an investment plan for the renovation of the municipal building stock.



2.3.4 Solid Waste

Current Situation

All of the City’s households and most of our commercial enterprises receive a weekly (and sometimes daily) waste collection. The waste (around 1,000 tonnes per day, of which about 80% is organic waste) is disposed of at a new landfill site, which was constructed to EU standards. General waste from industrial premises is collected along with the municipal waste and taken to the new landfill. We have a separate landfill site for the disposal of construction and inert materials that was opened in 2016 and a storage area for hazardous waste outside of the City boundaries. However, we believe that some industrial waste (including hazardous waste) is either stored, dumped or burned on companies’ sites or on nearby brownfield land to avoid the waste collection charges levied on industry.

Currently we do not separate potentially recyclable materials either at source or at the landfill site, though a few private companies are operating small-scale recycling operations for paper, aluminium and glass.

Relevant Stakeholders

Waste collection and management in Tbilisi is under our direct control via the TbilService Group. The hazardous waste facility is managed by the Ministry of Environment and Natural Resources Protection.

We have recently signed a contract with a private company, KVD Georgia, to build a waste treatment and energy recovery facility at the new landfill site. The new plant will treat all of the

City's household waste via a Mechanical-Biological Treatment (MBT) system to transform the waste into 200 tonnes per day of high quality diesel oil (Euro 5 standard) plus bitumen. Metals, glass and PET bottles will be extracted prior to the MBT process and will be sold on international markets. KDV will not charge the City a gate fee and will meet the costs of operation from the sale of diesel oil and recyclables.

Relevant Legislation & Policies

The National Waste Management Strategy for 2016-2030 together with the National Waste Management Action Plan for 2016-2020 were published by the national Government in 2016. The Strategy aims to develop the Georgian waste management sector so that it is in accordance with the European waste management policy. The vision of the Strategy is for "Georgia to become a waste preventing and recycling society" by:

- Taking action on prevention, reuse, recycling and recovery of waste;
- Collection of all municipal waste in Georgia;
- Developing waste at source separation;
- Introducing Full Cost Recovery;
- Introducing Extended Producer Responsibility;
- Taking initiatives on specific waste streams of national concern;
- Establishing Private-Public Partnerships;
- Introducing incentives to meet the objectives of the Strategy.

The City believes that the new treatment plant will meet these criteria (though this has still to be agreed by the Ministry of Environment and Natural Resources Protection).



2.3.5 Land Use and Biodiversity

Current Situation

We have no up to date inventory of green spaces since no survey has been carried out since 1988. A new inventory would determine the extent and quality of green spaces, the variety of plant species in the City and would also provide information on the forested areas, most of which could be better managed to improve biodiversity.

We also need to remediate the extensive areas of brownfield land left over from closed industrial sites. Many of the brownfield sites are situated along the banks of the Mtkvari River and, if remediated could contribute to the provision of continuous green spaces and provide new recreational areas.

Currently we have no information on the nature or extent of soil pollution in the City, though there is anecdotal evidence that pollution has increased over the last few years (e.g. many green areas have been taken over by small industrial enterprises that are potentially polluting such as vehicle repair shops and petrol stations). At the moment we have no legislation in place, nor monitoring of soil pollution levels, to form a basis for improving the situation.

We have a number of NGOs in the City working with schools, producing magazines and TV articles and undertaking research. However, we recognise that communication and outreach to citizens on land use and biodiversity needs to be improved.

Relevant Stakeholders

All of the activity in this area is under the direct control of City Hall, though the involvement and cooperation of private developers and the general public will also be essential to make the necessary improvements.

Relevant Legislation & Policies

Land Use and Biodiversity are comprehensively covered in the Tbilisi Environmental Strategy 2015-2020, though taking the necessary actions has so far been limited by the budget available.

The Environmental Strategy suggests that investment is needed for:

- Sustainable landscaping and the creation of continuous green spaces to improve biodiversity and reduce flood risk;
- Replacing potable water that is being used for watering green spaces – this is expensive and not sustainable;
- Introduction of an online GIS web-based platform for the City to enable easier investigation and analysis of the environmental data, especially in the field of green spaces and the City's flora and fauna.

Many of the above topics are being addressed in a current project, the *“Tbilisi Land Use Concept”* which is being prepared by a private non-profit company (City Institute), which is working with our Department of Architectural Services. The objectives are:

- To protect the landscape in outer areas of the City (by restricting building);
- To re-integrate the Mtkvari River into the City with more recreational areas;
- To revitalise small rivers in the City, many of which are underground and built over;
- To reduce threats & improve resilience from flooding.

This project is in its final stages and a report will be published later this year. It should provide a valuable reference point for the GCAP, pointing to where investments should be made to improve the green infrastructure in the City.

All of this work in the Land Use and Biodiversity sector will link directly to the *“100 Resilient Cities”* project (see below).



2.3.6 Resilience

Current Situation

Tbilisi is particularly susceptible to flooding, both from the Mtkvari River and from surface water flowing down from the nearby hills during heavy rain. A severe weather event in 2015, exacerbated by a landslide, caused extensive flooding with the loss of 19 lives and severe damage to 160 homes. We are preparing a Flood Protection Plan, which will require investment in improved flood defences and sustainable urban drainage systems (SUDS) in new developments and major refurbishments.

We consider that other climate risks are less significant, though high temperatures during heatwaves can cause health problems amongst the more vulnerable members of our population, particularly the elderly and young children.

The City is also vulnerable to earthquakes, though this topic is outside of the scope of the GCAP.

Relevant Stakeholders

As with Land Use & Biodiversity, all of the activities in the Resilience area are under the direct influence of City Hall. However, once again the involvement of private developers and the general public is essential and we will also be drawing on the experience of other cities and assistance from the international institutions under the “100 Resilient Cities” Programme.

Relevant Legislation & Policies

There is no legislation covering Resilience but a Resilient City Strategy is being developed under the “100 Resilient Cities” programme and will provide links to city strategies elsewhere in the world. This new strategy will also cover the risks presented to the City by earthquakes. We have appointed a Chief Resilience Officer to oversee this work.

It is also worth noting that actions we intend to take within other sectors will have a direct influence on Resilience. For example:

- Improving the thermal insulation of buildings will reduce the vulnerability of occupants to cold weather in the winter and extreme heat episodes in the summer;
- Reducing leakage on the water supply system will reduce susceptibility to droughts;
- Rehabilitation of brownfield land will include sustainable urban drainage systems (SUDS) to reduce the risk of flooding;
- Improving the quality of our green spaces will reduce the ‘heat island’ effect, thus reducing heat stress for citizens during periods of very hot weather;
- Reforestation of the hills around Tbilisi will reduce the risk of landslides and torrential flooding.

These cross-cutting themes are recognised later in the GCAP development.

2.4 Previous Strategies & Plans

We recognised during the early stages of preparing the GCAP that there were already numerous strategies and plans in place or in preparation that are related to the environmental situation in Tbilisi and/or Georgia, and therefore of relevance to the GCAP. In order to avoid 'reinventing the wheel' we carried out an analysis of all of these documents. [Annex 2](#) provides a list of the documents examined, together with the date they were produced, by whom and a summary of the main findings.

The tables in the Annex clearly illustrate the number and variety of strategies and plans relating to environmental performance in Tbilisi, many of which have been prepared in the last two years. Whilst all have information that is relevant to the GCAP, the most important are:

Plan	Description	Sector
Tbilisi Environmental Strategy (TES)	Produced and adopted by the City of Tbilisi, setting out a clean plan of actions. The strategy is predominantly focused on land use and green spaces, along with some information on other sectors.	Land Use & Biodiversity
Morgenstadt Report	A recent, clear analysis of the environmental situation in Tbilisi. Its recommendations are mainly on 'soft' measures such as governance and awareness raising with only a few 'hard' investments proposed.	Comprehensive
Georgian Air Policy Review	An up-to-date picture of air quality nationally, and of the transport sector in Tbilisi and its impact on air quality.	Air / Transport
Tbilisi Sustainable Energy Action Plan (SEAP)	Sets out a clear plan of actions in the energy use (though not supply) sector. It is specific to Tbilisi and has been adopted by City Hall.	Energy / Buildings / industry / Transport
USAID Water Assessment Report	Provides a baseline position on water resources and usage (for Georgia).	Water
National Waste Management Strategy and Action Plan	Requires the production of a Waste Management Plan (WMP) for Tbilisi (and other municipalities) that is compliant with EU legislation. We will publish our own WMP later this year	Waste

Land Use and Biodiversity is not directly addressed by specific strategies and plans, though it is well covered in the Tbilisi Environmental Strategy.

New legislation from a national level is in preparation for most environmental areas and will provide a framework for action in Tbilisi. We recognise that there is no shortage of information on

what needs to be done – the emphasis now needs to be on overcoming the barriers to making it happen.

2.5 Summary

This overview of existing environmental policies and legislation and the current situation in Tbilisi supports and reinforces our view of priorities:

Existing Priorities	
Transport and its impact on air pollution, noise pollution and congestion	Transport
Improving energy efficiency in buildings (though industry also merits attention)	Buildings /Industry
Improvement of green spaces (which should include remediation of brownfield and contaminated sites).	Land Use & Biodiversity
Improving resilience to flooding and other climate risks	Cross-cutting

Additional areas of concern	
Increasing the use of small-scale renewable energy schemes for both electricity and heat	Energy / Buildings
Improving the water treatment systems to comply with EU standards	Water
Improving our waste collection systems in parallel with building the new waste treatment plant.	Waste

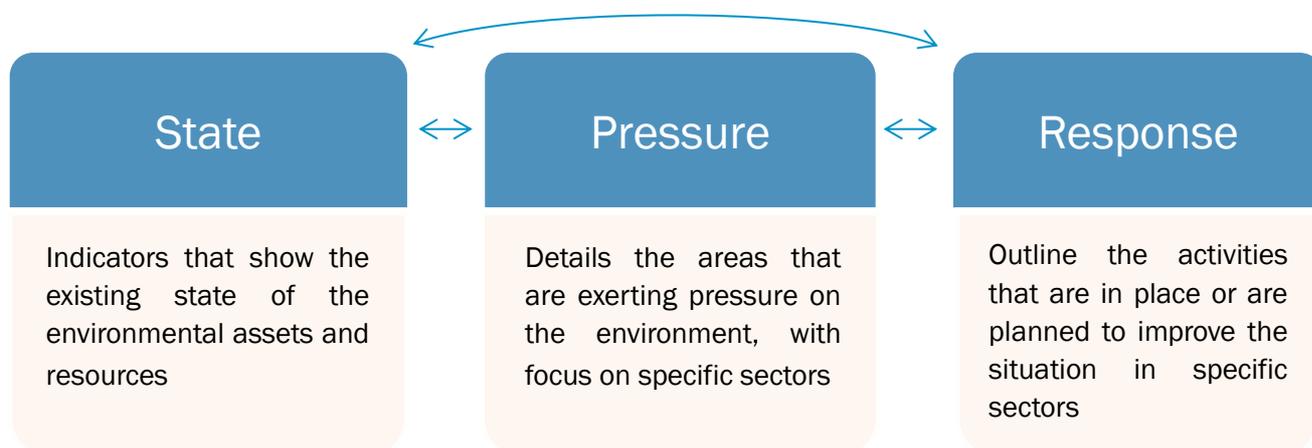
Although there are numerous strategies and plans relating to environmental issues both in Tbilisi and nationally, the current legislative framework is weak. However, new environmental policies are gradually being developed in order to meet Georgia’s aims of implementing legislation that is compliant with EU standards and legislation will gradually be introduced to achieve these aims. The GCAP will help Tbilisi to achieve its environmental objectives based on a thorough understanding of current environmental performance, prioritising actions, identifying potential investment opportunities and providing access to additional finance.

3 Benchmarking – Analysis of Environmental Indicators

In the previous sections of this report we have presented a mainly qualitative picture of the environmental situation in Tbilisi. Examination of Environmental Indicators provides a quantitative analysis of environmental performance measured against international standards.

The GCAP Methodology developed by EBRD details a means of assessing the environmental situation through ‘State’, ‘Pressure’ and ‘Response’ (SPR) Indicators. These indicators seek to provide a holistic assessment of urban environmental performance, with the understanding that performance in one area (e.g. ‘State’) is influenced by performance in another (e.g. ‘Response’).

GCAP Pressure State Response Framework



The Methodology uses a ‘traffic light’ system (red, amber, green) to provide an initial impression of where our environmental performance is poor (red), where some improvement is needed (amber) and where it already meets international standards (green). We have also tracked trends in performance where we have the data.

The Methodology suggests the use of 35 ‘Core’ indicators to provide an overall picture but, recognising that the data for all of these indicators may not be available, also provides a further 51 ‘Optional’ indicators that can be used as substitutes for the ‘Core’ indicators (i.e. a total of 76 indicators). We have collected data for 32 of the ‘Core’ Indicators and for over 60% of the ‘Optional’ indicators.

Detailed summaries have been prepared for all of the core indicators showing the benchmarks, sources of data, any estimates or calculations used, trend data and links to further information. These detailed summaries are presented in [Annex 3](#).

Summaries of the indicators analysis are shown and discussed in the following sections, including the ‘red’, ‘amber’, ‘green’ status and an indication of the trend (positive, stable, negative) where data is available. ‘Core’ indicators are whole numbers (1, 2, 3...), while ‘Optional’ indicators – being indicator data that provide additional insight in the same indicator area – are denoted as decimals (1.1, 2.1, 3.1...).

3.1 ‘State’ Indicators

The ‘State’ indicators cover Quality of Environmental Assets, Availability of Resources and Climate Change Risks. The summary tables are discussed below.

The “State’ indicators where the assessments show we have the biggest environmental challenges are:

Main areas of concern – ‘State’	
Total Suspended Particles (TSP) including concentrations of PM _{2.5} and PM ₁₀	Air
Ammonia concentrations in the Mtkvari River	Water
Green space per head of population	Land Use
Economic damage from floods and earthquakes	Resilience

Data on concentrations of PM_{2.5} and PM₁₀ are not available before September 2016 as only concentrations of TSP (total suspended particulates) were being monitored under the old system. These show extremely high values. We have now installed three automated monitoring stations which still show average values well above the benchmark for PM_{2.5} and PM₁₀. The original data shows worsening trends of both SO₂ and TSP, mainly due to the increased use of diesel vehicles.

The Water Exploitation Index could also be used as a Resilience Indicator. However, the index shows that only 4.5 % of available renewable freshwater resources are currently being extracted in Georgia so drought is not a major climate risk for Tbilisi.

By contrast the total area of green spaces in the urban areas of the City has declined over the last 15 years and this will contribute to increasing heat stress during periods of hot weather.

Although the annual GHG emissions per capita and per unit of GDP are low for Tbilisi, these values are heavily influenced by the fact that most of our electricity is supplied from hydro with zero emissions. These indicators do not therefore point towards high levels of energy efficiency nor of the use of other renewable energy sources.

Further information on the Resilience indicators will be available later this year from the “100 Resilient Cities” project.

These findings are in line with the priorities we expressed at the outset of the GCAP preparation.

3.2 ‘Pressure’ Indicators

The ‘Pressure’ indicators measure the activities that are the main causes of our environmental challenges. They cover Transport, Buildings, Industry, Energy, Water, Solid Waste and Land Use.

According to the analysis above the main areas responsible for putting pressure on the environment are:

Main areas of concern – ‘Pressure’	
The age of the vehicle fleet (especially private cars) coupled with the lack of fuel standards, the numbers of vehicles per household and the low presence of bus and cycle lanes	Transport
The high levels of electricity consumption in buildings together with the absence of green building standards and other environmental certifications;	Buildings
Water consumption per capita (which is closely linked to leakage on the water supply network – non-revenue water)	Water
Low levels of recycling or composting of municipal waste	Waste
The absence of any recycling of industrial waste or use of ‘grey’ water in industry	Industry

Transport

The summary table shows that air pollutants from Transport are mainly due to the age of the car fleet, the number of cars per household and the fact that national fuel standards for cars and light vehicles only comply with EURO 4 (EURO 6 is classed as ‘green’). There are around 400,000 cars registered in Tbilisi of which 74% were over 15 years old according to 2013 data.

More information on the Resilience of our transport systems will be gathered as part of the “100 Resilient Cities” project.

Buildings

We have no floor area data for non-residential buildings but the indicators for residential premises indicate low levels of efficiency for electricity usage and average for heat, though we believe the latter may be partly due to under-heating of dwellings in many cases.

Industry

The availability of data for Pressure indicators in industry is relatively sparse and in some cases masks the true situation. For example: electricity consumption has been estimated

from national data; the 'green' rating for the share of renewable energy is almost all due to the hydro-electricity supply; the 'green' rating for wastewater treatment masks the fact that there is no chemical or biological treatment.

Although no data is available on heavy metals emissions from industry, the figure will be low because of the nature of industrial enterprises in the City (i.e. mainly SMEs).

Energy

Access to the natural gas network (the main source of heat energy) is available to over 95 % of the population. Because most households have individual gas heaters we have no plans to reinstate the district heating systems in Tbilisi.

A large proportion of Tbilisi's renewable energy is from the hydro-electric stations – energy from other renewable sources (mainly wood for heating) is around 10% of the total. Apart from this there are few other renewable energy installations.

Water

The 'red' benchmarks for water consumption per capita, per unit of GDP and for non-revenue water are mainly due to the high level of losses (around 50%) in the water distribution network. 100% of residential and commercial wastewater is treated, but only mechanical treatment is used at present.

Despite the damage to 160 homes during the 2015 floods, this is still in the 'green' category by international standards

Solid Waste

Solid waste generation per capita in Tbilisi is close to the average for similar cities. Although we have little recycling at present, the planned new waste treatment centre will include segregation of metals, glass and PET bottles as well as energy production.

The expected lifetime of the new landfill site is 18 years with no recycling but will be much longer than this (in excess of 50 years) with the new waste facility.

Land-Use

Data availability for the Land Use indicators is relatively sparse but will be improved when the "*Tbilisi Land Use Concept*" project is completed. In general these indicators do not adequately reflect the problem of decreasing areas and quality of green spaces in the City.

These conclusions reflect some of our expressed priorities (e.g. transport and energy in buildings) but do not address areas such as improving green spaces.

Several of the indicators within the individual sectors are also important for Resilience. These include: Resilience of transport systems (Indicator 13); Heating/cooling consumption in buildings (Indicator 15); Resilience of the electricity network to climatic extremes (Indicator 24); Resilience to floods (Indicator 28). This reflects the cross-cutting nature of Resilience issues and also the close linkages between the GCAP and the "*100 Resilient Cities*" project.

3.3 'Response' Indicators

The information below in the "Response" indicators provides a snapshot of our current and planned responses to dealing with the environmental challenges of the City.

The areas where response to the challenges are absent or need significant improvement are:

Main areas of concern – 'Response'	
Promoting the use of public transport through awareness campaigns and measures such as 'smart' traffic management systems	Transport
Introducing building standards for energy efficiency	Buildings
Introducing regulations and standards in industry for energy efficiency of processes and equipment, waste recycling and reuse, and use of 'grey' water	Industry
Introducing incentives and awareness campaigns to promote the use of small-scale renewable energy technologies	Energy
Improving recycling of solid waste through technology investments (in progress) and awareness campaigns	Waste
Improving resilience to flood risks and other climate related pressures	Cross-cutting

Transport

We recognise that improving air pollution from transport is a priority for us. A start has been made by incentivising the import of low emission vehicles and, from 2018, re-introducing annual inspections for vehicles covering both safety and emissions aspects. We are also making improvements to the public transport systems through extensions to the Metro and the purchase of new buses and mini-buses.

Up to now we have not run any public awareness campaigns aimed at increasing the use of public transport or for cycling and walking. We also need to increase the use of smart technologies to manage traffic flows in the City centre. Improvements in emergency management of the public transport system are also needed and will be examined in the "100 Resilient Cities" project

Buildings

We have no green building codes in Tbilisi nor incentives to construct building to internationally recognised standards such as BREEAM/LEED. This is likely to change after the publication of the NEEAP in 2017. There is a lot of interest in improving energy efficiency in buildings, encouraged by programmes such as that recently funded by EBRD, and this is one of our stated priority areas for the City.

Industry

There are no regulations or financial incentives that encourage the improvement of energy and resource efficiency of industrial processes and machinery, though some national programmes (e.g. those supported by DANIDA) are aiming to address this. Some other international energy efficiency programmes include industry but the emphasis is far less than for buildings.

Energy

The electricity distribution system covers all of Tbilisi and gas is available to 95 % of the population. The gas network is gradually being extended to the remaining 5%. There are no incentives for developing or installing renewable energy technologies either through regulatory/financial measures or through awareness campaigns. Some of the international programmes are promoting renewables.

The extent of damage to the electricity networks during the 2015 flood, and its general resilience will be explored in the “100 Resilient Cities” project.

Water (supply, sanitation, drainage)

Charging for water consumed is regulated but improvements still need to be made on metering of households (currently 25% coverage). Losses from the water distribution network are high at around 50% but action is being taken to reduce this to 30% by 2018. These investments will also improve the quality of drinking water. There are no awareness campaigns that encourage water saving or reuse.

All buildings are connected to the sewerage system but wastewater is not separately billed even for commercial enterprises. Improvements to the treatment of wastewater are planned but will not be fully implemented until 2023.

Solid waste

Improvements to our waste collection systems have been made in the last few years and landfill capacity has been rationalised by closing old landfills and opening the new landfill built to EU standards. We will develop a new Waste Management Plan during 2017 in accordance with the National Waste Management Strategy.

We currently have no facilities or incentives to encourage recycling or composting, nor any awareness campaigns covering these topics or waste minimisation. However, the new waste to energy facility planned at the main landfill site will include segregation of some materials (metals, glass, plastic bottles) to be sold on international markets. This new facility will eliminate the need for segregation of recyclables at source.

There is existing legislation to discourage littering and fly-tipping but we need improved enforcement.

Land-Use

There are regulations and a permitting system in place to control construction density, though we need to improve the regulations to promote transit-orientated development and to provide incentives for mixed-use developments.

Generally the indicators analysis supports our initial view of the priority areas we need to address. It is also clear that the GCAP needs to take account of three main areas – legislation, improving public awareness and investment measures:

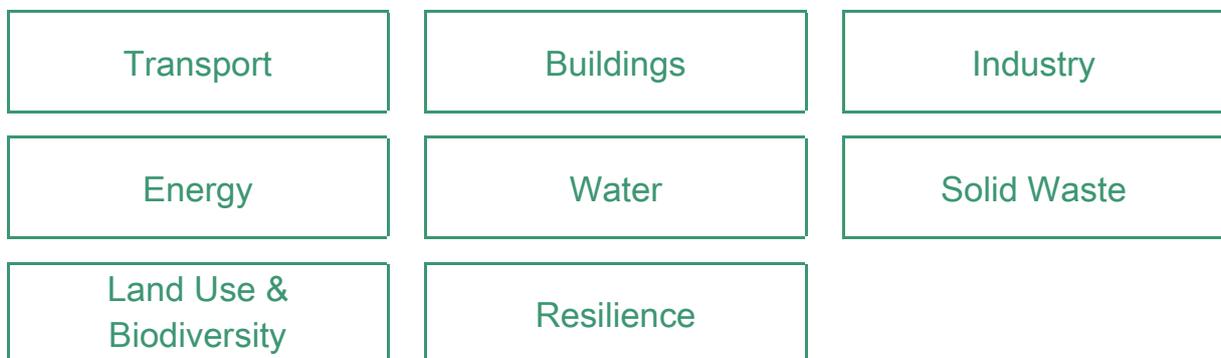
- **Legislation.** New legislation is being prepared at a national level in most environmental areas – certainly covering Air, Energy Use (especially in buildings), Water and Waste. This legislation will of course include Tbilisi and some of the legislation will require transposition into local plans (e.g. the National Waste Management Strategy requires the preparation of local Waste Management Plans).
- **Public Awareness.** Public awareness campaigns as a means of improving environmental performance have not been a feature of our activities to date. Some NGOs and small companies are working in this area but much more needs to be done. The recent Morgenstadt Report provides a number of recommendations in this area which we intend to follow up, where appropriate drawing on experience from other cities and countries.
- **Investment Measures.** The indicators analysis highlights the areas where investment is needed. Other recent documents such as the Tbilisi Environmental Strategy and the SEAP (and almost certainly the forthcoming NEEAP) reinforce this message. Our challenge is to agree which of these projects are the highest priorities and to determine sources of finance to implement them.

The following sections include the discussions we have held with other stakeholders to prioritise of the areas to be addressed and the actions required, taking into account not only the environmental dimension but also the financial, political and social implications of each measure.

GREEN CITY ACTION PLAN

4 Methodology

In this Section we briefly describe the Methodology we employed to arrive at the final set of Measures that will form the Green City Action Plan for each of our priority sectors:



The Methodology builds on the Green City Baseline developed in the preceding Sections and so takes into account:

- The current situation and previous strategies and plans produced for each sector (Section 2);
- The results of the Indicators Analysis (Section 3).

We have also undertaken extensive consultations with City Departments, National Government bodies, external stakeholders (private companies, industry bodies, NGOs, independent local and international experts) and the general public to arrive at a GCAP that is realistically possible to achieve within the constraints of the City's budget and other resources.

4.1 Areas of Influence

In addition to the analysis and the stakeholder consultations our final priorities were influenced by the areas in which the City has the most freedom to act. The table below illustrates for each sector where we have a significant level of direct influence (in green), where we have some direct influence but also need to work with other partners (in blue) and where we have less direct influence and are more reliant on other partners to implement the measures (in orange). We have also identified the other important local actors for each sector.

Table 4.1 Areas under the Direct and Indirect Influence of City Hall

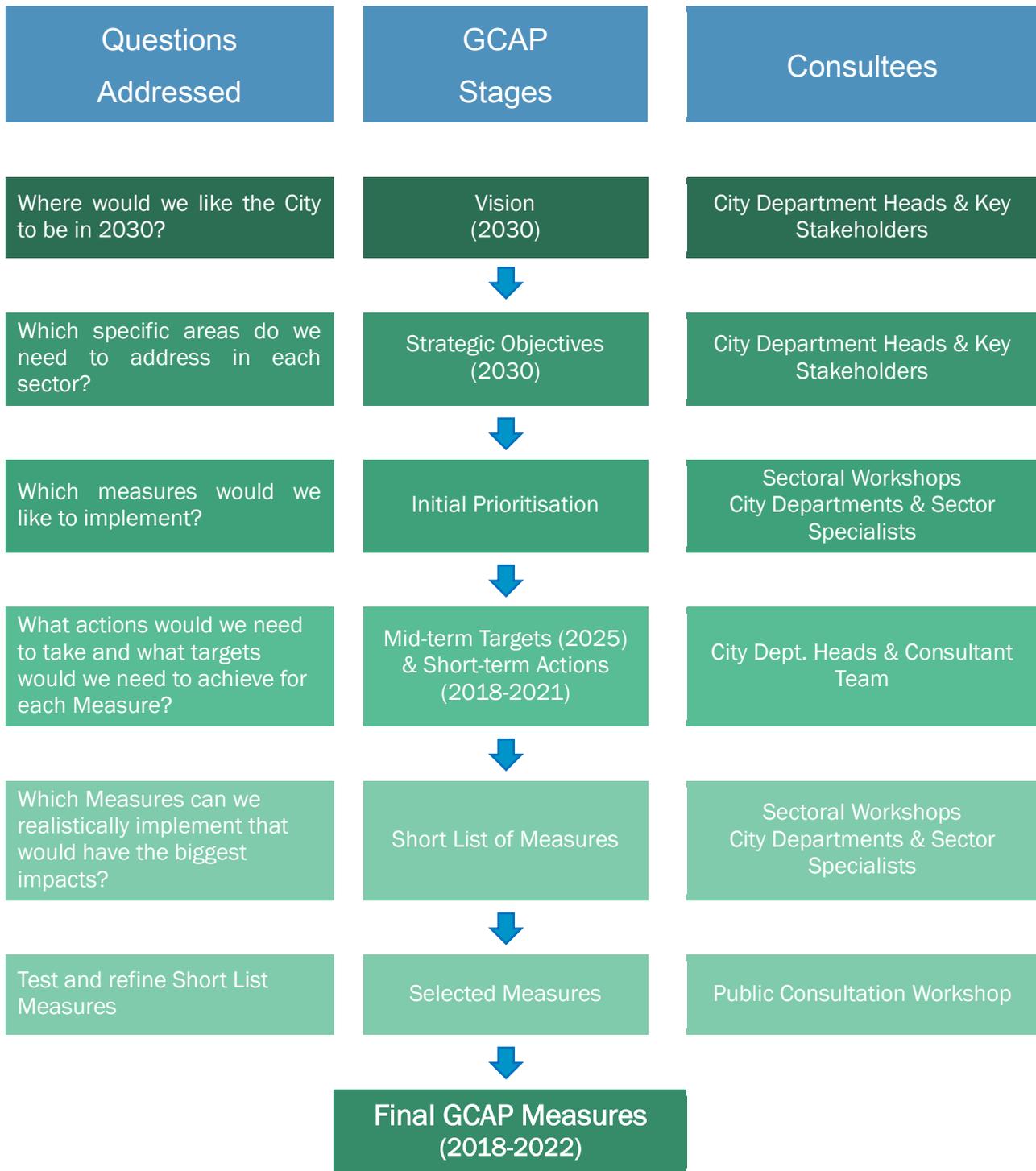
Sector	Direct Influence	Indirect Influence	Other Local Actors
Transport	Bus fleet; Minibuses; Taxis; Transport Infrastructure	Private Cars	Tbilisi Transport Company; Minibuses Company; Taxi Owners
Buildings	Municipal Estate	Private Buildings; Residential Blocks	TELASI; Building Owners' Associations; Private Individuals
Industry	Local Regulations	Industrial Enterprises	Georgia Employers Association; Georgian Chamber of Commerce & Industry; Business Owners
Energy	Landfill Gas Generation	Small-scale Renewables	TbiliService Group; TELASI; Georgia Water & Power
Water	Pipework Maintenance;	Pipework Installation & Refurbishment; Wastewater Treatment Plant; Wastewater Legislation	Georgia Water & Power
Solid Waste	Collection; Treatment; Regulation	Industrial Waste	TbiliService Group; KDV
Land Use & Biodiversity	Green Spaces; Biodiversity		Land Owners
Resilience	Flood Defences; Earthquake Protection		100 Resilient Cities Group; Private Individuals

Key: Green = significant direct influence; Blue = some direct influence; Orange = little direct influence

The measures will also be underpinned by national organisations such as the Ministry of Environment and Natural Resources Protection, National Environmental Agency and Ministry of Energy who are responsible for developing legislation and producing national plans such as the NEEAP and the Waste Management Code.

4.2 Stages in GCAP Development

Based on this knowledge the Methodology followed the logical steps illustrated in the diagram below, which also shows the questions addressed at each stage and the main consultees and consultation mechanisms.



In the above process the **Vision** is a qualitative overarching aim for what we would ideally like the state of the City to be by 2030.

We then consulted on which specific areas we would need to address in each sector (e.g. the public road vehicle fleet for the Transport sector; wastewater treatment for the Water sector) to arrive at a set of **Strategic Objectives**. These are long-term targets that start to operationalise the City's actions to build toward the Vision.

These first two steps mainly involved the relevant City Departments and a few other Key Stakeholders (e.g. GWP for the Water sector).

We then held a series of Sectoral Workshops/Roundtables with a wider group of stakeholders during which we developed the **Initial Priorities** for Measures that we would like to implement. This step was prior to considering the implementation costs and wider impacts and could be considered as our 'Long List' of potential Measures. These **Initial Priorities** are discussed in the following Sections for each sector.

The next stage took place mainly between the City Departments and the consulting team. It comprised further detailed analysis of the Strategic Objectives to develop a set of **Short-term Actions (2018-2021)** and the **Mid-term Targets (2025)** required for each 'Long List' Measure. This provided valuable insights into what was realistically possible and formed the basis for the next step. The results of this analysis are shown in [Annex 4](#).

We then held a second round of Sectoral Workshops/Roundtables where the 'Long List' of Measures was discussed in more detail. This included consideration of capital and operational costs for each Measure plus their level of impact (high, medium, low) on the environmental indicators, economic growth and social improvements. This enabled us to produce a 'Short List' of Measures that could be included in the final GCAP with a high degree of confidence that they could realistically be implemented. The results of this analysis of Measures are included as [Annex 5](#) and Summarised in [Annex 6](#).

Finally, in order to test the practicality and acceptability of the selected Measures we held a **Public Consultation Worksop**. This event was held at the Czech Embassy and was attended by 18 delegates from City Hall as well as 47 other stakeholders, including representatives from National Ministries, Universities, NGOs, the private sector, business and household associations, and our two arms-length companies Tbilisi Transport Company (TTC) and TbilService Group (TSG). The outcomes of the workshop were a set of Measures agreed by all stakeholders and refined in terms of likely costings and timescales for implementation. Further details of the workshop are included in [Annex 7](#).

This detailed analysis and extensive consultation has allowed us to develop a GCAP that is realistically achievable by 2030 given the resource constraints of the City but which will have maximum positive impacts on the City's environment, economic development and social inclusion. The outcomes of this process are presented for each sector in turn in the following Sections of this document.

5 Transport



Transport is one of the key areas for strategic development of our City. It has a dominant impact on local air quality and noise levels and significant impacts on economic growth and social inclusion.

The city transport system of Tbilisi is an interactive combination of the following elements:

- *Road vehicle fleet* (buses, minibuses, light and heavy duty vehicles, private cars);
- *Transport infrastructure* (roads, metro, cable railways, bicycle paths, walking areas);
- *Transport management/organisation* (including parking policy);
- *Passenger expectations and experience.*

We estimate that around 90% of air pollution in the City comes from Transport, with diesel-powered vehicles being a more major contributor, as most of our buses and all mini-buses and taxis use diesel. Improving traffic flows in the City will also reduce pollution levels as well as congestion. We acknowledge the desire of our citizens to own and drive their own vehicles, but believe improving the quality of our public transport network will make it a more attractive option and reduce the number of cars in the City centre.

Following the GCAP methodology, we developed a Vision, Strategic Objectives and list of Specific Measures to address the City's most pressing environmental challenges for Transport. Our consultees for this sector included national authorities (Ministry of Environment and Natural Resources Protection, National Environmental Agency, Land Transport Agency), Tbilisi Transport Company, NGOs and independent local and international experts.

The outcomes are presented below in the order of the Vision, Strategic Objectives for each identified priority area, Measures to achieve these objectives, and detailed descriptions of each of the Measures. For more detailed information on the outputs, please see [Annexes 5 and 6](#).

5.1 Vision and Strategic Objectives

Our Vision and Strategic Objectives for Transport are as follows.

5.1.1 Vision

Vision

To Develop a Sustainable City Mobility System

Our Strategic Vision of a **Sustainable City Mobility System** envisages an efficient, attractive, user-friendly and competitive public transport system based on the bus network, together with other transport modalities. This will include a public road vehicle fleet with low levels of emissions and noise, high levels of safety, extended possibilities for non-motorised transport, an optimised road infrastructure network with prioritisation of public transport and an optimised traffic management system.

5.1.2 Strategic Objectives & Priorities

To achieve the Vision we have developed the following Strategic Objectives and identified priority areas within each Objective. All of the Objectives and priority areas address the over-riding aim of reducing the impact of transport on air quality and so improving the indicators for PM_{2.5}, PM₁₀ and Total Suspended Particulates (TSP) as well as reducing energy usage and associated CO₂ emissions.

Strategic Objective

1

A Sustainable Urban Mobility Plan (SUMP) which represents an “umbrella” for the implementation of strategic objectives 2, 3 and 4

The Sustainable Urban Mobility Plan (SUMP) will be the umbrella document for improving mobility around the City. It will include feasibility studies of priority projects and will be coordinated with the Tbilisi Sustainable Urban Transport Strategy. Ultimately, it will lead to a reduction in harmful emissions to the air as well as improved access to, and better quality of City transport services.

Strategic Objective

2

Public road vehicle fleet with low levels of emissions and noise and high levels of safety

Bus fleet. Obsolete diesel fuelled buses represent the major source of PM₁₀ and PM_{2.5} emissions in Tbilisi. **We plan to continue to replace obsolete buses by new vehicles together with optimisation of the new fleet to match the local demand for transport.**

Minibuses. Although the minibus fleet is “younger” and has better emissions standards than the buses, their presence increases the density of traffic and their emissions are significant. **We plan to reduce the number of minibuses and to replace them with new buses.**

Taxis present a problem owing to their high number, poor technical condition and insufficient regulation. **We plan to introduce regulation in this segment of transport.**

Private cars. We have less ability to act in this area but we are ready to make use of those measures that are available to us. However, because of the of fuels used (less than 3 % diesel, almost 30 % CNG).We consider this segment not crucial to improving air pollution.

Modal Share. Given that private vehicle replacement depends on the general economic situation and is likely to take a long time, our approach will focus on **improving the efficiency, safety and comfort of the public transport system.** In the longer term, we would also like to introduce trams, to extend the Metro and cable railway, and to promote electric vehicles. Some feasibility studies are already under way (see below).

Strategic Objective

3

An optimised transport infrastructure network with prioritisation of public transport on roads

Even though Tbilisi's road network has been extensively developed in recent years, further extension and enhancements are planned (e.g. an additional bridge over the Mtkvari River).

We intend to introduce a strategy to **prioritise road use for public transport**. Currently there are dedicated bus lanes on three main streets in the City and we plan to introduce two more. Alternative transport modes such as cycling also need to be promoted. A new metro station is being opened and studies on the extension of cable car lines and on the introduction of tramway lines are in progress.

Strategic Objective

4

An optimised City traffic management system including all achievable features of an Intelligent Transport System

We have started working on an integrated approach to **road** transport. An efficient and effective Traffic Management System will improve traffic flows and lead to reduced **air and noise** emissions and improved air quality in the City.

5.2 Green City Measures

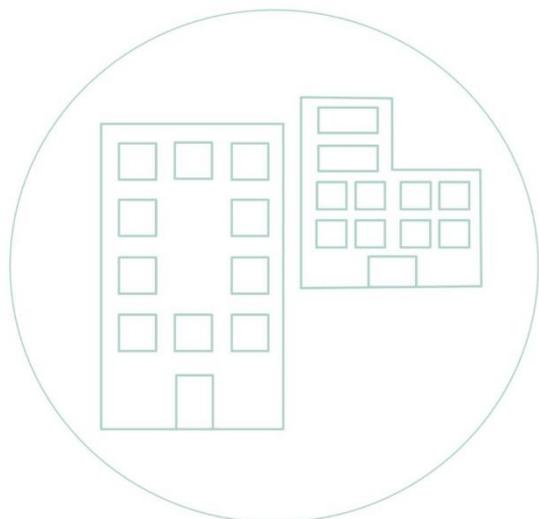
Taking into account the above priorities, future budgetary requirements, the capacity of the City to implement the actions and also their social and economic, as well as environmental impacts, the following Measures were selected as the most appropriate for the Green City Action Plan.

The table below shows the Measure, the relevant Strategic Objective, the Mid-term Targets, the organisations responsible for implementation, the timescale and potential funding sources. Further details of each Measure are provided in Section 5.3 following the table.

Table 5.1 – Green City Measures, Relevant Strategic Objective, Mid-term Targets, Timescales, Costings and Funding Sources for the Transport Sector

No	Green City Measures	SO	Mid-term Targets (2025)	Implementing Body	Timescale						Potential Funding Sources
					2018	2019	2020	2021	2022	2023+	
T1	Development of Sustainable Urban Mobility Plan (SUMP)	S01	SUMP implemented	City Hall (Transport Office); Tbilisi Transport Company (TTC)							City Budget; International Donors (Technical Assistance)
T2	Bus Fleet Renewal	S02	A bus fleet of low emission buses is in place. The number of minibuses is reduced to be replaced by additional buses	City Hall (Transport Office); Tbilisi Transport Company (TTC)							EBRD loan; Other International Donors
T3	Bus Network Restructuring	S03	Existing bus routes restructured to prioritise buses	City Hall (Transport Office); Tbilisi Transport Company (TTC)							City Budget
T4	Traffic Management System	S04	A traffic management system is in place. Optimised parking policy implemented	City Hall (Transport Office)							City Budget; International Donors
T5	Surface Transport Network Feasibility Studies	S03	Feasibility studies for new cable-ways, extended Metro and tram system completed	City Hall (Transport Office)							City Budget; International Donors (Technical Assistance)
T6	Regulation of Taxis	S02	Regulatory framework for taxis is in place	City Hall (Transport Office); Taxi Operators							City Budget

6 Buildings



Tbilisi City Hall recognises that there is a substantial potential for energy efficiency improvements in both municipal and private buildings in the City.

Improvement of energy efficiency in municipal buildings is a priority for the City. It is clear from the indicators analysis that both electricity and heat intensity (kWh/m²) in buildings is high by international standards and that there is no buildings energy certification. Initiatives and programs in this area will lead to a long-term commitment to improve energy efficiency across the whole of the building stock. In addition to addressing the municipal estate, we also need to encourage improvements in the energy efficiency of the residential sector, including both equipment (e.g. boilers, lighting, appliances) and thermal properties of the buildings. We also need to increase the use of renewables technologies (particularly solar PV in both public and private buildings).

To support the adoption of energy efficiency measures in Georgia's buildings (along with other sectors) the Ministry of Environment is currently developing a National Energy Efficiency Action Plan (NEEAP) as a tool to unlock the potential for development of improved energy use across all sectors. Currently the NEEAP is in the final stages of preparation and is expected to be **adopted** by the end of 2017. The relevance of this document to the Buildings sector in the GCAP is mainly in the following areas – new standards for energy efficiency in buildings (for renovation and new construction), energy performance labelling and introduction of energy management practices including benchmarking.

We have developed a Vision, Strategic Objectives and list of Specific Measures to address the City's environmental challenges for Buildings. Our consultees for this sector included City departments (Economic Development Office, Property Management Agency) national authorities (Ministry of Energy, Georgian Chamber of Commerce and Industry), private companies (TELASI - electricity operator), NGOs, other stakeholders (e.g. representatives of Home-owner Associations) and local experts.

The outcomes are presented below in the order of the Vision, Strategic Objectives for each identified priority area, Measures to achieve these objectives, and detailed descriptions of each of the Measures. For more detailed information on the outputs, please see **Annexes 5 and 6**.

6.1 Vision and Strategic Objectives

Our Vision and Strategic Objectives for the Buildings sector are as follows.

6.1.1 Vision

Vision

Tbilisi's buildings provide pleasant, comfortable and functional spaces without wasting energy

The City's commitment to energy efficiency is clear. Our vision for Buildings is that they provide pleasant, comfortable and functional spaces using modern and 'green' technologies with low maintenance requirements.

Energy efficiency in buildings (public and residential) covers innovations applied to each area of building energy services in an integrated fashion, including small-scale renewable systems (e.g. solar PV and heat pumps), the building envelope, lighting, heating, ventilation and air conditioning technologies. Success will require a defined policy and measures that are implemented efficiently and consistently.

6.1.2 Strategic Objectives & Priorities

Strategic Objective

1

Proactive and informed municipal government leadership in energy efficiency covering renovation measures with energy performance standards and the use of renewables

Energy Efficiency in Public Buildings. Improvement of energy efficiency in municipal buildings is a priority for the City. Initiatives and programs in this area will lead to a long-term commitment to achieve energy efficiency at a large scale. Efficient building energy management systems (BEMS) providing data about the buildings' specific energy consumptions are a key component for decisions to be made on energy efficiency project financing.

Residential Energy Efficiency. Outside of the municipal estate we also need to encourage improvements in the energy efficiency of the residential sector, including both equipment (e.g. boilers, lighting, appliances) and thermal properties of the buildings. We will achieve this through consultations with building owners' associations and landlords, possibly using established financing mechanisms already used for general building refurbishments.

Renewable Energy Systems. In both the municipal estate and the residential sector, we will also work to incentivise and promote the use of small-scale renewable energy systems (especially solar PV). This will be done in close cooperation with the electricity distribution company, TELASI, to ensure that local networks are capable of supporting this localised generation.

Data driven informed decisions supporting leadership in energy efficiency objectives with reliable data on energy consumption, tariffs, condition of building services and investment costs.

To achieve this objective we will develop a Municipal Energy Management System (EMS). Energy consumption and the associated value of efficiency savings can be difficult to communicate due to imperfect metering and data availability for both municipal and private owners, as well as due to uncertainty about future energy prices. The EMS will help to alleviate this problem. Measured energy consumption data needs to be benchmarked with new and renovated buildings to show real achievable savings converted into monetary terms. There is also potential to increase awareness and uptake in the municipal, residential and commercial markets by emphasising non-energy benefits such as increased comfort, improved health and environmental benefits in addition to reduced energy costs.

We have no consolidated register of municipal buildings which includes the condition of building structures, the condition of heating/cooling systems, building areas, building project design, etc. Also, information about energy performance (including energy consumption) and energy bills in buildings is lacking. Residents and building owners need simple access to understandable, reliable information, as well as consistent engagement with qualified service providers.

We need to create a clear record of success in achieving cost effective energy savings, through improvement measures, standards and direct procurement of efficient equipment. This will encourage and assist less- efficient buildings to improve their performance.

We also need to support the development and employment for every level of profession (consultants, designers, installers) involved in energy efficiency improvements. This will entail a high-level curriculum to increase efficiency- related knowledge, skills and abilities. We also need to adopt minimum certification requirements for firms and workers in the major building sectors.

6.2 Green City Measures

Taking into account the above priorities, future budgetary requirements, the capacity of the City to implement the actions and also their social and economic, as well as environmental impacts, the following Measures were selected as the most appropriate for the Green City Action Plan. Details of the analysis of Measures for the Buildings sector is included in [Annex 7](#).

The table below shows the Measure, the relevant Strategic Objective, the Mid-term Targets, the organisations responsible for implementation, the timescale and potential funding sources. Further details of each Measure are provided in Section 6.3 following the table.

Table 6.1 – Green City Measures, Relevant Strategic Objective, Mid-term Targets, Timescales, Costings and Funding Sources for the Buildings Sector

No	Selected Measures	SO	Mid-Term Targets (2025)	Implementing Body	Timescale						Potential Funding Sources
					2018	2019	2020	2021	2022	2023+	
B1	National Energy Efficiency Action Plan (NEEAP)	S01	NEEAP completed and used for improving energy efficiency in the building stock	City Hall (Economic Development Office); Ministry of Energy							National Government
B2	Minimum Technical Requirements for Buildings	S01	Minimum technical requirements for new construction and major renovation of buildings in place	City Hall (Property Mgt. Agency); Ministry of Energy							City budget; National government; IFIs & donors
B3	Rehabilitation of Municipal Buildings	S01	Thermal rehabilitation of Municipal buildings completed	City Hall (Property Mgt. Agency); Building owners & co-operatives							City budget; IFIs & donors
B4	Use of Renewable Energy	S01	Renewable energy technology installations in municipal and other buildings ongoing	City Hall (Property Mgt. Agency); Building owners & co-operatives; TELASI							City budget; IFIs & donors; Private sector
B5	Municipal Energy Management System	S02	Municipal Energy Management System implemented	City Hall (Economic Dept. Office)							City budget; IFIs & donors

7 Industry



We recognise that the industrial and commercial sectors contribute to the environmental state of the city, and so our strategic vision is that Tbilisi businesses meet high environmental standards. We have limited direct influence in this area and so will need to work with business organisations such as the Georgian Employers Association (GEA) and the Georgia Chamber of Commerce & Industry (GCCl) as well as the businesses themselves. Most businesses in Tbilisi are SMEs. Food and beverages production is the main industrial sector but there are lots of small engineering companies and vehicle repair shops as well.

The assessment of the Industry sector has shown that our businesses have low levels of knowledge about environmental performance, standards or improvement measures, and there is little support available. Industry representatives have also identified that an inability to meet international environmental standards will affect the ability of businesses to compete in the international market. The GCAP baseline analysis shows that industrial waste and wastewater treatment are also areas for concern, and the lack of data on energy highlights the poor understanding of the environmental impact of this sector.

To respond to these challenges, we will need to initiate industry support programmes to improve industrial environmental performance. Actions taken in the industrial sector will be supported by measures in other sectors, particularly in Water and Waste.

Following the GCAP methodology, we developed a Vision, Strategic Objectives and list of Specific Measures to support improving the environmental performance of our businesses. Our consultees were the Georgian Employers Association (GEA) and the Georgian Chamber of Commerce and Industry (GCCl), which together represent around 11,000 businesses, as well as local and international experts.

For more detailed information on the outputs, please see [Annexes 5 and 6](#).

7.1 Vision and Strategic Objectives

Our Vision and Strategic Objectives for Industry are as follows.

7.1.1 Vision

Vision

Tbilisi's businesses achieve high standards to minimise their impact on the City's environment

Even though the City does not have a direct influence on industry, we will work with other bodies such as the Ministry of Environment, Georgia Chamber of Commerce & Industry (GCCCI) and the Georgia Employers Association (GEA) to help make improvements in the environmental performance of our businesses, improve their competitiveness and support the growth of a local environmental goods and services (EGS) industry.

7.1.2 Strategic Objectives & Priorities

To achieve the Vision we have developed the following Strategic Objectives and identified priority areas within each Objective.

The City has a limited role in regulating businesses, so the priority measures focus on providing support for businesses to achieve improvements in environmental performance. For these, we will need to act in partnership with the existing business support organisations. In order to assist business to implement improvements, and to support actions in other areas of the GCAP, we propose to also prioritise development of the EGS sector, so that businesses and organisations will be able to access local expertise, products and services.

Strategic Objective

1

Businesses are aware of their environmental impact and actively contribute to the achievement and maintenance of a Green City by continuous reduction of air emissions, wastewater discharges and waste generation

Companies' environmental performance is monitored and fines may be imposed but there is no information on how to improve. We need to have more information & awareness campaigns, technical assistance and capacity building to help local businesses to improve environmental performance and incentives such as environmental standards in procurement.

Strategic Objective

2

Tbilisi businesses gain competitive advantage by meeting international environmental and resource efficiency standards

Support programmes are critical to enable local businesses to compete under EU environmental regulations, and therefore this is a high priority for us, as it will also assist our economic development.

Strategic Objective

3

Tbilisi has a strong and growing sector providing environmental technologies and services to support local businesses to meet these standards

We will assist local businesses to provide the goods and services needed to improve environmental performance, thus helping to grow a new industry in our city economy. Supporting this sector will enable all sections of the GCAP to be implemented while developing new products and skills to supply other regions.

Strategic Objective

4

Industrial waste and wastewater is re-used or recycled or appropriately treated

Concerns have been identified around industrial waste and wastewater treatment. Although general waste from industry is collected alongside municipal **solid** waste there is no consistent collection and treatment of hazardous wastes and construction waste. Similarly, wastewater from industry is treated along with other wastewater streams but there is no requirement for onsite treatment of polluting effluents. We need legislation and investments to improve the situation in both areas.

7.2 Green City Measures

Taking into account the above priorities, future budgetary requirements, the capacity of the City to implement the actions and also their social and economic, as well as environmental impacts, the following Measures were selected as the most appropriate for the Green City Action Plan.

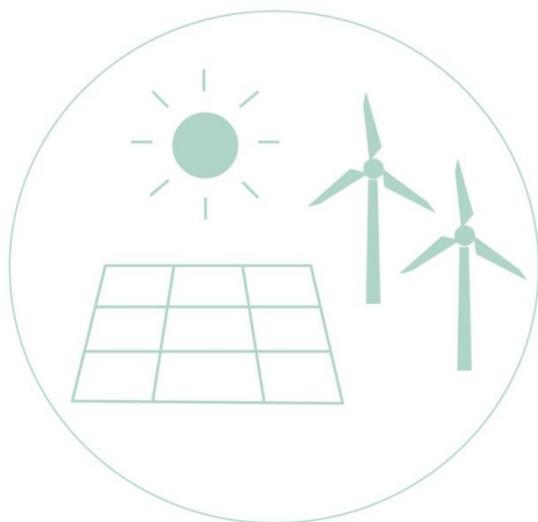
The table below shows the Measure, the relevant Strategic Objective, the Mid-term Targets, the organisations responsible for implementation, the timescale and potential funding sources⁴. Further details of each Measure are provided in Section 7.3 following the table.

⁴ CAPEX is where funds have to be spent from the City's capital budget or raised from elsewhere. The figure quoted is anticipated expenditure over the life of the GCAP (2018-2022). OPEX is the cumulative operational costs over the life of the GCAP and is used for 'soft' measures such as developing plans or awareness campaigns. It includes both one-off costs for individual plans and annual operating costs of systems.

Table 7.1 – Green City Measures, Relevant Strategic Objective, Mid-term Targets, Timescales, Costings and Funding Sources for the Industry sector

No	Green City Measures	SO	Mid-term Targets (2025)	Implementing Body	Timescale						Potential Funding Sources
					2018	2019	2020	2021	2022	2023+	
I1	Environmental support programme for businesses	S01	500 businesses supported. 200 businesses report on environmental performance annually. Business waste is monitored.	City Hall; Industry Bodies (GEA, GCCI); Private businesses							National Government; International Donors; Private sector
I2	Support programme for environmental accreditation	S02	100 businesses have gained accreditation in ISO 14001 or EMAS	City Hall; Industry Bodies (GEA, GCCI); Private businesses							National Government; International Donors; Private sector
I3	Market support programme for the Environmental Goods & Services sector	S03	EGS sector recognised and growing	City Hall (Transport Office); Tbilisi Transport Company (TTC)							City Hall; International Donors; Private sector
I4	Hazardous waste treatment facility	S04	80% of hazardous waste is appropriately treated.	City Hall, Ministry of Environment; Private businesses							National Government; EBRD; International Donors
I5	Construction waste management	S04	50% of construction waste generated is recycled or re-used.	City Hall; Ministry of Environment; NGOs/Agency							City Hall; International Donors; Private sector

8 Energy



The energy networks in Tbilisi provide reliable electricity and heat **supply** to the City's residents, with limited interruptions. Most of Tbilisi's electricity comes from hydro-**power** stations and most of the heat energy is from natural gas. Although the energy grid's ability to respond to demand is sufficient, the environmental impacts of energy generation and consumption in the City are still significant. We see the opportunity to promote a cleaner, more distributed energy network by introducing and incentivising renewable energy and energy efficient measures to energy producers and consumers.

Distribution of electricity in the City is the responsibility of a private company TELASI, so we do not have direct influence in this area. We are, however, in constant dialogue with TELASI and we are actively pursuing joint initiatives such as small-scale renewables on buildings and ensuring that the distribution networks can accommodate these technologies. This will be an important area of the forthcoming NEEAP.

Apart from the renewable energy from the hydro-**power** stations, there is almost no electricity generated from other renewables sources. Heat energy from renewable sources (mainly wood for heating) is around 10% of the total. There are no incentives for developing or installing renewable energy technologies either through regulatory/financial measures or through awareness campaigns.

In addition to promoting more renewable energy sources we also need to improve the energy efficiency of the City's non-buildings energy equipment (such as IT systems and other equipment) and of the street lighting.

We have developed a Vision, Strategic Objectives and list of Specific Measures to address the City's environmental challenges for the Energy sector. Measures and objectives that are proposed in the GCAP will assist the City and other stakeholders to generate green energy and to use this energy in an efficient manner. Our consultees for this sector included City departments (Economic Development Office), Georgia Water & Power (GWP) and the electricity distributor, TELASI, both of which are private companies.

The outcomes are presented below in the order of the Vision, Strategic Objectives for each identified priority area, Measures to achieve these objectives, and detailed descriptions of each of the Measures. For more detailed information on the outputs, please see [Annexes 5 and 6](#).

8.1 Vision and Strategic Objectives

Our Vision and Strategic Objectives for the Energy sector are as follows.

8.1.1 Vision

Vision

Tbilisi's energy system is characterised by a high level of generation from renewable energy sources and the efficient use of clean energy

We recognise that there is significant potential for increasing renewable energy generation for both electricity and heat in the City, and for reducing energy consumption in public lighting and other equipment. We intend to continue exploring potential energy saving opportunities and the wider use of renewable energy sources to produce clean energy and achieve a robust and sustainable energy system. To achieve the Vision we will need to work with partners such as TELASI and GWP as well as the private sector.

It is anticipated, that this vision will deliver multiple benefits to Tbilisi's citizens through reduced energy costs and investments in existing businesses.

8.1.2 Strategic Objectives & Priorities

Strategic Objective

1

Promotion of small-scale urban renewables and utilisation of renewable energy potential in the wider City area

Apart from the large proportion of energy supplied from hydro there are virtually no other sources of renewable energy in the City. It seems unlikely that other large-scale renewable energy supply systems will be developed by GWP though there could be scope for electricity generation based on wind, biomass (timber from managed forests) and from landfill gas (covered in the Solid Waste sector). There is also scope for smaller systems based on local hydro, solar, biomass (for heating) and possibly geothermal (**heat pumps**). We will encourage the investigation and deployment of these alternative energy sources.

Strategic Objective

2

Efficiency in energy use (public lighting, electrical equipment)

This objective defines a framework to improve the energy efficiency of other energy consuming equipment used within the municipality together with a potential mechanism for financing the necessary improvements.

In addition to actions in municipal buildings there are actions that the City can take to reduce energy usage under its direct control. These include:

- Modernising public lighting by the use of LEDs;
- Introducing procurement rules for the purchase of energy efficient appliances within the municipality.

One method of financing energy efficiency improvements (including in Buildings) could be the use of Energy Performance Contracting (EPC) as has been used in other cities in Central & Eastern Europe.

8.2 Green City Measures

Taking into account the above priorities, future budgetary requirements, the capacity of the City to implement the actions and also their social and economic, as well as environmental impacts, the following Measures were selected as the most appropriate for the Green City Action Plan.

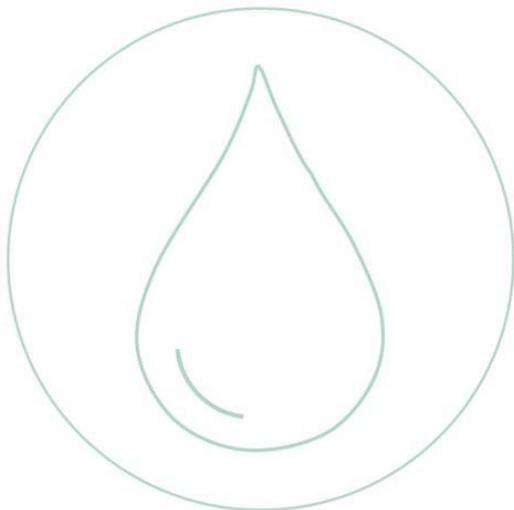
The table below shows the Measure, the relevant Strategic Objective, the Mid-term Targets, the organisations responsible for implementation, the timescale and potential funding sources⁵. Further details of each Measure are provided in Section 8.3 following the table.

⁵ CAPEX is where funds have to be spent from the City's capital budget or raised from elsewhere. The figure quoted is anticipated expenditure over the life of the GCAP (2018-2022). OPEX is the cumulative operational costs over the life of the GCAP and is used for 'soft' measures such as developing plans or awareness campaigns. It includes both one-off costs for individual plans and annual operating costs of systems. These costs could be funded from the City budget or from international donors' Technical Assistance funds.

Table 8.1 – Green City Measures, Relevant Strategic Objective, Mid-term Targets, Timescales, Costings and Funding Sources for the Energy Sector

No	Selected Measures	SO	Mid-Term Targets (2025)	Implementing Body	Timescale						Potential Funding Sources
					2018	2019	2020	2021	2022	2023+	
E1	National Energy Efficiency Action Plan (NEEAP)	S01	National Energy Efficiency Action Plan (NEEAP) completed and used as umbrella document for the Energy sector	City Hall (Economic Development Office); Ministry of Energy							National Government
E2	Promotion of urban scale renewables	S01	Renewable energy systems for energy generation promoted and deployed	City Hall (Economic Development Office); TELASI, Ministry of Energy							City budget; National government; IFIs & donors
E3	Street lighting modernisation	S02	Street lighting modernisation to LED standards	City Hall (Economic Dept. Office)							City budget; IFIs & donors

9 Water



The City authorities have limited power to influence water supply and wastewater treatment as both these activities were transferred to the private company, Georgia Water and Power (GWP), some years ago.

GWP is responsible for:

- Potable water supply (the capacity of this resource is sufficient for Tbilisi City's needs);
- Operation and maintenance/repair of the existing water and wastewater infrastructure;
- Operation of the central wastewater treatment plant (WWTP) including discharge of the pre-treated water to the Mtkvari river.

The City is responsible for the construction (including financing) of new water and wastewater infrastructure and for the issue of permits for maintenance and repair of the existing key infrastructure.

We recognise that the quality of supplied potable water as well as the efficiency of wastewater treatment is an important issue for Tbilisi residents. At the moment, we have high levels of leakage from the water distribution system, mainly because of its age and lack of maintenance in the past. The WWTP only has first-stage mechanical treatment and lacks the chemical and biological stages of an up to date plant. We also have problems with surface water run-off which in general is not treated and goes directly to the rivers.

We have developed a Vision, Strategic Objectives and list of Specific Measures to address the City's key challenges for the Water sector. Our consultees for this sector included national authorities (Ministry of Environment and Natural Resources Protection, National Environmental Agency), Georgia Water and Power, NGOs and local and international experts.

The outcomes are presented below in the order of the Vision, Strategic Objectives for each identified priority area, Measures to achieve these objectives, and detailed descriptions of each of the Measures. For more detailed information on the outputs for the Water sector please see [Annexes 5 and 6](#).

9.1 Vision and Strategic Objectives

Our Vision and Strategic Objectives for the Water sector are as follows.

9.1.1 Vision

Vision

A Water and Wastewater Management System that meets Current and Future International Standards

Our vision of a **Water and Wastewater Management System that meets Current and Future International Standards** would mean improvements to the municipal water supply system and treatment network, thus decreasing their impact on the environment and human health. Actions will be based on close cooperation with Georgia Water and Power (GWP), our strategic partner in this area, together with other key stakeholders.

9.1.2 Strategic Objectives & Priorities

Strategic Objective

1

Improvements to the Water Distribution System and Wastewater Treatment Plant

The top priorities for the City in the Water sector are **Water Losses and Wastewater Treatment**. Taking action in these areas will entail:

- Reducing water losses on the distribution network from their current level of around 50%;
- Establishing a regular monitoring system to determine the condition of the water distribution network;
- Adding new treatment stages at the WWTP to bring it up to international standards.

The City has limited power to act directly in these areas but needs to work in partnership with GWP to ensure that the necessary investments are made.

Strategic Objective

2

Reduce Surface Water Run-off and Improve Surface Water Quality

Our priorities in this area are to:

- Develop an effective wastewater quality monitoring system covering all polluters including industrial and commercial premises;
- Introduce legislation on wastewater discharge limits and quality;
- Ensure that run-off from roads, industrial sites, agricultural land and newly constructed residential and commercial premises are connected to the main sewerage system.

The City could act directly in these areas but in practice, we would consult with GWP to agree practical solutions.

Strategic Objective

3 Develop a Program Focused on the Reduction of Water Consumption

Under this Objective, we need to:

- Identify feasible opportunities for the reduction of water consumption in households, commerce and industry;
- Develop an awareness programme aimed at reducing water consumption in these sectors;
- Present proposed options on new tariffs and charging mechanisms to key stakeholders including the public and industry and implement the most feasible measures

Our focus in all of the above Objectives will be to extend and enhance cooperation with GWP as our strategic partner in water and wastewater management, in particular in the area of infrastructure management (e.g. newly constructed water and wastewater pipelines, investments in the WWTP). We will also ensure GWP's active involvement in monitoring of discharged wastewater quality, in particular from industrial premises located in the Tbilisi area.

9.2 Green City Measures

Taking into account the above priorities, future budgetary requirements, the capacity of the City and GWP to implement the actions and also the social, economic and environmental impacts, the following Measures were selected as the most appropriate for the Green City Action Plan.

The table below shows the Measure, the relevant Strategic Objective, the Mid-term Targets, the organisations responsible for implementation, the timescale and potential funding sources⁶. Further details of each Measure are provided in Section 9.3 following the table.

⁶ CAPEX is where funds have to be spent from the City's capital budget or raised from elsewhere. The figure quoted is anticipated expenditure over the life of the GCAP (2018-2022). OPEX is the cumulative operational costs over the life of the GCAP and is used for 'soft' measures such as developing plans or awareness campaigns. It includes both one-off costs for individual plans and annual operating costs of systems. These costs could be funded from the City budget or from international donors' Technical Assistance funds.

Table 9.1 – Green City Measures, Relevant Strategic Objective, Mid-term Targets, Timescales, Costings and Funding Sources for the Water Sector

No	Selected Measures	SO	Mid-Term Targets (2025)	Implementing Body	Timescale						Potential Funding Sources
					2018	2019	2020	2021	2022	2023+	
W1	Modernisation of Central Waste Water Treatment Plant	S01	Chemical and biological treatment stages completed at WWTP	City Hall (Infrastructure Dept.); Georgia Water & Power							Other International Donors; Private sector
W2	Extension of the existing sewerage system	S02	New areas of the City and all industrial premises connected to the main sewerage system	City Hall (Infrastructure Dept.); Georgia Water & Power							International donors; Private sector
W3	Regular repair and maintenance of water distribution system	S01	Reduce the level of water losses by at least 3% per year to 2025 (i.e. reduce losses to under 25%)	City Hall (Infrastructure Dept.); Georgia Water & Power							International donors; Private sector
W4	Reduction of water consumption by consumers	S03	Awareness campaign completed. New charging systems being implemented	City Hall (Infrastructure Dept.), Ministry of Environment							National Government; International Donors
W5	Wastewater discharge limits for industrial & commercial premises	S02	New discharge limits in place and monitored	City Hall (Environment Dept.); Ministry of Environment							City Hall; National Government

10 Solid Waste



Waste generation is an integral part of our modern society, resulting from increasing consumption of goods and services. Consequently municipal solid waste (MSW) management is one of the strategic areas for the future development of Tbilisi.

The system of MSW management in the City consists of collection of solid waste from citizens (and partly from industry), its movement and treatment. Minimisation of environmental and human health impacts represents a key principle of this system. Although generation of MSW per capita is at an average level compared to other cities, one of our goals is to reduce waste generation, though recognising that there will always be a certain amount of solid waste that we will have to deal with. Our objective here is to use this waste as a source of valuable secondary materials and energy and minimise the amount of waste that is sent to landfill.

Waste collection and management in Tbilisi is under our direct control via the TbilService Group. Currently there is little recycling of MSW apart from some small-scale schemes operated by community groups and NGOs. The hazardous waste facility is managed by the Ministry of Environment and Natural Resources Protection.

Following the GCAP methodology, we developed a Vision, Strategic Objectives and list of Specific Measures to address the City's most pressing environmental challenges for Solid Waste. Our consultees for this sector included, national authorities (Ministry of Environment), private companies (KDV Georgia), and independent local and international experts.

The outcomes are presented below in the order of the Vision, Strategic Objectives for each identified priority area, Measures to achieve these objectives, and detailed descriptions of each of the Measures. For more detailed information on the outputs, please see [Annexes 5 and 6](#).

10.1 Vision and Strategic Objectives

Our Vision and Strategic Objectives for Solid Waste management are as follows.

10.1.1 Vision

Vision

A Sustainable City that turns its Waste into Valuable Resources

As waste generation has become an integral part of our modern society, we recognise municipal solid waste (MSW) management as one of the key areas where we need to act. With the Vision **Sustainable City that turns its Waste into Valuable Resources**, our overall objective is the minimisation of MSW generation and treatment according to EU standards.

10.1.2 Strategic Objectives & Priorities

Strategic Objective

1

A Municipal Waste Management Plan which represents an “umbrella” for the implementation of strategic objectives 2, 3, 4 and 5

The Municipal Waste **Management** Plan of the City of Tbilisi will become a framework document for all solid waste related activities in the future. It will be developed in accordance with the new national Waste Management Code which was introduced earlier in 2017 and will set strategic objectives and detailed actions for further development of MSW management in the City.

Strategic Objective

2

Minimisation of municipal solid waste generation

The most efficient way to manage waste is to prevent its production in the first place. Reduction of the amounts of waste generated is therefore the preferred approach to solid waste management in the City.

Although solid waste generation per capita in Tbilisi is at an average level compared with other cities of a similar size, our citizens and other waste producers need to be regularly informed through awareness campaigns about the possibilities for reducing their material consumption and waste generation.

Strategic Objective

3

Use of collected waste as a source of valuable secondary materials and energy, and minimisation of the amount of waste that is disposed to landfill

As the majority of the waste generated is disposed of at the **new** Tbilisi landfill, the next overriding priority is to shift from landfilling to using the waste for material or energy recovery.

A private company, KDV Georgia, will construct the new waste treatment facility adjacent to the current landfill. This facility will treat all of the City's municipal **solid** waste and eliminate the need for separate collection and treatment of recyclable materials. It will extract metals and glass for recycling and produce high quality diesel **oil** for use locally or for sale on international markets.

We also intend to utilise the landfill gas for electricity generation, which is the next logical step in the project that currently includes landfill gas collection and flaring.

Strategic Objective

4

Development of an efficient and environmentally friendly municipal solid waste collection system

Despite improvements over the last few years, there is still a need to further modernise the waste management infrastructure, in particular vehicles and containers used in the collection of MSW. New container and low emission vehicles will be purchase in order to replace some of the current infrastructure and to serve the territories of New Tbilisi and other border areas.

Along with purchase of new equipment, optimisation of the collection system will be implemented, focusing in particular on monitoring and route optimisation.

Strategic Objective

5

Closure and remediation of existing illegal dumpsites and prevention of new dumpsites

Although the situation in Tbilisi has improved since the separate landfill for construction & demolition waste was built in 2016, illegal dumpsites still pose a serious problem for the City. Following the requirement set in the National Waste Management Action Plan we will undertake an inventory of existing illegal dumpsites and implement a programme to remove and remediate them.

The closure and remediation will be accompanied by an awareness raising campaign that will cover prevention of fly-tipping, proper waste handling and the adverse impacts of poor waste management as additional elements of that proposed in Strategic Objective 2.

We also plan to improve the City's capacity for monitoring and control of illegal dumping and to **strengthen** enforcement of the existing system of fines and penalties for littering.

The above Objectives and priorities will be addressed through our wholly owned subsidiary company, the TbilService Group.

10.2 Green City Measures

Taking into account the above priorities, future budgetary requirements, the capacity of the City to implement the actions and also their social and economic, as well as environmental impacts, the following Measures were selected as the most appropriate for the Green City Action Plan.

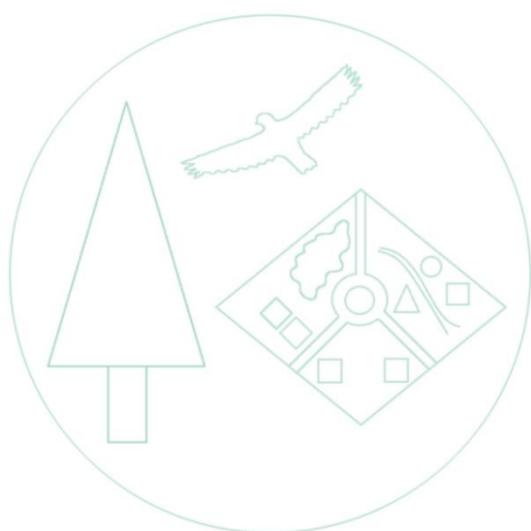
The table below shows the Measure, the relevant Strategic Objective, the Mid-term Targets, the organisations responsible for implementation, the timescale and potential funding sources. Further details of each Measure are provided in Section 10.3 following the table.

Table 10.1 – Green City Measures, Relevant Strategic Objective, Mid-term Targets, Timescales, Costings and Funding Sources for the Solid Waste sector

No	Green City Measures	SO	Mid-term Targets (2025)	Implementing Body	Timescale						Potential Funding Sources
					2018	2019	2020	2021	2022	2023+	
SW1	Improvement of regulatory and planning capacity of the City	S01 S05	Municipal Solid Waste Management Plan implemented City's capacity for monitoring, control and enforcement strengthened	City Hall; Ministry of Environment; TSG							City Budget
SW2	Construction of new waste treatment facility	S03	New waste treatment facility constructed and operating	City Hall; TSG; Private sector (KDV Georgia)							Private sector (KDV Georgia)
SW3	Modernisation of waste collection equipment	S04	New waste collection containers and vehicles purchased	City Hall; TSG; Ministry of Environment							City Budget; EBRD; Other International Donors
SW4	Awareness raising campaign for general public	S02 S05	Annual awareness raising activities focused on waste prevention and good waste handling	City Hall, Ministry of Environment; NGOs							City Hall; National Government; International Donors
SW5	Closure & remediation of illegal dumpsites	S05	Illegal dumpsites gradually closed and remediated	City Hall - TSG; Ministry of Environment							City Hall; National Government; International Donors

SW6	Utilisation of landfill gas for electricity generation	S03	Project for landfill gas utilization implemented	City Hall; TSG; TELASI							City Hall; EBRD; Private sector
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11 Land Use & Biodiversity



We recognise that the shortage of green spaces and recreational areas within the City is one of our top priorities for improving the environment for our citizens. There are some areas where green spaces are at a satisfactory level (e.g. in the suburbs, the hills around the City, Tbilisi Sea, Tbilisi Dendrology Park). However, the main problems are in the urban area of the City where green cover is often lacking. It is well recognised that green spaces and biodiversity play an important role in the living standards of people, not only providing healthy habitats for humans, but also for wildlife and plants in the densely built areas of our City.

Unfortunately, there is a negative trend regarding green spaces in urban Tbilisi, mainly because of newly built infrastructure such as residential and office buildings which in some cases have been built on urban green spaces (UGS).

The last official green spaces inventory was carried almost 30 years ago, but we know from recent work in the Tbilisi Land Use Concept that we have only 5.6m² of green space per capita against an accepted minimum benchmark of 10m² per capita. Biodiversity in general is not satisfactory in the urban areas of the City, but the Tbilisi Dendrology Park and the Tbilisi Sea play important roles and have a significant impact on the quality of the environment and species richness around the City.

Following the GCAP methodology, we developed a Vision, Strategic Objectives and list of Specific Measures to address the City's most pressing environmental challenges for Land-Use and Biodiversity. Our consultees for this sector included national authorities (Ministry of Environment and Natural Resources Protection, National Environmental Agency), NGOs and independent local and international experts.

The outcomes are presented below in the order of the Vision, Strategic Objectives for each identified priority area, Measures to achieve these objectives, and detailed descriptions of each of the Measures. For more detailed information on the outputs, please see [Annexes 5 and 6](#).

11.1 Vision and Strategic Objectives

Our Vision and Strategic Objectives for Land-Use and Biodiversity are as follows.

11.1.1 Vision

Vision

A City with extensive and attractive green spaces and a high level of biodiversity

Our Strategic Vision of a **Green and Sustainable City** has the aim of increasing both the quality and the surface area of new Urban Green Spaces (UGS), which will help to create a more pleasant and healthy environment for our citizens as well as new habitats for animals and plants in the urban area. This will eventually result in improved biodiversity in the urban areas as parks and gardens can also act as green islands for variety of birds and other animals.

11.1.2 Strategic Objectives & Priorities

Strategic Objective

1

Create and implement an up-to-date Sustainable Urban Planning System for the future City development with the emphasis on green spaces

The new Sustainable Urban Planning System will be based on the Tbilisi Land Use Concept which will shortly be approved by City Hall. It will act as the umbrella document for all land use decisions in the City. Ultimately it will lead to better and more efficient information on which to base decision making and the creation of regulations governing land use in the City.

Efficient operation of the Planning System will require the development of a computer based system that holds all information on current land use in the City.

Strategic Objective

2

Development of new public parks & gardens and improvement of existing Urban Green Spaces

We seek to increase the ratio of urban green spaces per capita in our City, which currently is very low. New and modern green spaces can be developed by remediating brownfield and old industrial complexes and improving current green areas (mainly parks) in the urban part of the City. The new green space will include small urban parks and playgrounds, community gardens, urban forests or thematic parks. This will have a positive effect on human health and biodiversity, and has multiple associated economic, social and environmental benefits.

Strategic Objective

3

Improvement and protection of local flora and fauna in urban and suburban areas along the Mtkvari River

Improving the biodiversity status of the Mtkvari River will be achieved through the introduction of “Green Corridors” - natural embankments that can provide nesting (breeding) zones with natural slopes for many species. Improving biodiversity in this way would improve public health by creating new green spaces and better access to the river. It will also enhance green behaviour by involving citizens, NGOs and community groups in the new developments. There would also be positive effects on air and soil quality, and a contribution to resilience.

Strategic Objective

4

New reforested areas on Tbilisi Hills and surrounding areas to provide windbreaks and alleviate soil erosion, landslides and torrential floods

The ultimate aim is to develop new tree plantations to minimise damage caused by high winds, flooding, soil erosion and landslides. This is closely linked with anticipated actions from our work in the “100 Resilient Cities” programme. It will also contribute to job creation, and to improvements in public health and community involvement and have a positive impact on water and soil quality and on climate change (greenhouse gas emissions).

11.1.3 Green City Measures

Taking into account all above mentioned priorities, future budgetary requirements, the capacity of the City to implement the actions and also their social and economic, as well as environmental impacts, the following Measures were selected as the most appropriate for the Green City Action Plan.

The table below shows the Measure, the relevant Strategic Objective, the Mid-term Targets, the organisations responsible for implementation, the timescale and potential funding sources⁷. Further details of each Measure are provided in Section 11.3 following the table.

⁷ CAPEX is where funds have to be spent from the City’s capital budget or raised from elsewhere. The figure quoted is anticipated expenditure over the life of the GCAP (2018-2022). OPEX is the cumulative operational costs over the life of the GCAP and is used for ‘soft’ measures such as developing plans or awareness campaigns. It includes both one-offs of systems. These costs could be funded from the City budget from international donors’ Technical Assistance funds.

Table 11.1 – Green City Measures, Relevant Strategic Objective, Mid-term Targets, Timescales, Costings and Funding Sources for the Land-Use and Biodiversity Sector

No	Green City Measures	SO	Mid-term Targets (2025)	Implementing Body	Timescale						Potential Funding Sources
					2018	2019	2020	2021	2022	2023+	
LUB1	Development of a Sustainable Urban Planning System	S01	Sustainable Urban Planning System implemented and in use	City Hall (Department of Architecture; Department of Ecology)							City Budget; International Donors (Technical Assistance)
LUB2	Computer Based System for Land Use in the City	S01	Implementation of a Computer Based System	City Hall (Department of Architecture)							City Budget
LUB3	Development of New Green Spaces in the Urban Area of the City	S02	Development of at least 60-100 Ha of new green areas in the urban area of the City by 2025	City Hall (Department of Ecology)							City Budget; Private sector; International Donors
LUB4	Biodiversity Strategy and Green Corridors to Promote Biodiversity	S03	Green corridors development alongside the Mtkvari River	City Hall (Department of Ecology)							City Budget; International Donors
LUB5	Field Investigation on Landslide Prevention and Flood Risk Mitigation	S04	Increased tree planting to create wind breaks and alleviate flooding and erosion	City Hall (Department of Ecology)							National Government; International Donors

12 Resilience



We consider that resilience to stresses and shocks is a critical to the long-term stability and economic development of the City.

We are situated in an area with high risk of natural disasters (flooding, earthquakes and landslides) and the impacts of climate change, and are subject to the stresses of:

- Aging infrastructure, particularly housing, transport and drainage;
- High levels of air pollution;
- Poor quality public transport system.

Our City was seriously affected by a significant natural disaster in 2015, when severe flooding killed 19 people, directly affected around 700 people, and caused severe damage to the transport network and the zoo, resulting in around 65 million GEL damage and losses. Severe flooding also occurred in 2012, killing 5 people, and an earthquake in 2002 killed 10 people.

In 2016 Tbilisi was selected to join the 100 Resilient Cities Programme, which provides a methodology and technical support to integrate resilience planning and actions across all areas of the city, over three years. Through this programme we are developing a proactive and integrated plan to address shocks and stresses from natural disasters and adverse socio-economic trends.

We have carried out an extensive consultation exercise, bringing together over 160 representatives of the City and National Authorities, NGOs, other experts, citizens and international experts for the Agenda Setting Workshop in January 2017. The outputs of this will inform the Action Plan.

We have appointed a Chief Resilience Officer (CRO) to oversee the work and the first project meetings will be held in the autumn of 2017. These sessions will also consider the cross-cutting issues highlighted in other Sectors, especially Buildings and Land Use.

The GCAP Vision, Strategic Objectives and Measures to address Resilience will therefore be built around the activities of the 100 Resilient Cities Programme, but is not fully defined at this stage. The sections below provide initial considerations on developing the objectives and measures, which will be further refined and integrated into the GCAP as the 100RC Programme develops.

12.1 Vision

Vision

A resilient city, where resilience thinking is embedded in all our decision-making

Resilience is the capacity of individuals, communities, institutions, businesses, and systems within a city to survive, adapt, and grow, no matter what kinds of chronic stresses and acute shocks they experience.

Our strategic vision is that Tbilisi is a resilient city, where resilience thinking is embedded in all our decision-making.

12.1.1 Strategic Objectives & Priorities

It is sensible to fully develop the Strategic Objectives, targets and measures for resilience under the 100RC timescale, and information emerging from 100RC will be incorporated into the future GCAP programme.

We are in the early stages of assessing our priorities, which will inform the 100RC Action Plan. We expect that these actions will require significant investments, particularly in improved flood defences.

Resilience cuts across all sectors of the GCAP and therefore measures in other areas such as Transport system improvements, Buildings refurbishments and Sustainable Urban Drainage Systems (SUDS) must be designed to contribute to Resilience.

Strategic Objective

1

Creating and implementing a strategic resilience plan under 100 RC programme

The 100 RC Action Plan will help us to fully assess our most pressing resilience needs and define a strategic plan to implement measures to build up resilience and integrate it throughout our municipal activities.

We recognise resilience as a cross-cutting issue that affects several sectors recognised in the GCAP. Initial priorities linked to the GCAP include:

Urban drainage solutions to mitigate flood risks: Major floods pose a big risk to the city's resilience and we plan to address this by assessing options to integrate improved urban drainage solutions in our city planning. (GCAP measures to increase and improve green spaces in the City will include sustainable urban drainage systems which improve resilience to flooding.)

Landslide and flood protection: To mitigate the risk of landslides and flash floods, we will consider land use and other measures to improve the City's resilience. (GCAP measures such as tree planting around the City and on the Tbilisi hills will act as windbreaks and reduce the susceptibility to flash floods and landslides.)

Adapting buildings to temperature extremes and water scarcity: Temperature extremes and seasonal water availability put stress on our City's buildings. We will consider appropriate thermal insulation, low-energy cooling and heating and water efficiency technologies to reduce these stresses. (GCAP measures to improve the thermal insulation of municipal buildings will reduce stresses on occupants during extremely hot and cold weather. As the rehabilitation programme extends to all residential buildings in future years these benefits will accrue to all citizens.)

Our Resilience Team is cross-departmental, which will enable us to incorporate these cross-sectoral issues in our plans, and resilience thinking into the GCAP programme.

Other measures specific to Resilience that will require capital funding will be identified as part of the 100RC programme.

13 Monitoring and Reporting

Monitoring has essentially two key goals: to inform the decision makers about the consequences of their actions and to inform the public about the progress of the City towards environmental performance. The main purpose of the Monitoring Plan (MP) is to establish how the measures included in the GCAP for each sector (transport, buildings, industry, energy, **water**, solid waste, land use/biodiversity, resilience) impact the quality of environmental assets: Air quality, water bodies, drinking water, land/soil quality, water resources, green spaces, greenhouse gasses (GHG) emissions, as well as the adaptation to natural events such as flooding or earthquakes.

The MP therefore covers monitoring the implementation of agreed measures and their progress towards targets and objectives, as well as of their likely impacts on the quality of the **environment**.

The main purpose of systematic monitoring is to inform the planning of actions as well as to provide information to the key stakeholders including EBRD and to the public. Information can also be used for information and education activities aiming at raising awareness on “green behaviour” and facilitating support for the implementation of “green” measures.

We have developed the MP for the period 2017 – 2025. It includes a results-based Progress Monitoring Plan and an Impact **Monitoring** Plan (both included as **Annex 8**). We will carry out a mid-term review (MTR) to assess progress against targets and the social and economic benefits arising from changes in the sectors.

13.1 Progress Monitoring Plan

The Progress Monitoring Plan (PMP) is based on the planned measures for the respective sectors. Our underlying assumption is that the planned actions will lead to the achievement of planned measures (mid-term targets), which will contribute to the strategic aims of the respective sectors. Meeting the strategic aims will contribute to the improvement of the quality of environmental assets.

We have prepared the PMP to distinguish between:

- Measures already under implementation;
- Relevant and priority measures for the City;
- Measures that are relevant but not a priority.

These categories are discussed further in [Annex 8](#).

The timeline includes milestones for each activity. Mid-term targets, indicators and activities from relevant plans included in the GCAP measures (e.g. SUMP, NEEAP) are reflected in in the PMP. Awareness, stakeholder consultations and participation have been included as “cross cutting” measures.

The PMP will be used as the basis for preparing periodic progress reports. Activities under implementation and achieved milestones will be marked in a different colour to provide visual evidence of actual progress. Reports will cover the progress achieved in the implementation of the GCAP (during the reporting period and cumulative), explanation of variances between planned and actual progress, and plans for the next reporting period. Objectively verifiable indicators have been formulated for each milestone.

Responsibilities for gathering information on indicators, updating the PMP and reporting are summarised below. We intend to set up a Monitoring Unit that will involve these City Departments.

Sector	Participating Offices
Coordination of Monitoring and Reporting	GCAP Monitoring Unit
Transport	Transport Office
Buildings	Economic Development Office; Ministries of Energy and Economy
Industry	Economic Development Office; Ministries of Environment and Economy
Energy	Economic Development Office; Ministry of Energy
Water	Economic Development Office; National Water & Electricity Regulation Commission
Solid Waste	Economic Development Office; Municipal Improvement Department
Land Use & Biodiversity	Office of Ecology and Green Spaces; Department of Architecture; Municipal Improvement Department
Resilience	100 Resilient Cities Group
Financial Issues	Office of Finances

13.2 Impact Monitoring Plan

We have prepared an Impact Monitoring Plan (IMP) comprising two parts:

- The first part links the measures with environmental indicators. **Annex 8** differentiates for each measure between significant, medium, minor and no measurable impacts. This will help to better assess the influences that specific measures are likely to have on changes in the environmental indicators.
- The second part of **Annex 8** includes the baseline for 'State' and 'Pressure' indicators likely to be influenced by the measures. Only indicators that are measured and baseline values are available have been included.

Some measurable changes in indicator values could occur and will be established after three years of GCAP implementation, at the end of 2021. Target savings and improvements related to measures should be evident by 2025, provided the implementation progresses as planned.

We acknowledge that external factors beyond our control will also influence the indicators' values. A measurement mechanism allowing sampling at "pressure locations" to measure changes likely due to the measures will be set up where feasible to improve attributability. Comparison with overall changes in the City will help to identify other possible pressure sectors/locations and design appropriate actions.

The main responsibility for compiling, analysing and interpreting information on indicators and preparing the mid-term and final reports lies with the Economic Development Office, supported by the relevant City Departments.

13.3 Mid-term Review

The Mid-term review (MTR) will establish progress made towards the targets for both the Progress Monitoring Plan and the Impact Monitoring Plan. Decision makers and external experts are recommended to participate in the MTR to further facilitate ownership of the GCAP and to discuss/agree upon/introduce possible modifications.

The MTR will rely mainly on secondary data for information of Monitoring Plan progress and changes in the quality of environmental assets, with verification of selected indicators. For the assessment of social and economic benefits and sector-specific improvements, mixed methods may be used and triangulated as appropriate. Data from quantitative surveys based on a representative sample of households stratified along key characteristics (such as gender, schoolchildren) would for example provide data on green behaviour or the support of, or opposition to individual measures. Qualitative methods could include a transect walk⁸, observations, key participant interviews, as well as group interviews and focus group discussions, case studies or process tracing.

⁸ A transect walk is a type of walk an evaluator might take around a community in order to obtain a representative observation of its people, surroundings, and resources. Transect walks are a kind of spatial data gathering tool. The transect walk is planned by drawing a "transect line" through a map of a community. The line should go through, or transect, all zones of the community in order to provide a representative view. The evaluator, accompanied by several community members, walks along the area represented by the transect line on the map. He or she talks to the community members while observing conditions, people, problems, and opportunities (Academy for Educational Development 2002).

13.4 Utilisation of Monitoring Information

The City will use the information among others to adjust planning and prioritisation of measures and actions, for informing the EBRD and existing/potential partners in the environmental sector, for adjusting the environmental monitoring technologies, and for informing and motivating the public. New policy options may be identified to accelerate Green City development.

EBRD will incorporate the information and lessons learned into the process of choosing, preparing and appraising projects. The Bank will also use the information to evaluate its effectiveness in supporting the City's green development, and guide future discussions and cooperation with City officials.

We have formulated the MP with emphasis on simplicity, clarity and efficient utilisation. Capacity building of key staff involved in the monitoring process will be part of the GCAP implementation. No additional staff are needed to carry out the MP at this stage, though some investment in ITC may be required for efficient flow of information.

Monitoring of environmental indicators will rely as much as possible on existing technologies and procedures. Investments in new technologies and additional equipment that may be required will be compared with the additional benefit of improved information.

SUMMARY and CONCLUSIONS

14 Summary and Conclusions

The systematic application of the EBRD methodology for developing our Green City Action Plan has resulted in a set of measures that encompass all areas that have an impact on the City's environment. By prioritising these measures we have been able to develop a plan that will have the maximum impact on our environmental assets as well as producing other social and economic benefits for the City. Whilst the Plan is challenging, we believe that it will be possible to implement the measures over the next five years within the capacity of the City budget and other resources, though recognising that further actions will be necessary after this period if we are to achieve our long-term Vision for 2030.

In developing the GCAP we have carried out extensive consultation with a wide range of stakeholders so that the views of the City, its citizens, businesses and institutions have been fully taken into account. We recognise that we will need the help and cooperation of all of these groups as well as other partners and, in some cases, the assistance of international financial institutions and donors to provide some of the funding needed.

The Measures include a range of actions including:

- New legislation, strategies and plans;
- 'Soft' measures such as awareness raising and business support programmes;
- Investments in all sectors in new systems, plant & equipment and improved land use.

The Measures will have a positive impact on our main areas of concern such as:

- Emissions to air (particularly PM_{2.5}, PM₁₀ and Total Suspended Particulates);
- Energy use in buildings;
- Improving the environmental performance of our businesses;
- Increased use of renewable energy;
- Reducing water leakage in the distribution network;
- Improving wastewater quality;
- Improving waste management and treatment;
- Developing more and better quality green spaces in the City;
- Improving the resilience of the City to natural events such as flooding and earthquakes.

We estimate that, taken together, the Measures will produce in CO₂ emissions savings of around **450,000 tonnes per year** and water savings of around **55 million m³ per year**. In addition the

Measures will have significant positive impacts on economic growth, job creation, public health and safety, and improved access to public amenities and green spaces.

Realising the GCAP aims and objectives demands action in the short term across all sectors and we intend to commence implementation as soon as possible, and certainly by the beginning of 2018. We look forward to working with Tbilisi's many stakeholders to achieve the Vision set out in this **Green City Action Plan**.

Annexes

A1 – [List of Contributors to the GCAP](#)

A2 – [Previous Strategies & Plans](#)

A3 – [Strategic Objectives, Short-term Actions & Mid-Term Targets](#)

A4 – [Key Programmes & Measures Summaries](#)

A5 – [Monitoring Plan / Impact Monitoring Plan](#)