

City of Ekurhuleni

Climate Change Response Strategy (CCRS)

2025

Foreword

As the Executive Mayor of Ekurhuleni, it is with great pride and a profound sense of responsibility that I present our City's Climate Action Plan (CAP). This comprehensive roadmap is designed to significantly reduce our greenhouse gas emissions, adapt to the multifaceted impacts of climate change, and promote sustainable development across our municipality.

Climate change stands as one of the most critical challenges of our era, and its repercussions are already being felt acutely within our City. From devastating floods to crippling heatwaves, we have witnessed firsthand the severe effects of climate change on our communities, our economy, and our environment. For instance, recent studies indicate that urban areas like ours could see a 10-20% increase in extreme weather events by 2050.

The financial implications are equally staggering, with potential damages to infrastructure projected to cost billions annually. However, we are not merely passive victims of this global phenomenon; we are also active participants in the solution. As a City, we bear the responsibility to act decisively and urgently. Our CAP delineates our unwavering commitment to reducing carbon emissions, investing in renewable energy sources, and promoting sustainable land use practices. This strategic plan embodies our City's core values of inclusivity, equity, and sustainability, and it articulates a clear and ambitious vision for a low-carbon, climate-resilient future.

The importance of a just transition cannot be overstated in our context. A just transition ensures that the shift towards a sustainable economy is fair and inclusive, leaving no one behind. Vulnerable communities, who are often the most affected by climate change, must be at the forefront of our efforts. For example, socially vulnerable populations are disproportionately impacted by climate change, facing higher risks of health issues, economic losses, and displacement. In Ekurhuleni, we have seen how extreme weather events can strain our budget, diverting funds from essential services to emergency responses and infrastructure repairs.

I am particularly proud to affirm that our Climate Action Plan is meticulously aligned with the objectives of the Paris Agreement, the United Nations' Sustainable Development Goals (SDGs), and the South African Climate Change Bill.

We acknowledge that climate action is a global imperative, and we are steadfast in our commitment to contributing to the reduction of greenhouse gas emissions and the promotion of sustainable development on a global scale.

I call upon all residents, businesses, and stakeholders to join us in the implementation of this vital plan. Together, we can forge a sustainable, thriving, and climate-resilient city for the benefit of all. Let us embrace this opportunity to lead by example and ensure a prosperous future for generations to come.

Thank you.

Mr. Nkosindiphile Xhakaza

Executive Mayor

City of Ekurhuleni

Executive Summary

The City of Ekurhuleni's Climate Action Plan (CAP) is a comprehensive framework designed to address the multifaceted impacts of climate change while promoting sustainable development. This plan emphasizes the importance of addressing community needs and fostering partnerships with businesses and communities to ensure inclusive, equitable, and responsive climate actions. Climate change poses significant risks to Ekurhuleni, including increased temperatures, variable rainfall patterns, and extreme weather events such as floods and heatwaves. These changes threaten the city's economy, infrastructure, and residents' well-being. The CAP underscores the urgency of addressing these challenges to protect vulnerable communities and ensure sustainable development.

The CAP highlights the necessity of active participation from residents, businesses, and other stakeholders to implement climate actions effectively. This collaborative approach ensures that the city's climate initiatives are aligned with the needs of its diverse communities. The CAP emphasizes the need for resilience planning and disaster risk reduction, particularly in response to floods and heatwaves. The city aims to enhance its ability to anticipate, absorb, and recover from climate-related impacts through improved disaster preparedness and risk reduction programs. This includes investing in early warning systems, green infrastructure, and sustainable urban planning.

The CAP outlines several key adaptation and mitigation measures to address climate change impacts. Adaptation measures include protecting and conserving biodiversity, improving water efficiency, enhancing disaster preparedness, and promoting sustainable agricultural practices. Mitigation measures focus on reducing greenhouse gas emissions through clean energy supply, improved energy efficiency, sustainable transport, and sustainable waste management. Ekurhuleni faces various climate-related risks, including flooding, heatwaves, drought, and wildfires. Increased rainfall and inadequate drainage systems lead to frequent flooding, damaging infrastructure and displacing communities. Rising temperatures exacerbate the urban heat island effect, posing health risks to residents, especially vulnerable populations. Water scarcity due to variable rainfall patterns and increased demand threatens water security and agricultural productivity. Dry conditions and strong winds increase the risk of wildfires, endangering lives and property.

The CAP emphasizes the importance of all city departments working together to achieve climate goals. Effective implementation of the CAP requires coordination and collaboration across various departments, including Environmental Resource and Waste Management, Water and Sanitation, Energy, Transport, and Community Services. The Resilience and Just Transition Forum serves as an oversight body to ensure interdepartmental coordination and progress towards climate targets. Ekurhuleni commits to being a net zero emissions city by 2050. The interim targets include a 19% reduction in greenhouse gas emissions below 2019 levels by 2030 and at least a 70% reduction in greenhouse gas emissions compared to 2019 levels by 2050. These targets align with the city's commitment to the Paris Agreement and the Sustainable Development Goals (SDGs), aiming to create a sustainable, resilient, and equitable future for all residents.

The CAP reflects Ekurhuleni's unwavering dedication to addressing climate change, promoting social empowerment, and ensuring a sustainable future for its residents. By fostering community partnerships, enhancing resilience planning, and implementing key adaptation and mitigation

measures, Ekurhuleni aims to build a climate-resilient city that protects vulnerable communities and promotes inclusive, sustainable development.

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List of acronyms

APEX	Advance Practices for Environmental Excellence in Cities
BRT	Bus Rapid Transit
BWI	Wood Workers’ International
CAP	Climate Action Plan
CBA	Critical Biodiversity Area
CC	Climate Change
CCRS	Climate Change Response Strategy
CDP	Carbon Disclosure Project
CHP	Combined Heat and Power
CoE	City of Ekurhuleni
C40 Cities	C40 Cities Climate Leadership Group
DBSA	Development Bank of Southern Africa
EDGE	Excellence in Design for Greater Efficiencies
EIP	Environmental Implementation Plan
EPR	Extended Producer Responsibility
EPL	Energy Performance Labelling
ERWART	Ekurhuleni Water Care Company
ESA	Ecological Support Area
GCAP	Green City Action Plan
GCCR	Gauteng Climate Change Response Strategy
GHG	Greenhouse gas
GDS	Growth and Development Strategy

GDP	Gross Domestic Product
GPC	Global Protocol for Community Scale
GVA	Gross Value Added
ICLEI	Local Government for Sustainability
IDP	Integrated Development Plan
IPCC	Intergovernmental Panel on Climate Change
IPP	Independent Power Producer
IFC	International Finance Corporation
PACE	Property Assessed Clean Energy
PMS	Performance Management System
PPP	Public-Private Partnerships
MRF	Materials Recovery Facility
NEMA	National Environmental Management Act
NDP	National Development Plan
NCCRP	National Climate Change Response Policy
NCCAS	National Climate Change Adaptation Strategy
SACN	South African Cities Network
SADC	South African Development Community
SDBIP	Departmental Service Delivery and Budget Implementation Plan
SDGs	Sustainable Development Goals
SECO	Secretariat for Economic Affairs of the Swiss Confederation
UN	United Nations
UNFCCC	United Nations Framework Convention on Climate Change

CHAPTER 1: Introduction

Climate change, as defined by the United Nations Framework Convention on Climate Change (UNFCCC, 1992), is a change of climate which is attributed directly or indirectly to human activity that alters the composition of the global atmosphere, and which is in addition to natural climate variability observed over comparable time periods. It has been identified as a significant threat to human livelihoods and sustainable development in many parts of the world (IPCC, 2022). Global climate change is possibly the greatest environmental challenge facing the world this century. It is the responsibility of our national, provincial, local government and all human beings to preserve the environment, restore the natural ecosystems and put in place policies, strategies, implementation documents and plans to address climate change. The impacts of climate change vary from loss of human lives, loss of animal life, eradication of plants, drought, floods, heat waves, loss of biodiversity and weather extremities.

South Africa is severely impacted by climate variability and frequently experiences droughts, floods, and other extreme weather events (IPCC 2022). Such events cause significant damage to infrastructure, ecosystems, and livelihoods. It is women, youth, the unemployed and those living in informal settlement that are most vulnerable to climate change. Climate change has an impact on the economy, various industries namely the mineral and energy industries. The South African economy is dependent on primary sectors such as agriculture and mining, particularly minerals extractives, which are natural resource dependent and energy intensive. Climate change impacts such as increased temperatures, rainfall variability and increased coastal storms and sea level rise will have direct impacts on South Africa's natural resources and infrastructure, affecting food security and health, threatening water, and coastal resources, and impacting on development. These impacts will be especially felt by the poor, as they will be more exposed to them and have fewer resources to cope with these impacts. This will exacerbate social inequalities facing the country.

Cities act as the concentration of economic activity within any region, consume most resources within the country and act as a major contributor to environmental degradation. This intense utilization of resources has severe effects on the natural environment within the region causing the ecosystems within the area to become severely distressed. The City of Ekurhuleni (CoE) is no different in this respect as it consists of a highly concentrated population that is serviced by major infrastructure, which renders them vulnerable to the impacts of climate change and environmental degradation. These impacts may be warmer temperatures, fiercer storms and increases in rainfall over shorter periods which contribute to the exposure of society to flash floods and other natural disasters. Better urban planning and policies can reduce energy use and greenhouse gas emissions and improve the resilience of urban infrastructure to climate change, thus shaping future trends. The role of local government and municipalities is that of ensuring that they protect the people, provide clean livable spaces for the communities, provide efficient transport, ensure the reduction of air pollution, maintain green spaces within the cities, water provision, waste collection, reducing greenhouse gas emissions and providing awareness and education on climate change, its impacts and what the city is doing and can do in future to address these impacts.

Municipalities implement all policies and regulations developed at national and provincial government level. Municipalities have access to the people and baseline data on the ground which can be used to monitor and evaluate the impacts of the implemented programs and effectiveness of the policies. The municipalities have a clear idea of the locality and socio-economic topography of the cities and are

the entry points to the public through service delivery which is aimed at ensuring that cities are resilient to climate change through climate mitigation and adaptation practices. Service delivery should be transparent and consider the environment and improve human life while at the same time ensuring that cities can handle the blows of climate change and that cities can recover from climate change and natural disasters. Cities can make sure that they lessen their vulnerabilities and plan better for climate change through strategic and integrated city planning.

“In both mitigation and adaptation, cities have a crucial role to play in managing the unavoidable and avoiding the unmanageable. Cities, where most of the world’s population resides, are vital actors in addressing climate change. Well-planned, compact cities can be highly resource-efficient and lead to lower greenhouse gas emissions per person. Cities, as centers of expertise and innovation, can invest in greening sectors, such as transport, buildings, and waste management, creating jobs and supporting long-term economic growth. Also, as major decision-makers in the flow of goods and services, cities can be leaders in creating demand for environmentally friendly products and sustainable consumption’ (UNEP- Climate Change the Role of Cities: June 2009)

“Climate Change Mitigation refers to efforts to reduce or prevent emission of greenhouse gases. Mitigation can mean using new technologies and renewable energies, making older equipment more energy efficient, or changing management practices or consumer behavior. It can be as complex as a plan for a new city, or as simple as improvements to a cook stove design. Efforts underway around the world range from high-tech subway systems to bicycling paths and walkways.” (UNEP)

“Adaptation refers to adjustments in ecological, social, or economic systems in response to actual or expected climatic stimuli and their effects or impacts. It refers to changes in processes, practices, and structures to moderate potential damage or to benefit from opportunities associated with climate change. In simple terms, countries and communities need to develop adaptation solution and implement action to respond to the impacts of climate change that are already happening, as well as prepare for future impacts.” (UNFCCC)

Tackling climate change will require urgent and transformational changes across all sectors at a municipal level. It will require innovations in urban and infrastructure planning, a massive shift to clean energy sources and changes to the utilization of land, water, and food (IPCC, 2022). To advance in the above-mentioned actions, the City of Ekurhuleni is guided by this update to the Climate Change Response Strategy (CCRS) (the first was approved in 2017) which is the overarching framework for all the City’s climate change actions and ambitions.

On the basis of the evidence base for climate mitigation and adaptation, this revision to the CCRS presents the following key goals and targets:

Mitigation

In 2022, the City prioritized responding to climate change through the development of a Green City Action Plan (GCAP) which identified city-level policies, investments, and planning strategies to help the City meet its climate mitigation targets (reduction in fossil fuel energy use by 25%, reduction in private fossil fuel vehicle kilometers travelled by 20%, 50% reduction in waste sent to landfill, improvement in water security by 20% and reduction in greenhouse gas (GHG) emissions by 2030 compared to a Business-as-usual (BAU) scenario). These targets were aligned with the *Ekurhuleni+* and *Ekurhuleni+ Challenge 2030* targets. With this update to the Climate Change Response Strategy, the scope of these targets has been extended for each of the emission areas to include the full

citywide emissions as reported in the 2019 GPC-aligned Greenhouse Gas (GHG) Inventory. The level of ambition has also been enhanced from the GCAP for 2030 and the time horizon of the targets was extended to include targets for 2050.

<i>Goal</i>	Ekurhuleni commits following a pathway towards being a net zero emissions city by 2050, demonstrating leadership, and leveraging support for improving the livability of the city and the health and well-being of its residents. This commitment will complement the national and provincial government's mitigation commitments and efforts and address the city's primary development needs with regards to energy, transport, sanitation, and waste management.
<i>Target</i>	As the goal of net zero is dependent on multiple factors, including the actions of other stakeholders, the city commits to taking every possible action and tackling the barriers to net zero by adopting a target of at least 70% reduction in citywide GHG emissions by 2050 compared to the base year (2019) level of 20.71 MtCO ₂ e. The interim target for 2030 is a reduction of 19% GHG emissions below base year levels by 2030. A key measure in achieving these targets is the phasing out of fossil fuels by going beyond the GCAP's 2030 BAU targets and reducing reliance by 100% by 2050.

Adaptation

The GCAP also included climate adaptation targets that have been reviewed in light of the more recent update to the Climate Hazards and Vulnerability Assessment in 2024. This version of the strategy has included the following climate adaptation goals and targets.

<i>Goal</i>	Ekurhuleni commits to building resilience to climate-related impacts and improving the quality of life for its citizens by investing in natural resource management, sustainable agriculture, disaster management and the creation of green jobs.
<i>Target</i>	-30% increase in the percentage of biodiversity priority areas by 2030 and 80% increase in the percentage of biodiversity priority areas by 2050; -10% increase in the percentage of protected biodiversity areas by 2030 and 80% increase in the percentage of protected biodiversity areas by 2050; -30% reduction in alien invasive alien plants by 2030 and 80% reduction in alien invasive plants by 2050; -20% improvement in water security by 2030 and 80% improvement in water security by 2050; -Reduce pollution in rivers and wetlands by 10% by 2030 and reduce pollution in rivers and wetlands by 80% by 2050; -20% increase in recreational open spaces by 2030 and 80% increase in recreational open spaces by 2050; -10 % reduction in climate related disaster risks by 2030 and 80% reduction in climate related disaster risks by 2050;

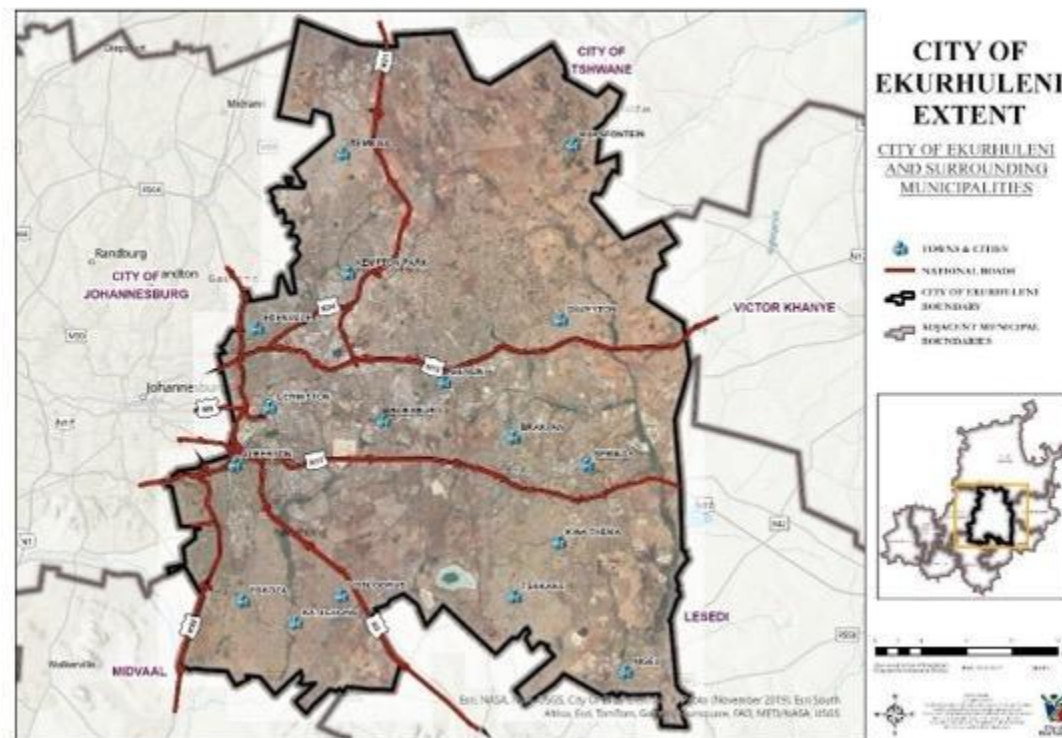
	-At least 20% of the food consumed in the region is grown sustainably and locally by 2030 and 80% of the food consumed in the region is grown sustainably and locally by 2050; -50% of farms implement energy efficiency and renewable energy upgrades by 2030 and 80% of farms implement energy efficiency and renewable energy upgrades by 2050; -50% of farmers implement drip irrigation systems by 2030 and 80% of farmers implement drip irrigation systems by 2050; -Create 500 new green jobs by 2030 and create 2000 new green jobs by 2050; -Provide training programmes on green skills for 500 residents by 2030 and provide training programmes on green skills for 2000 residents by 2050; and -Establish a Climate Advocacy Network with 50 stakeholders and conduct 5 advocacy events every year till 2050.
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In addition, the City in partnership with C40 Cities Climate Leadership Group (C40 Cities) and supported by the South African Cities Network (SACN) established a Just Transition Commission which recommends a conscious process of anticipating and planning for a just urban transition through five strategic imperatives (the five Rs): Re-industrialize to achieve job creation and economic growth, Re-urbanize to achieve sustainable urban integration, Re-govern to achieve cooperative governance, Re-mobilize to achieve social empowerment and Re-generate to achieve sustainable environmental benefit.

CHAPTER 2: City Context

History & Extent:

The City of Ekurhuleni (CoE) is the fourth largest municipality in South Africa with nine local authorities and 101 wards. It was formed in 2000 from the joining of several municipalities and is located on the East Rand of Gauteng Province, covering an area of approximately 1975km² (refer to figure 1). The neighboring municipalities include the City of Johannesburg, the City of Tshwane and Sedibeng District Municipality. Victor Khanye Local Municipality of the Nkangala District Municipality of Mpumalanga Province shares a short boundary in the east. Ekurhuleni was formed through the integration of two existing regional entities, namely Kyalami Metropolitan and the Eastern Gauteng Services Council. The main communities of the City are Tembisa, Katlehong, Vosloorus, Duduza, Daveyton and Thokoza.



Demographic and Socio-Economic Analysis:

According to the 2022 Census, population numbers in Ekurhuleni were sitting at 4, 006,691 with 48.9% being females and 51.1% being males. Total households were recorded to be about 1,421,003 with 31% of the people in the city living in poverty, 49% receiving social grants and 36.9% of the youth being unemployed (refer to figure 2). An important feature of the growth in population numbers is the net migration into the city from Limpopo, Eastern Cape and KwaZulu Natal. The migrant laborer from outside countries are mostly from Zimbabwe, Mozambique and Malawi with a few from other South African Development Community (SADC) countries (CoE One Plan, 2024). Population densities are high especially in the former township and informal residential areas which are characterized with inadequate housing and other service delivery issues. Despite having a large percentage of the population of working age, the rate of unemployment is still high in Ekurhuleni.

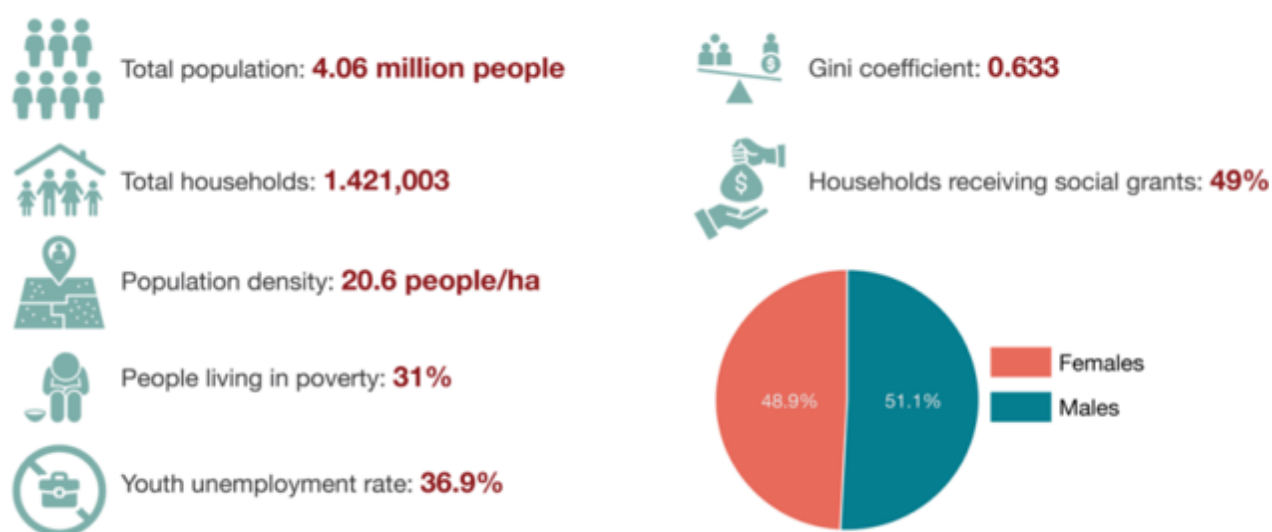


Figure 2 Summary of key demographics & socio-economic metrics (CoE One Plan, 2024)

Economic Analysis:

The City of Ekurhuleni contributes 21.2% to the provincial Gross Domestic Product (GDP) and forms part of the economic and employment core of the Gauteng City-Region. In terms of the total contribution to the Gauteng Province, Ekurhuleni is ranked third and contributes 8,11% to the country's Gross Value Added (GVA), with a growth rate of 0,72% (refer to figure 3). The CoE's economy is extensive and varied and is currently comparable in size to that of many small African countries. This is attributed to many factories for goods and commodity production being situated in Ekurhuleni. Of particular importance to the City's economy are the freight and warehousing operations linked to the OR Tambo International Airport. This makes Ekurhuleni a significant role player in not only the development of its region but the country as a whole.



Figure 3 Summary of key economic metrics (CoE One Plan, 2024)

The City differs vastly from other large cities in the country, such as Johannesburg, Cape Town, Pretoria and Durban, that reinvented themselves around relatively mature city centers. The absence of an urban core, juxtaposed with high population densities over vast stretches of land supporting largely mining, agriculture, logistics and industrial economic activities, provides an opportunity for the City to

be the perfect arena for a new approach to spatial and economic transformation. The spatial and economic transformation approach (figure 4) includes eight Catalytic Land Development Areas that are the focus areas for investment and transformation. The areas include (refer to figure 4):

1. The Kempton Park CBD-Rhodesfield area (1) which is a prominent component of the Aerotropolis, and which represents the major node of economic activity within Integration Zone 1.
2. The Boksburg CBD (2) and surrounds, which combined with the Germiston CBD (3) and Benoni CBD (4) represent a significant part of the City western mining belt with extensive opportunity for residential infill development along the road and rail network (corridor). Collectively the four areas noted above represent the economic core of the City of Ekurhuleni which also includes the Aerotropolis.
3. The Tembisa CBD (5) which represents the Tembisa Urban Hub and surrounds at the northern end of Integration Zone 1.
4. The Vosloorus Urban Hub (6) which could also functionally extend to the Kathoza Junction precinct to the west.
5. The KwaThema CBD (7) which could also extend southwards to include the cluster of housing projects in the vicinity of Duduza.
6. The Daveyton CBD or Urban Hub (8) which could also functionally extend to include the Etwatwa CBD further to the east along the corridor.

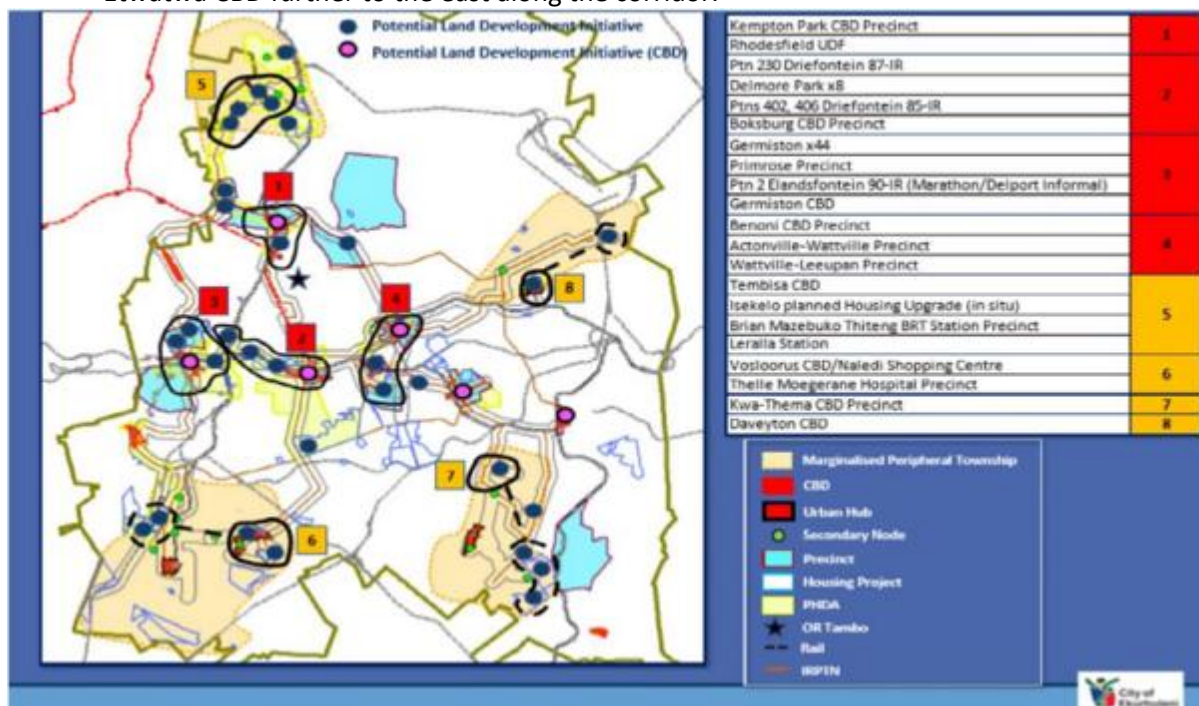
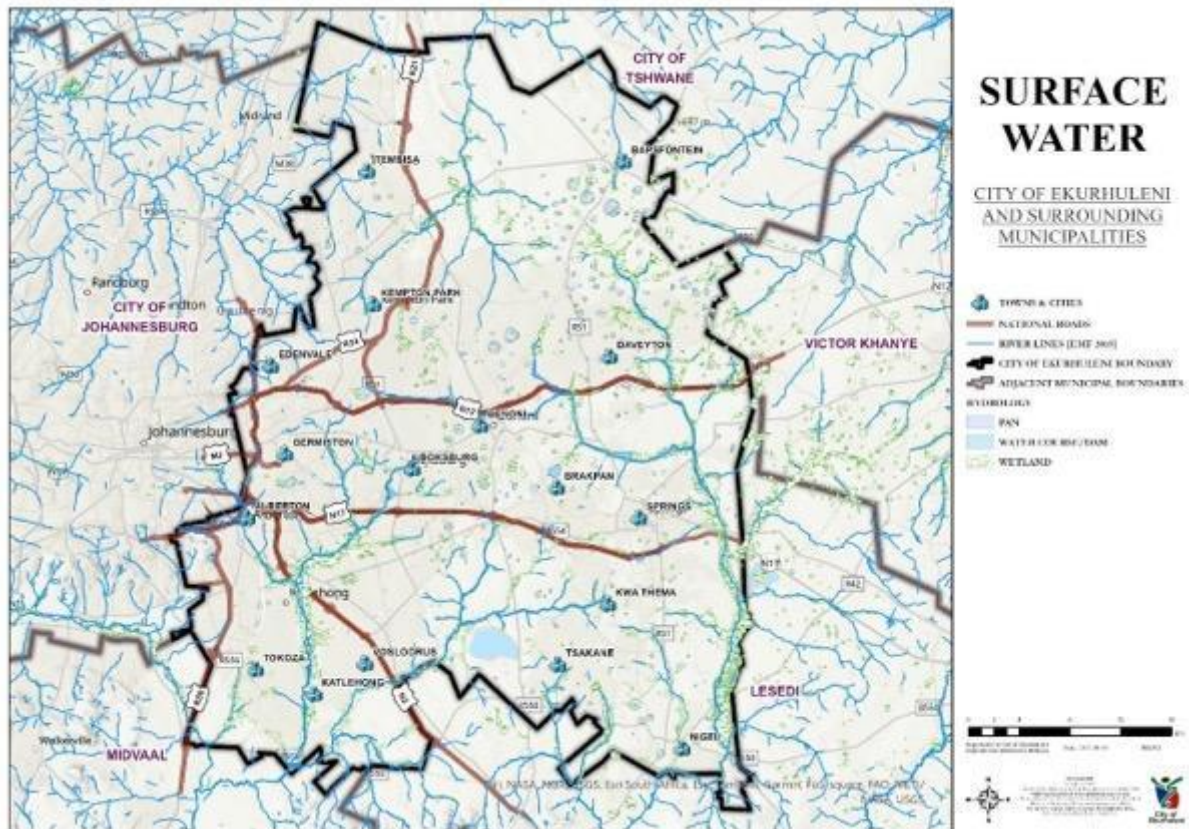


Figure 4 Spatial economic transformation for Ekurhuleni: Catalytic Land Development areas (One Plan, 2024)

The City was confronted with having to create a single uniform identity, and to create and optimize linkages between towns, townships and economic centers. This included the promotion of access to services and facilities and the protection and maintenance of open spaces and lakes with the vision of the Gauteng City region in mind. While largely modified by urban, mining and agricultural development, the CoE still supports threatened biodiversity and important ecological infrastructure within the grassland biome, which offer a range of ecosystem services. Due to the significant extent of modification of the natural landscape, most of the remaining ecosystems in the CoE are threatened.

Topography and Landscape

The convergence of the Limpopo and Vaal river catchments is observed within the CoE region. The terrain is generally flat with elevations ranging from 1460 m to 1760 m. The following topographical features are prominent within the landscape of Ekurhuleni i.e., plains with pans; undulating plains with pans; strong undulating plains; superimposed river valley (i.e., Blesbokspruit) on plains with pans and ridges. The occurrence of groundwater in the CoE is prominent, due to the underlying geology within the region, which is dominated by dolomite of the Chuniespoort Group and tillites of the Dwyka group, both of which are formidable for the water carrying capacity. The surface hydrological system consists of 6 river or spruit systems (refer to figure 4). The Blesbokspruit, is a system that originates to the north of Benoni and Daveyton and flows southwards through Springs and Nigel towards the Vaal River. The eastern part of the catchment contains extensive natural wetlands, while the western part is highly modified by agriculture and human settlements. Key industrial sites including mine dumps and slimes dams, waste disposal sites, intensive agriculture, and sewage works all impact negatively on water quality. The second river system is the Klip River and its tributaries. The Riet spruit originates in the south-west of the Benoni area and joins the Klip River outside the CoE boundary. The Natalspruit, another tributary of the Klip River, rises in and around the Germiston and Boksburg areas. The upper reaches of the Klip River can be found to originate within Kathlehong. The pollution within these spruits can be attributed to human settlements, agricultural practices and industrial activities. Although these rivers join the Vaal River, they do so downstream of the Vaal dam, thus the effects of this pollution on the CoE's quality of drinking water is not problematic. However, the pollution affects both the aesthetic and natural aspect of the Vaal River. The third river system includes both the Kaal and Olifant Spruits. These originate in Kempton Park and Tembisa and flow north to join the Hennops River in Centurion. There is serious pollution in this system, which is attributed once again to human settlements and agricultural activities. The Jukskei Spruit is the fourth system and has a number of small tributaries within the system, which drain to the western region of the CoE around Edenvale. This system takes control as it leaves Ekurhuleni through parts of Alexandria. The fifth river system is the Bronkhorst Spruit, which is located in the eastern region. This area is drained by two small spruits namely Os spruit and Koffie spruit, which feed the Bronkhorst Spruit. The sixth and final system is the large Rietvlei Spruit. This system starts in the smallholdings area of Kempton Park and flows northwards past the OR Tambo International Airport to Rietvlei Dam. This dam is a high contributor of water supply in Tshwane. The primary supply of this water originates from agricultural and industrial surface runoff. The Grootvlei River in the Bapsfontein area is a tributary of this system. An impressive feature of the CoE region is the prevalence of a number of pans, which is directly linked to flat topography. They cover a total area of 3 559 ha and are mostly seasonal. A few perennial pans are found within agricultural areas. A number of lakes are situated within the municipal region and are primarily a creation of the Gold Mines in the area. The Germiston, Benoni and Boksburg lakes are prime examples of this and are utilized as recreational parks. However, the water quality of these systems is under severe stress due to problems associated with water hyacinth, mine dust pollution and storm water drainage. The water quality is generally poor in all river/stream systems within Ekurhuleni (details provided below). The poor management of storm water, sewage treatment plant,



industries and agricultural activities all contribute greatly to the negative impacts on river/stream systems.

The damming of most river and spruit systems is a common problem associated with the agricultural activities in the region. Many of the rivers have been canalized, mostly for storm water control in urban areas or for agricultural purposes. The ever-increasing human pressures in the area have caused many of the natural systems in the area to experience a downward cycle of deterioration. As described above the natural systems in the CoE are overshadowed by contributions from sewage works and mining. The increase in urbanization has resulted in an increase in the surface water runoff of almost 300%. The higher river flood peaks and levels pose a serious threat to all developments (mainly informal housing) within designated flood zones. Many parts of Tembisa, Katlehong, Tsakane and Nigel are at particular risk.

Water resources regulate temperature and weather patterns, sequesterate carbon, perform flood attenuation functions, store water for dry periods and provide cooling effects. All these functions are important for climate action within Ekurhuleni. It is therefore necessary for resources and efforts to be directed towards the protection and management of water bodies within the City.

CHAPTER 3: The policy context for Ekurhuleni's Climate Change Response Strategy

To become a climate-resilient and net-zero carbon city, Ekurhuleni leans on several key international, national and provincial policies and strategies for direction.

International perspective:

The Paris Agreement has been ratified by 196 parties, including South Africa. The Agreement commits the parties to keep global warming below 2°C and limit the temperature increase to 1.5°C. As part of the agreement, all parties and stakeholders in different sectors are encouraged to shift away from fossil fuels, foster climate resilience and reduce climate vulnerability. The role of subnational governments in the fight against climate change is significant. Hence the CoE recognized the Paris Agreement as an overarching framework for climate mitigation and adaptation within the City.

National perspective:

South Africa has become a strong player in the global climate change and sustainable development space. This is evident in the following legislative commitments:

1. Section 24 of the Constitution of the Republic of South Africa (1996), which states that everyone has the right to (a) an environment that is not harmful to their health or well-being; and to (b) have the environment protected, for the benefit of present and future generations.
2. The National Development Plan (NDP) 2030, which sets out the country's commitment to becoming an environmentally sustainable, climate resilient, low-carbon economy and just society by 2030. Chapter 5: titled Environmental Sustainability and Resilience, outlines a number of objectives and actions aimed at ensuring environmental sustainability and an equitable transition to a lower carbon economy. In addition, Chapter 3: Economy and Employment, includes a focus on the green economy, transition to a low carbon economy and society, and motivation for green product and service development.
3. The National Climate Change Response Policy (NCCRP) published as a White Paper (2011), which documents the vision and policy of the South African government in developing an effective response to climate change and moving towards a low carbon economy.
4. Climate Change Bill (2018), which outlines the country's commitment "To build the Republic's effective climate change response and the long term, just transition to a climate resilient and lower carbon economy and society in the context of an environmentally sustainable development framework; and to provide for matters connected therewith". The Bill enables MECs responsible for the environment and Municipal Mayors to undertake a climate change needs and response assessment, and a climate change response implementation plan.
5. The National Climate Change Adaptation Strategy (NCCAS) (2019), which serves as a common reference point for climate change adaptation efforts in the country and provides guidance for national climate change adaptation objectives.
6. Climate Change Act (2024), which aims to enable the development of an effective climate change response and a long-term, just transition to a low-carbon and climate-resilient economy and society for South Africa in the context of sustainable development. The Act is designed to define, manage, monitor, and implement South Africa's response to climate change.

Climate adaptation and mitigation efforts for the City of Ekurhuleni are informed by the above-mentioned national legislation.

Provincial perspective:

Gauteng contributes a significant portion of national greenhouse gas (GHG) emissions. It is therefore fundamental for the province to invest considerably in mitigation efforts required to meet South Africa's international emissions-reduction obligations. In the Gauteng province, climate action is guided by the Gauteng Climate Change Response Strategy-GCCR (2018) which is focused on greenhouse gas mitigation, building sustainable and resilient socio-economic systems in the province. The strategy puts forward interlinked mitigation and adaptation actions and targets in ten sector-based response programmes. The GCCR has ten priority climate response actions namely: natural resource restoration, renewable energy adoption in new public infrastructure, strengthening early warning systems for agricultural sector, adoption of cleaner and alternative energy generation, sustainable waste management, adoption of cleaner mining and industrial processes, improve household energy efficiency, investment in sustainable transport systems, improve disaster risk reduction and management and strengthen integrated water resources management.

The largest municipalities in Gauteng namely the City of Tshwane, the City of Johannesburg and the City of Ekurhuleni have recognized the importance implementing climate action at local level by developing Climate Action Plans (CAPs) in the province. The CAPs comprise of innovative emission reduction and resilience-building actions that address the local impacts of climate change which are aligned with the overarching GCCR actions.

Ekurhuleni's CAP incorporates the GCCR actions in an appropriate context. As part of the climate mitigation interventions, the Ekurhuleni's strategy focuses on increasing sustainable and clean energy adoption to reduce fossil fuel energy use, improving energy efficiency in existing and new buildings to reduce GHG emissions, reduction of fossil fuel emissions from private vehicles by improving access to sustainable public transportation systems and reducing waste being sent to landfills. These actions are aligned with some of the GCCR priority actions. In terms of the climate adaptation interventions, the Ekurhuleni new CAP includes the following interventions: increasing biodiversity protected areas to retain ecosystem services (e.g., climate regulations, flood attenuation), restoration of water bodies to improve water quality and supply, increasing recreational open spaces, enhancing disaster preparedness and climate resilience, and raising City wide awareness on climate change and adaptation.

Local perspective:

The City of Ekurhuleni climate change action is guided by the following plans and strategies:

1. The existing Integrated Development Plan (IDP), which has put environmental wellbeing, climate change and GHG emissions reduction at the top of its priority list. A problem statement is highlighted in the IDP and acknowledges the need to address certain climate change related issues within the municipality to ensure the city maintains environmental wellbeing. *"Ekurhuleni's Growth and Development Strategy identifies the need to achieve environmental wellbeing as key goal to be achieved leading to 2055. The ongoing degradation of the environment involves on-going systemic effects of mining on land, air and water, industrial pollution and human incursion into hazardous mining wastelands and dolomitic area. This situation will be aggravated by climate change which will increase the intensity and frequency of storm events and put pressure on food supply chains, A second set of environmental challenges relates to the unsustainable consumption*

resources (water, soil, energy and waste) by urban and industrial production systems and the degradation of biodiversity and ecosystems.”

2. The Growth and Development Strategy (GDS) 2055, which traces Ekurhuleni’s development through three historical phases and using this historical analytical framework, it argues that the discovery of gold and coal in the first phase of development, and the twinning of the mining and manufacturing industries, translated into natural resource use that was not sustainable for the environment and the residents of the City. The third phase of development ensured access for the majority of the City’s residents, which were excluded in the past, to land resources which at most was also extractive in character in line with the two phases of development. Essentially, the three phases of Ekurhuleni’s development have resulted in certain undesirable environmental development outcomes. (City of Ekurhuleni IDP: 2018/2019-2020/2021). These are: high carbon emissions from electricity generation; unsustainable natural resource usage; and uncontrolled pollution. To protect the natural environment and promote resource sustainability the key initiatives or interventions that will be rolled out during this term as part of the GDS includes: Development of parks; Renewable/Alternative energy; Implement recycling program; Waste minimization; Keep Ekurhuleni Clean program; Protection of natural resources; Pollution control; and Urban management. To Protect the Natural Environment and Promote Resource Sustainability, the GDS 2055 stresses the importance of mainstreaming biodiversity and ecosystem goods and services in the economy so that their full value is recognized, and that their sustainable use is rewarded. The City will continue to protect the natural environment and promote resource sustainability. Alternative sources of energy will be investigated and implemented. The Ekurhuleni waste minimization strategy will be implemented to reduce waste in the landfill sites and to improve the cleanliness of the City; this will also include intensifying the recycling project. Air quality monitoring, rehabilitation of water bodies, compliance with standards for drinking water will be at the center of the efforts to protect the natural environment. The City will continue to provide and upgrade the different levels of parks to enable communities to have access to well-developed open spaces. Water conservation, demand management and pollution prevention to protect the existing water resource capacity will be central to the agenda during the term.
3. The Draft Departmental Service Delivery and Budget Implementation Plan (SDBIP) 2021 -2022 has been put against the City’s climate change and resilience ambitions. The focus for this review was to identify alignment with departmental outcomes and indicators. This is a crucial step in the institutionalization of the previous and second iteration of the Climate Change Response Strategy and strategic move towards ensuring that the city’s climate change goals and targets are achieved. Moreover, the City with technical assistance from the World Bank’s IFC has just finalized a draft Green Cities Action Plan. This action plan seeks to support the City achieve its mitigation targets and create a roadmap that will support the city to become a Green City. Therefore, where possible the outcomes that align with the actions that have been proposed in the Green Cities Action Plan have been highlighted. It is acknowledged that some departments have projects that align to climate change and resilience which have not been included in the SDBIP 2021 – 2022, and as such this has been noted as a limitation of the current review.
4. The Advance Practices for Environmental Excellence in Cities (APEX) tool which is an innovation of the International Finance Corporation (IFC) in partnership with the State Secretariat for Economic

Affairs of the Swiss Confederation (SECO). The APEX tool is an online App that helps quantify and prioritize policy and investment solutions across four key sectors namely: energy, transportation, waste and water. The APEX tool was used to develop the Green City Action Plan, the tool identified the GHG emissions, measures and targets across the APEX sectors (GCAP, 2022). There are several targets and priorities in the GCAP that fall outside the scope of APEX and the Green City Action Plan. These aspects are important for the overall sustainability of Ekurhuleni, and several departments in CoE are doing work in these areas. However, they are not included in Apex modelling exercise being referred to because the version focused exclusively on climate change mitigation and resource efficiency, specifically in the energy, transportation, waste, and water sectors.

5. The Green City Action Plan (GCAP) identifies actions including city-level policies, investments, and planning strategies that can help the City meet its climate mitigation targets by 2030. The GCAP focuses specifically on climate change mitigation, as well as resource efficiency in terms of energy, transportation, waste and water sectors. As part of the Climate Change Response Strategy (CCRS) revision, the GCAP mitigation targets have been extended to 2050 and now include adaptation target that have been reviewed in light of the more recent Climate Hazards and Vulnerability Assessment in 2024.

CHAPTER 4: CAP Evidence Base: Ekurhuleni's greenhouse gas emissions

Carbon dioxide (CO₂) and other greenhouse gases (such as methane and nitrous oxide) are being added to the atmosphere faster than it can be removed by other parts of the carbon cycle. Since the Industrial Revolution there has been a large increase in human activities such as fossil fuel burning, land clearing and agriculture, which affect the release and uptake of CO₂. Emissions from activities taking place in urban environments constitute about 70% of total global emissions. Reducing emissions in cities is synonymous with a more sustainable and livable urban environment. As a growing city in one of Africa's major economic hubs, Ekurhuleni is a significant contributor to local and global emissions, and therefore has numerous opportunities to adopt a more sustainable development pathway. The greenhouse gas (GHG) emissions inventory is the foundation of climate change mitigation response. The results of the GHG inventory are presented in this section.

According to the 2019 Base Year Emissions Overview which covers GPC BASIC sources (see text box), CO₂ and other greenhouse gases are produced by the activities and sources outlined below.

History of Ekurhuleni's GHG inventory:

The total emissions for the 2018/19 financial year amounted to 20.71 MtCO₂e, broken down as follows:

- stationary energy sources, from energy and electricity consumed in buildings and industries resulted in emissions of 13.15 MtCO₂e (64%)
- transport (on-road and rail, but excluding aviation) 6,26 MtCO₂e (30%)
- waste (0.57 MtCO₂e) and wastewater (0.73) MtCO₂e (6%).

The emissions per capita for this year amount to 5.8 tons of CO₂e / capita

Box SEQ Box * ARABIC 1: GHG inventory approach

The inventory was developed using the Global Protocol for Community-Scale Greenhouse Gas Emission Inventories (GPC), an internationally recognized methodology to calculate city-wide emissions. The City followed the BASIC approach, which includes direct emissions from stationary energy, transport and waste (Scope 1) and indirect emissions from grid-supplied electricity (Scope 2). It excludes emissions from Agriculture, Forestry and Land-use (AFOLU) and Industrial Processes and Product Use (IPPU). Lastly, the approach excludes all GHG emissions that are generated outside the City's boundaries as a result of activities within the City (Scope 3), for example emissions from production of goods outside the City, for consumption within the City.

The first ever city-wide GHG inventory for Ekurhuleni was completed in 2022 based on data from the 2018/19 financial year and was updated for the 2021/22 financial year. This citywide inventory is the first step towards understanding the emissions profile of the city. The inventory forms the basis for the subsequent emissions trajectory and scenario modelling used to identify mitigation strategies and quantify GHG reductions and formulate emissions targets. Mitigation strategies are made up of a series of actions aimed at reducing the city's contribution to GHGs, and at the same time driving the development of a cleaner, more equitable and environmentally sustainable city.

The inventory helps to track emissions levels over time and also provides insights into the activities in the city that drive emissions, such as transportation, waste and energy use in buildings. The GPC requires that cities, at a minimum, report emissions in the following areas:

- Stationary energy: fuel burned to produce energy for use in buildings (residential, commercial, and industrial), including solid/liquid fuels (Scope 1) as well as electricity supplied to buildings by the grid (Scope 2).
- Transportation: fuel burned to produce energy for travel, including liquid fuels (Scope 1) as well as energy supplied by the grid to electric motors (Scope 2)
- Waste: emissions from the treatment of solid waste (e.g., waste disposed of in informal or managed landfills, open burning) and wastewater (e.g., wastewater treated in septic tanks, water treatment plants, or discharge into latrines or water bodies within the city limits).

These three sectors are generally the largest sources of GHG emissions in urban areas. Other sectors, such as agriculture, forestry, land-use (AFOLU) and industrial process and product use (IPPU) are also important, but according to the GPC standard, reporting them is optional.

2018/2019 Greenhouse Gas Emissions inventory:

20,710,626 tCO₂e

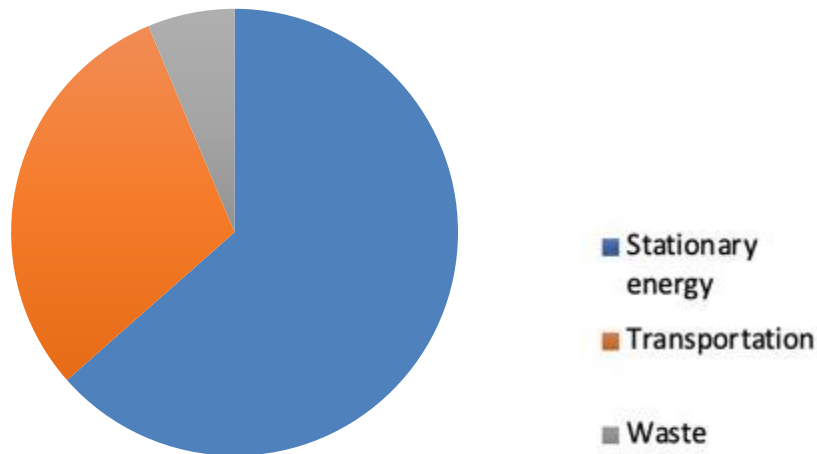


Figure 6 Historical distribution of Greenhouse Gas Emissions for the City of Ekurhuleni (Source: CIRIS, 2022 & 2024)

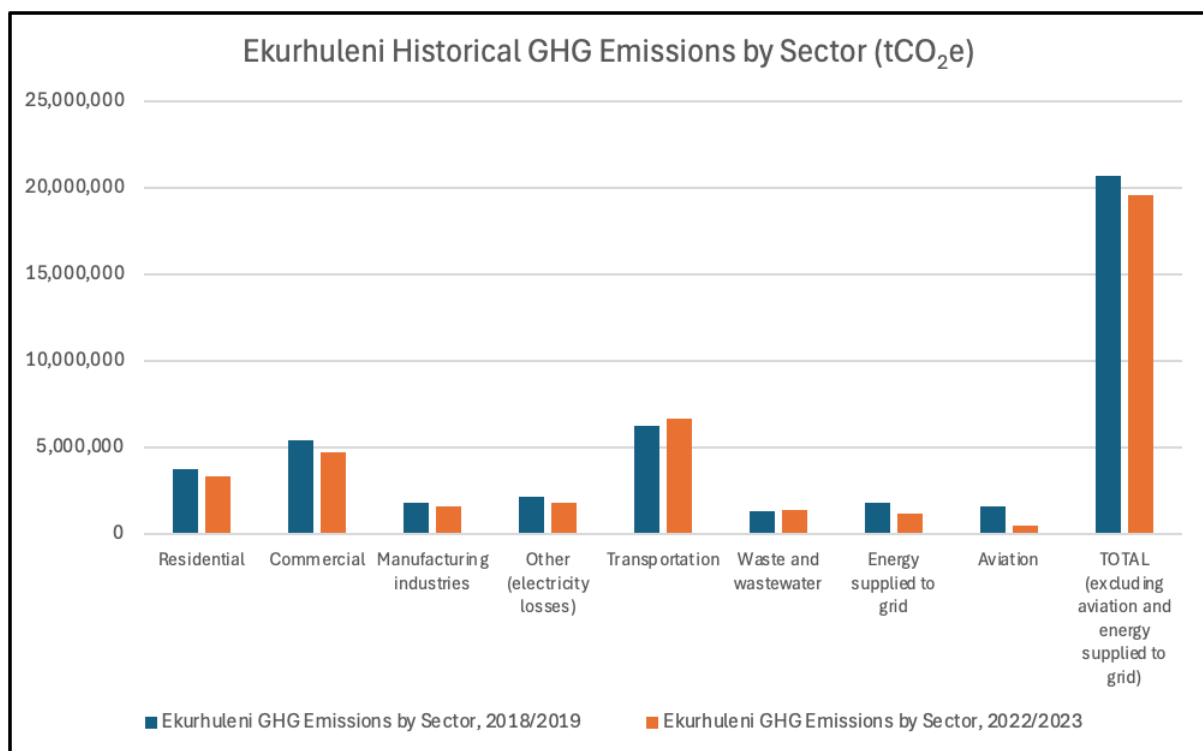


Figure 7 Greenhouse Gas Emissions by sub-sector and scope, 2019 (Source: CIRIS, 2022)

The main source of emissions is the use of energy within the city boundary. Stationary energy emissions are mostly attributable to the Commercial sector and contributes 64% to the total citywide emissions (or 13.15 MtCO₂e). Transport and waste are also major contributors, and respectively contribute 30% (or 6.26 MtCO₂e) and 6% (or 1.23 MtCO₂e). The waste emissions are approximately split between 0.57 MtCO₂e solid waste and 0.73 MtCO₂e wastewater generated and disposed within

the city boundary. 46% of GHG emissions take place as a result of direct fuel combustion within city limits (Scope 1). Scope 2 emissions due to electricity consumption account for 63% of emissions from the Stationary Energy sector. Figures 6 and 7 above show the distribution of GHG emissions for Ekurhuleni in 2019 and GHG emissions by sub-sector and scope. Emissions from the stationary energy sector are particularly high due to the high prevalence of coal-fired electricity from the national grid. Due to the transboundary (Scope 3) nature of Aviation emissions from flights to and from OR Tambo International they are not included in the totals of a BASIC inventory. It is important to note that the inventory was based upon the best available data and several assumptions, however there are multiple opportunities to improve the quality of the inventory in the future. Access to better inventory data sources is synonymous with improving planning capabilities, decision making and access to financial support for actions across the represented sectors. The data for the 2019 financial year was used as the basis for the GHG Scenario modelling used to develop the mitigation strategies.

2022/2023 Greenhouse Gas Emissions Inventory:

The GHG inventory was recently updated in 2024 based on the 2023 financial year. According to the latest GHG inventory, Ekurhuleni generated an estimated total of 19.57 MtCO₂e during the 2023 financial year.

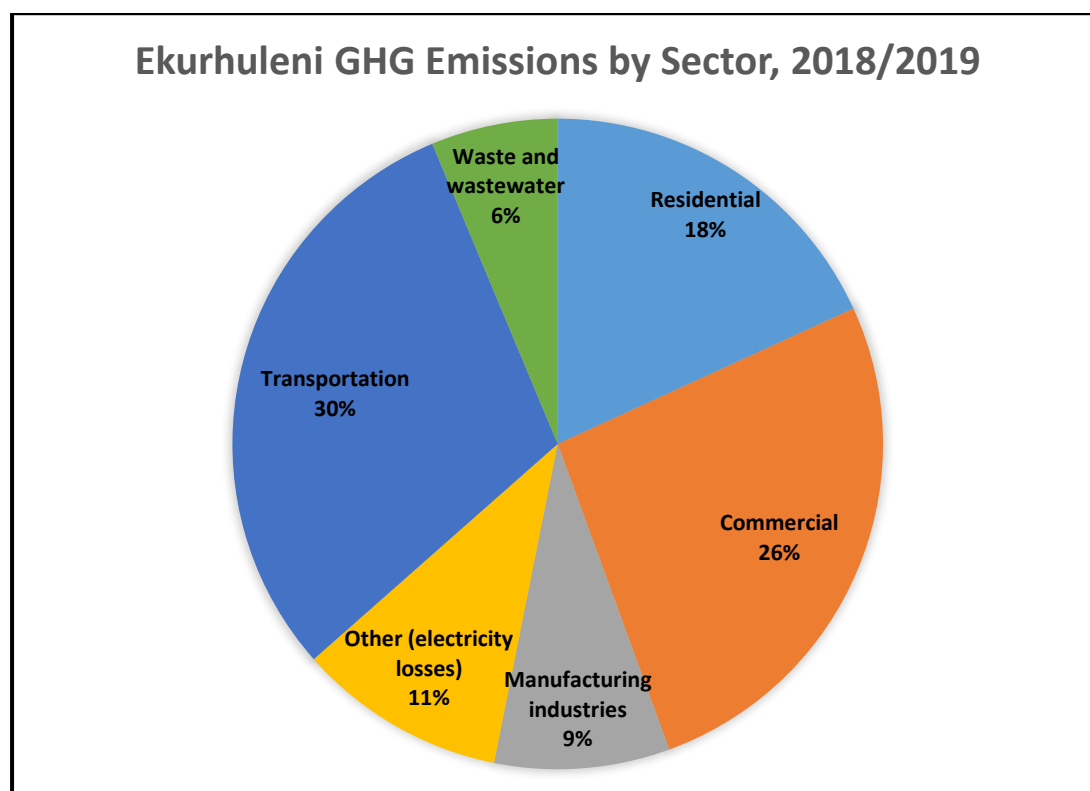


Figure 8 Distribution of Greenhouse Gas Emissions for the City of Ekurhuleni, 2023 (Source: CIRIS, 2024)

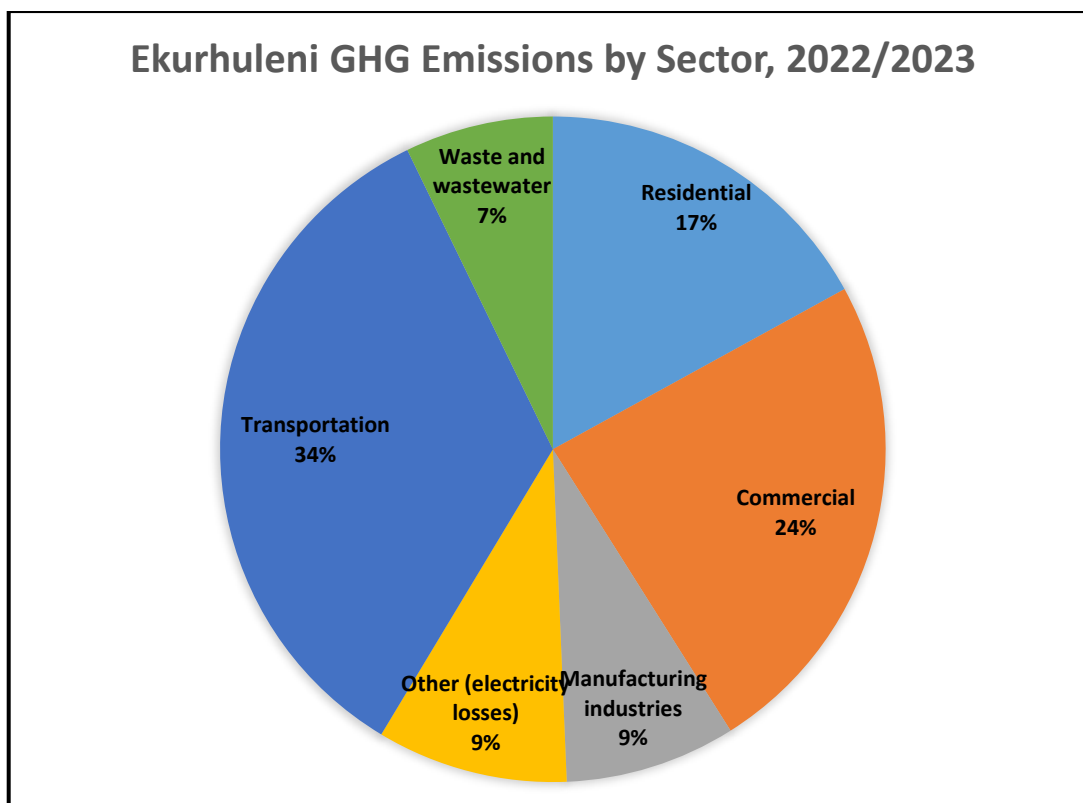


Figure 9 Greenhouse Gas Emissions by sub-sector and scope, 2023 (Source: CIRIS, 2024)

According to the latest GHG inventory, Ekurhuleni generated an estimated total of 19,57 MtCO₂e during the 2022/2023 financial year. This shows a slight decrease of 5.5% from the 2019 inventory and is likely due to the impact of load shedding and Covid-19 resulting in reduced electricity consumption over this period. For this year the overall emissions profile is very similar, and the main source of emissions remains the use of energy within the city boundary. Stationary energy emissions are mostly attributable to 11.47 MtCO₂e for the sector and they contribute 58.6% to the total citywide emissions. Transport and waste are also major contributors, and respectively contribute 36.9% (7.21 MtCO₂e) and 7% (1.41 MtCO₂e). The waste emissions are approximately split between 3% (0.59 MtCO₂e) solid waste and 4% (0.82 MtCO₂e) wastewater generated and disposed within the city boundary. 43% of GHG emissions take place as a result of direct fuel combustion within city limits (Scope 1) while the remaining 57% comes from electrical energy consumption in buildings and industries. Scope 2 emissions due to electricity consumption account for 96% of emissions from the stationary energy sector. Figures 8 and 9 above show the distribution of GHG emissions for Ekurhuleni in 2023 and GHG emissions by sub-sector and scope.

Comparative Analysis: 2019 and 2023 GHG emissions inventory:

Total GHG emissions for Ekurhuleni decreased from 20.71 MtCO₂e in 2019 to 19.57 MtCO₂e in 2023. The decrease is mainly attributed to emissions from the Stationary Energy Sector which significantly decreased from 13.15 MtCO₂e (2019) to 11.47 MtCO₂e (2023). The decrease was likely a result of reduced energy consumption as a result of the national load shedding and possibly reduced energy demand during the Covid-19 pandemic. Other possible contributing factors to the reduced emissions in the Stationary Energy Sector include accelerated transition to cleaner energy sources triggered by

the need for alternative energy sources because of load shedding and improved energy efficiency within the manufacturing and retail industries.

As Ekurhuleni's population grows, so does the level of on-road transportation (mostly by increases in private vehicle usage and ownership), which explains the increase in on-road transportation emissions from 6.1 MtCO₂e to 6.5 MtCO₂e (a portion of the increased usage of standby petrol and diesel generators may have also played a role in this increase, but there is no data available to separate fuel use into that used for transport and stationary energy use). Nonetheless, for both emissions and traffic congestion reasons imperative for the City to improve investment in green and sustainable transportation solutions (e.g., increased use of public and non-motorized transport, and electrification of public and private transportation) to address the issue of high GHG emissions from the sector. The waste sector emissions increased slightly over the 4-year period, mostly driven by increase in population according to the available data and waste categorization estimates (from 1.3 MtCO₂e in 2019 to 1.41 MtCO₂e in 2023). Further analysis would be required to determine the efficacy of improved waste management practices (e.g., recycling, waste to energy programs etc.) and changes in consumer behavior resulting in less waste being generated.

Scenario Modelling and Target Setting

This Strategy advances and builds upon the work of the GCAP and sets new targets that meet the goals of the Paris Agreement. It does this in three ways, firstly by extending the target year and modelling horizon from 2030 to 2050. Secondly by including a portion of emissions that were not originally included in the original Apex modelling and GCAP, and thirdly by setting new targets based on an ambitious scenario. It is important to note that the higher level of ambition requires additional actions to those outlined in the GCAP. These measures go further by demonstrating leadership in key emitting sectors and will be used to advocate for emissions reductions in areas that are outside the direct control of the City (such as decarbonizing the national grid to reduce the emissions from electricity consumed in buildings and industrial facilities). These priority actions collectively aim to achieve maximum emission reductions (and associated co-benefits) in the city.

The reference year of the scenarios corresponds to the 2019 GHG inventory and the forecast extends to 2050, with 2030 being a key intermediate target year. The scenarios were developed based on an ambitious scenario generated in Apex with similar levels of ambition and measures adopted by the neighboring cities of Johannesburg and Tshwane which have a similar emissions profile to Ekurhuleni. In future iterations of the strategy, new modelling based on an updated GPC inventory and new implementation assumptions will need to be carried out, however the Apex modelling provides a sufficient evidence-base for determining the targets and a pathway towards net zero emissions by 2050. The uncertainty relating to the feasibility of the goals and strategies increases the further one looks into the future, however the sectoral goals in the short-term are based on actions that are either already underway or that have already been planned. As this is Ekurhuleni's first Paris-aligned Climate Change Response, the pathway to net zero emissions as an end goal will come into sharper focus in future iterations of this plan and once the strategies and goals are tested in the implementation phase. The details of how the targets and goals were developed, and the Apex modelling outputs are covered in more detail in the Appendix.

Ambitious assumptions and implications

Business-As-Usual (BAU)

The Apex model used to produce the scenarios and estimated emissions reductions for the GCAP makes use of a combination of projected population, GDP, income and private vehicle ownership levels to estimate the emissions pathways for the various sectors under a BAU scenario (which assume no actions are taken to reduce the city's emissions). A short-term annual growth rate of 1.7% per annum was assumed for population and 2% per annum for GDP for 2019-2030. Long term growth rates for the additional 2030-2050 modelling carried out using Apex are based on population and economic growth outlook data from Oxford Economics using the same data for Ekurhuleni's neighboring city, Johannesburg which has a similar growth outlook). Income levels follow the SMEC Infrastructure and Community Services Backlog Study (2019), residential buildings were assumed to grow at the same rate as population (average 0.9% per annum and non-residential building areas were assumed to grow at an average of population and GDP growth rates (using an average 1.9% per annum growth rate for GDP). The BAU trajectory is represented by the top line in each of the graphs presented below.

The original GCAP set a target of 23.7% reduction by 2030 against a BAU scenario (or 22% below the 2019 base year level). As mentioned above, the baseline emissions estimate used for the GCAP excluded approximately 30% of the total emissions resulting from activities within the city boundary. This 30% is approximately evenly split between emissions from freight transport and electricity consumed by Eskom's direct customers within the city boundary. When applying the same GCAP measures to the total citywide emissions, the GCAP would achieve a 19% reduction from the base year by 2030, 3% less than the 22% set in the GCAP. The additional strategies required to achieve the full 19% reduction are related to emissions from freight transport, as that was the only sector not specifically addressed in the plan. The measures taken for electricity will be the same for the Eskom customers within the city boundary as they are for the customers supplied directly by the city.

The graph below indicates where the possible emissions savings under the ambitious scenario as modelled by Apex. It is clear that the majority of the reductions result from an increase in the proportion of clean energy in grid electricity (including embedded generation from solar PV), and energy efficiency measures in new and existing buildings. The remainder of the reduction potentials are split between measures taken to reduce emissions from transportation and from solid waste and wastewater.

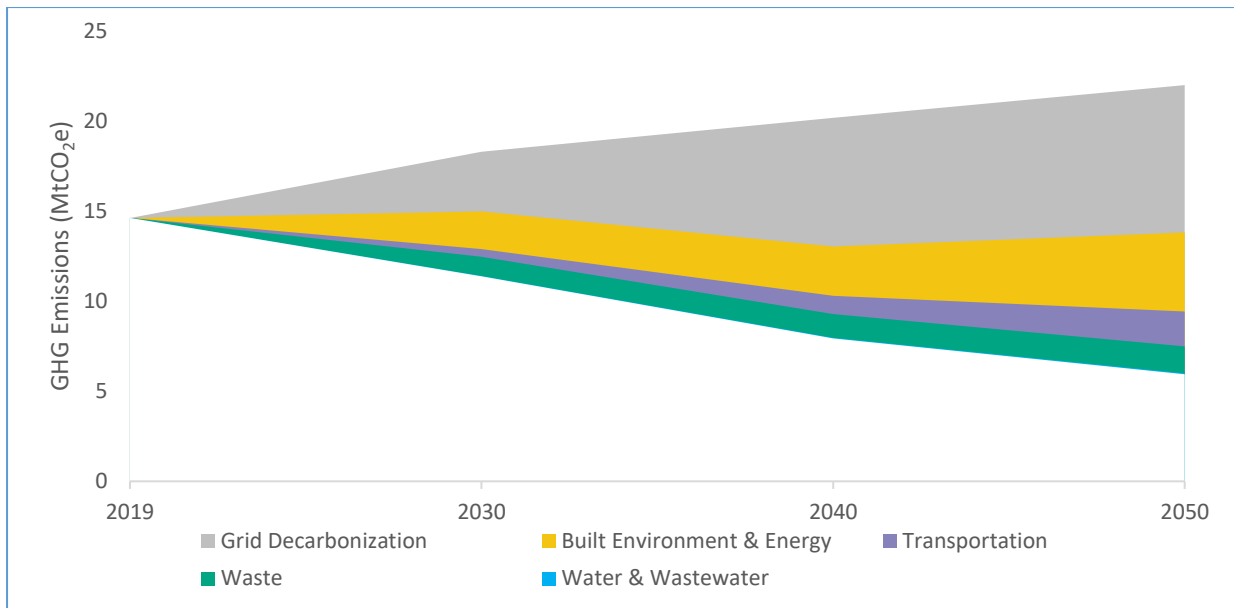


Figure 10 Emissions savings under the ambitious scenario as modelled by Apex.

When it comes to the 2050 target year, the following measures result in a 57% reduction from the base year level by 2050. This is what would be achieved under the modelled “ambitious” scenario; however, an even higher target is required to increase the likelihood of achieving net zero emissions. Achieving a 70% reduction by 2050 would be more in line with what is required to meet the goals of the Paris Agreement. A significant portion of the gap between the 57% and 70% reductions can be addressed through tackling emissions from freight transportation, facilitating a faster transition towards electric vehicles, improving the walkability and cycling opportunities and stronger efforts to decarbonize the electricity supply through buildings efficiency and small-scale embedded generation of electricity using rooftop and ground mounted solar photovoltaics. These additional measures are over and above the ambitious scenario measures outlined below.

Improvement in the grid emission factor for electricity from 0.928kg CO₂e/kWh in 2019 to 0.668kg CO₂e/kWh in 2030 and 0.403 CO₂e/kWh by 2050.

1. Built Environment & Energy:

MEASURES	2030	2040	2050
Existing Buildings with Energy Efficiency Refurbishment (40% Energy Savings)	GCAP	50% Private, 100% Municipal	100% Private, 100% Municipal
New Green Buildings (40% Energy Savings)		75% Private, 100% Municipal	100% Private, 100% Municipal
Energy Efficient Infrastructure		100% Streetlights & Traffic Lights	100% Streetlights & Traffic Lights

Rooftops with Solar Electricity Generation		20% Private, 40% Municipal	30% Private, 50% Municipal

2. Transportation

MEASURES	2030	2040	2050
Mode Shift (Private Vehicles Restrictions, Public Transport & NMT Investment)	GCAP	Private: 60% Public: 37% NMT: 3%	Private: 52% Public: 45% NMT: 3%
<i>Baseline 2019 (Mode Split by Passenger-km Travelled):</i> <i>Private: 76%</i> <i>Public: 21%</i> <i>NMT: 3%</i>			
Electric Vehicles		30% of new automobiles 20% of existing automobiles 50% of all buses 10% of all minibuses	60% of new automobiles 60% of existing automobiles 90% of all buses 25% of all minibuses

3. Solid Waste

MEASURES	2030	2040	2050
Anaerobic Digestion	GCAP	50% Food Waste	80% Food Waste
Composting		65% Garden Waste	100% Garden Waste
Recycling		75% Recyclables	90% Recyclables
Landfill Gas (LFG) Capture & Use		60% LFG Captured	60% LFG Captured

Waste-to-Energy		650 t/day Facility	650 t/day Facility

4. Water and Wastewater

MEASURES	2030	2040	2050
Existing Buildings Water Efficiency (30% Water Savings)	GCAP	30% Existing Buildings	30% Existing Buildings
Smart Meters in Buildings (10% Water Savings)		20% All Buildings	20% All Buildings
New Buildings Water Efficiency (30% Water Savings)		100% New Buildings	100% New Buildings
Wastewater Treatment & Reuse		338 MLD	338 MLD
Reduced Water Losses		24% Losses	24% Losses
Biogas Capture & Use		75% Biogas Captured	75% Biogas Captured

To meet the target of 70% will require additional actions to decarbonize the electricity supply and reduce emissions from freight transport. Even under high levels of ambition, reaching net zero emissions under the prevailing city context presents a significant additional challenge. Under the ambitious scenario there are remaining emissions in all sectors. However, the city is committed to seeking out ways of mitigating these residual emissions through re-planning efforts, pursuing technological advancement, and importantly seeking out support for financing further high-impact actions and working together with the national and provincial government, business, and industry where the city's mandate is limited.

Residual Emissions and Deadline 2020 Commitment

As Ekurhuleni is committed to supporting the goals of the Paris Agreement and Deadline 2020, the city has set a target to reduce emissions 19% by 2030 compared to 2019-levels. Ekurhuleni unconditionally commits to achieving a 70% reduction in emissions by 2050 compared to the 2019 base year. The city is also setting the additional conditional target of net zero emissions by 2050, which

is dependent on support for net zero by national government, the private sector, residents, as well as local and international finance entities. The additional support is required to tackle and resolve the barriers outlined in Table 1.

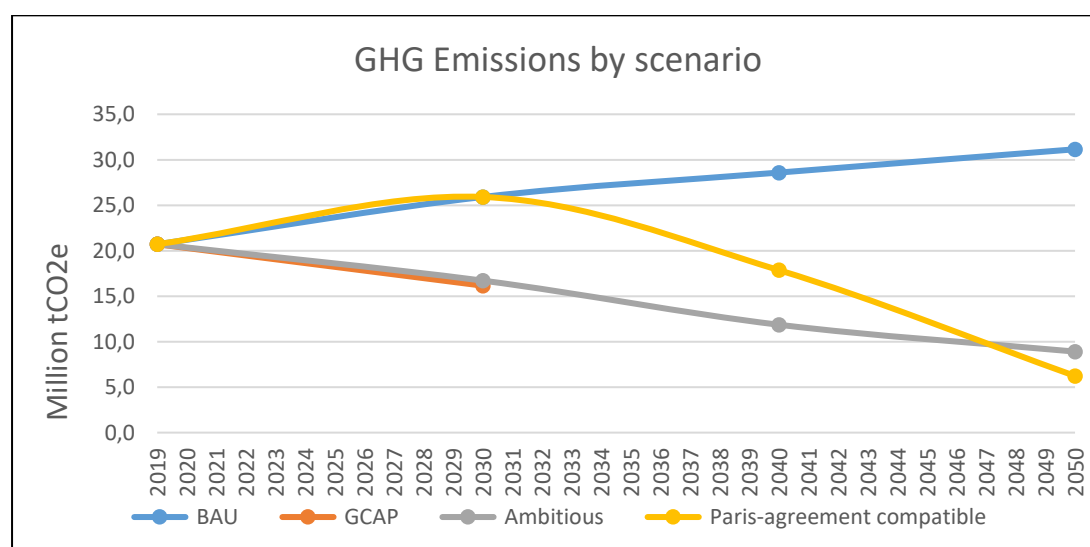


Figure 11 Greenhouse gas emission scenario and target trajectory

Significant effort and support by local and international stakeholders will be required to not only meet the trajectory of an ambitious scenario, but to go further to align with the goals of the Paris Agreement. Some of the barriers that need to be addressed to meet the goals of an ambitious scenario (and to go further in pursuit of net zero emissions) include those outlined in the table below.

Table 1 Summary of barriers to ambitious climate mitigation actions

Barrier description	Example(s)
High capital cost	- Installation and upgrades of wastewater treatment plants, roll out of alternative wastewater treatment technologies at scale and related operational costs; - Landfill gas capture infrastructure; - Electric vehicle cost and charging infrastructure cost; - Electricity storage technology to support a renewables powered electricity grid.
Cultural acceptance	Attachment to the use of traditional fuels such as charcoal and wood for cooking.
Higher operational costs	Recycling and composting have a higher operational cost than landfilling and informal dumping.
Limitations to City's role as a potential advocate, collaborator or convenor	- Shift to electric vehicles will require a ban on conventional vehicles, which is in national control; - Grid decarbonization is in national control; - Much of the taxi fleet is in private or informal hands; - Shift to electrification will require grid strengthening / upgrade.
Difficult to service / convert rapidly growing population and informal areas	- Need to link communities to modern wastewater treatment, waste collection, electricity grid, etc. - Informal housing roofs are not structurally sound for solar installations.

No current legislative and financial controls	• Required where a shift may not be economical, e.g. electrification of industry, shifting away from fossil fuels for cooking, etc.
Lack of expertise	• Technical expertise on planning for a grid with variable renewables

Data limitations for GHG inventories:

Emissions from the stationary energy sector are particularly high due to the high prevalence of coal-fired electricity from the national grid. Due to the transboundary (Scope 3) nature of Aviation emissions from flights to and from OR Tambo International are not included in the totals of a BASIC inventory. It is important to note that the inventory was based upon the best available data and a number of assumptions, however there are multiple opportunities to improve the quality of the inventory in the future. Access to better inventory data sources is synonymous with improving planning capabilities, decision making and access to financial support for actions across the represented sectors. The data for the 2019 financial year was used as the basis for the GHG Scenario modelling used to develop the mitigation strategies.

Sectorial analysis for Ekurhuleni:

- **Buildings**

Buildings constitute an important percentage of cities' greenhouse gas emissions. Therefore, to deliver climate action in line with the goals of the Paris Agreement, cities need to plan and implement actions that will support the delivery of zero carbon buildings by 2030 (and all existing buildings by 2050). The City of Ekurhuleni recorded 80, 30 MtCO₂e emissions in 2023 from buildings (residential and commercial). This can be attributed to rapid urbanization and population growth which puts a lot pressure on the building sector's energy consumption and carbon emissions. Hence, making the shift towards more sustainable and energy-efficient construction practices is a non-negotiable for the City. This includes the development of energy efficient green buildings (e.g., Property Assessed Clean Energy (PACE) programme), promoting renewable energy technologies in municipal buildings (e.g., solar photovoltaic (PV) panels on rooftops and private developments, using green building certification standards (e.g., Excellence in Design for Greater Efficiencies (EDGE) and contributing to a healthier urban environment.

The co-benefits of these initiatives include:

- Improved energy affordability for residents and businesses,
- Reduced energy consumption and associated cost savings,
- Enhanced indoor air quality, promoting occupant health and productivity,
- Increased property values and economic opportunities, and
- Creation of green jobs and stimulation of the local economy.

- **Energy**

Achieving 100% clean electricity by 2030 and 100% clean energy adoption by 2050 requires eradicating GHG emissions from energy generation and use in all sectors (e.g., buildings, transport, industry). The electricity crisis in South Africa has highlighted the urgent need for a more sustainable and resilient energy infrastructure, transitioning away from coal-powered generation to cleaner and renewable sources. The Ekurhuleni's stationary energy emissions were 11.47 MtCO₂e for the year 2023. To reduce these emissions, the City is actively working to diversify its energy sources. This transition involves moving away from traditional fossil-fuel-based energy towards a mix of cleaner and more sustainable alternatives. It is the independent power producers (IPP) who are seen as a driving force behind this shift.

The co-benefits of these initiatives include:

- Reduced air pollution,
- Improved energy security,
- Enhanced economic competitiveness, and
- Job creation in the renewable energy sector.

- **Transportation**

Transport constitutes the fastest growing source of GHG emissions in most cities and is one of the leading sources of local air pollution. In order to meet net zero emissions by 2050, cities need a 100% zero emission transport system by 2050. Ekurhuleni's total transportation emissions totaled to 7.21 MtCO₂e which increased compared to the 2019 GHG inventory. It is, therefore, critical for the City to improve investment in low-carbon and sustainable transportation systems through existing initiatives (e.g., encourage electric vehicles, implement parking restrictions for new developments, implement and operate new electric buses and Integrated Payment System and Improvements for minibus taxis).

The co-benefits of these initiatives include:

- Reduced air pollution,
- Improved mobility and accessibility,
- Enhanced quality of life, and
- Economic benefits from reduced fuel consumption.

- **Waste**

Solid waste is often the third largest source of greenhouse gas emissions in cities after buildings and transport. Understanding the sources and impacts of GHG emissions from the waste sector is critical when developing climate action plans for the City. Generally, waste disposal is responsible for roughly 5% of total GHG emissions, primarily from the methane released as food waste and other biodegradable matter (organics) decays in landfills and dumps. Hence the need for reducing organic waste disposal through composting or anaerobic digestion. The City of Ekurhuleni recognizes the

urgency and importance of transitioning towards a sustainable waste management system. Rapid urbanization and population growth have led to a significant increase in the amount of waste generated. In 2023, the City recorded 1.41 MtCO₂e emissions from waste which is slightly less than the emissions recorded in 2019. An overview of the waste challenges faced by the City of Ekurhuleni include limited landfill space and issues related to illegal mining and vandalism at landfill sites. City initiatives such as the waster reclaimers aim to maximize the value of waste and address various aspects of waste management, such as diverting organic waste and creating bankable projects. Challenges of limited municipal budgets for waste management initiatives is hindering the City's efforts. It is therefore critical for Ekurhuleni to explore alternative sources of funding beyond traditional budgets, potentially involving producers and manufacturers through Extended Producer Responsibility (EPR) regulations.

The co-benefits of these initiatives include:

- Reduced landfill space requirements,
- Job creation in the waste management sector,
- Enhanced resource efficiency, and
- Reduced greenhouse gas emissions.
- **Air quality**

Cities are exposed to fine particulate matter concentrations above the safe level established in the World Health Organization (WHO) ambient air quality guidelines. This affects cities' economies through higher healthcare costs, lower productivity and livability, reduced tourism and others. The City would need to ensure that the objectives as outlined in the Air Quality Management Plan is implemented. Some specific initiatives would focus on enhancing monitoring and enforcement of air pollution regulations; promoting cleaner energy sources and industrial processes; and encouraging clean and sustainable transportation options.

The co-benefits of these initiatives include:

- Improved public health,
- Reduced healthcare costs,
- Enhanced economic competitiveness, and
- Improved quality of life.

By implementing these initiatives, Ekurhuleni aims to achieve significant improvements in air quality, protecting public health, and enhancing economic competitiveness.

- **Water**

Ekurhuleni's water sector consumes a substantial amount of energy which contributes to GHG emissions. During the development of the Green City Action Plan (GCAP), it was estimated that the water sector could contribute about 6-7% of the required emission reductions. The Ekurhuleni Water Care Company (ERWAT) is exploring technologies to make sustainable water treatment more feasible.

Within the City's network, water treatment plants account for approximately 70% of the water sector's energy consumption. The City of Ekurhuleni's water distribution network spans over 7,000 km, with an average loss of 20% due to leaks and inefficiencies. The city's water supply is primarily sourced from the Vaal River System, through Rand Water.

The City of Ekurhuleni's Water Masterplan (2019-2030) outlines a comprehensive strategy for sustainable water management. In line with this plan, Ekurhuleni aims to reduce its water sector's energy consumption and greenhouse gas (GHG) emissions.

Key initiatives include:

- **Water Conservation:** Achieve a 15% reduction in water demand through efficient appliances, public education, and water-saving initiatives (Target: 2025).
- **Water Reuse and Recycling:** Increase water reuse and recycling capacity to 30% of total wastewater treatment by 2030.
- **Energy Efficiency:** Reduce energy consumption in water treatment plants by 20% through LED lighting, variable-speed drives, and renewable energy integration (Target: 2027).
- **Leak Detection and Repair:** Reduce water losses due to leaks to 10% by 2028 through enhanced detection and repair programs.
- **Wastewater Treatment Optimization:** Improve wastewater treatment efficiency, reducing energy consumption and increasing effluent quality.
- **Biogas Production:** Generate 4MW of electricity from biogas by 2026, reducing reliance on fossil fuels.
- **Sludge Management:** Implement efficient sludge management practices, reducing waste and generating energy.
- **Green Infrastructure:** Incorporate green infrastructure, such as wetlands and green roofs, to enhance water management and reduce energy consumption.

The co-benefits of these initiatives include:

- Reduced energy consumption and associated GHG emissions,
- Improved water efficiency and conservation,
- Enhanced water quality and public health,
- Increased resilience to climate change and water scarcity, and
- Economic benefits from reduced energy costs and water savings.

By implementing these sectorial initiatives, Ekurhuleni aims to create a sustainable, resilient, and climate-responsive water management system, supporting the city's growth and development while protecting its natural resources. Ekurhuleni can also achieve significant GHG reductions, improve air and water quality, enhance economic competitiveness, and promote sustainable development.

CHAPTER 5: CAP Evidence Base: Ekurhuleni's Climate Change Impacts and Vulnerabilities

5.1. Summary of observed climate trends for South Africa (DEA, 2018)

1. Increased warming between 2 °or even higher over the period 1931-2015 in the Western and Northern Cape, and over Gauteng, Limpopo and the east coast of KwaZulu-Natal.
2. Increased extreme daily rainfall events in most parts of the country.
3. Increase annual number of hot days with a decrease in the annual number of cold nights over most parts of the country.

South Africa is expected to experience (World Bank, 2021):

1. Rising temperatures with mean monthly temperatures projected to rise to 2.0°C by the 2050s and 4.2°C by the 2090s.
2. Increase in very hot days above 35 °C and the frequency of heat wave events.
3. Hotter and drier future with rainfall variability continuing and temperatures rising.
4. Increased extreme rainfall events (20 mm of rain falling within 24 hours) over eastern parts during the summer months.
5. Extreme weather events like droughts, floods, and other climate-related hazards.
6. Sea level rise and an increase in the frequency and intensity of sea storms.
7. Increase in the number of high fire danger days.

Projected climate Futures for South Africa (2015 - 2035, 2040 – 2060 and 2070 - 2090) in the Ekurhuleni Context

Climate Change projections were assessed at a national level under both the unconstrained and constrained pathways. The following climate scenarios were projected for unconstrained and constrained emission pathways respectively.

South Africa's climate future up to 2050 and beyond can be described using four fundamental climate scenarios at a national SCALE:

1. Warmer (<4 °C above 1961 - 2000) and wetter with greater frequency of extreme rainfall events. Increased spring and summer rainfall for Ekurhuleni.
2. Warmer (<4 °C above 1961 - 2000) and drier, with an increase in the frequency of drought events and somewhat greater frequency of extreme rainfall events. Reduced summer and spring and strongly reduced autumn.
3. Hotter (> 4°C above 1961 - 2000) and wetter with substantially greater frequency of extreme rainfall events. Increased spring and summer.
4. Hotter (> 4 ° C above 1961 - 2000) and drier, with a substantial increase in the frequency of drought events and greater frequency of extreme rainfall events. Reduced summer and spring and strongly reduced autumn

5.2. Ekurhuleni's Current and Future Climate: Temperature and Rainfall

To prioritize climate action and investment, the City needs to identify the likelihood of future climate hazards and the potential impacts on communities and the City as a whole. This can be achieved by

conducting a climate risk assessment. The CoE has undertaken a preliminary climate risk assessment which generated the following key climate trends and projections.

Summers in Ekurhuleni are considered mild with temperatures seldom above 30°C (Murillo-Tovar, Saldarriaga-Noreña and Saeid, 2021). Ekurhuleni falls within the summer rainfall region of South Africa and the experience of hot wet summers and cool dry winters are normal. More than 80% of the rainfall occurs from October to April. Average rainfall for the region is between 715 mm to 735 mm annually. The region is prone to intense rainfall events in terms of thunderstorms, which generally fall in the late afternoons. These storms account for the major flooding and heavy rainfall events that affect Ekurhuleni and can cause much damage to livelihoods and infrastructure (Muyambo, 2022). A number of recent studies have examined daily rainfall in and around Gauteng over the past few decades to gain a better understanding of rainfall variability and change.

The rainfall of the CoE is highly seasonal, with most of it being 650mm to 950mm occurring between November and April. Temperatures experienced in the CoE fluctuate between mild warm summers and cold winters where frost and sub-zero temperatures are common. According to the South African Risk and Vulnerability Atlas (2017), it is predicted that the CoE will experience similar rainfall, but it will be unpredictable in terms of season, frequency and intensity. Temperature will similarly be affected, with winter temperatures increasing over the next 45 years. The ability of natural land to moderate temperature (through albedo and transpiration) combined with the flood attenuation effect of wetlands, creates a strong case for conserving natural landscapes which are necessary to increase the resilience of communities that live in the CoE.

The CoE varies in elevation from approximately from 1480 – 1800 meters above sea level. A number of higher lying ridges and koppies traverse the CoE roughly east-to-west. These form part of the continental divide. The watershed created by this divide is the source of some of South Africa's major river system which either flow west towards the Atlantic Ocean or east towards the Indian Ocean. The topography in the remainder of the CoE is low-lying and relatively flat. Flooding associated with high rainfall events in these areas requires that suitable development buffer is maintained.

Table 2 A description of Ekurhuleni's temperature and rainfall

CLIMATE VARIABLE		CURRENT CONDITIONS	2050 PREDICTIONS	INCREASE
TEMPERATURE & HEAT: Temperatures in Ekurhuleni have increased by more than 1.5°C. The City is highly urbanized, therefore exposure to extreme heat is exacerbated by the urban heat island phenomenon.				
TEMPERATURE	Annual Average Temperature	Max 25°C (Summer) Min 17°C (Winter)	between 2.22 ^o -2.82 ^o (RCP 4.5) and 2.68 ^o - 3.08 ^o (RCP 8.5).	✓
HUMIDITY (for every 1°C rise in temperature the humidity will increase by 7%)	Annual Average Humidity	30-50%	14% increase	✓

HEAT	Annual average number of extreme heat waves	35°C	+2.1°C increase in temperature	✓
RAINFALL: The City experiences seasonal rainfall between November and April. Over the years, the amount of precipitation has decreased, and the occurrence of dry spells has increased.				
RAINFALL	Annual Average Rainfall	713mm	841mm	✓
	Summer	107mm	116mm	✓
	Autumn	53mm	64mm	✓
	Winter	6mm	7mm	✓
	Spring	72mm	94mm	✓
EXTREME RAINFALL	Heavy Rainfall Intensity		+6.4% increase	✓

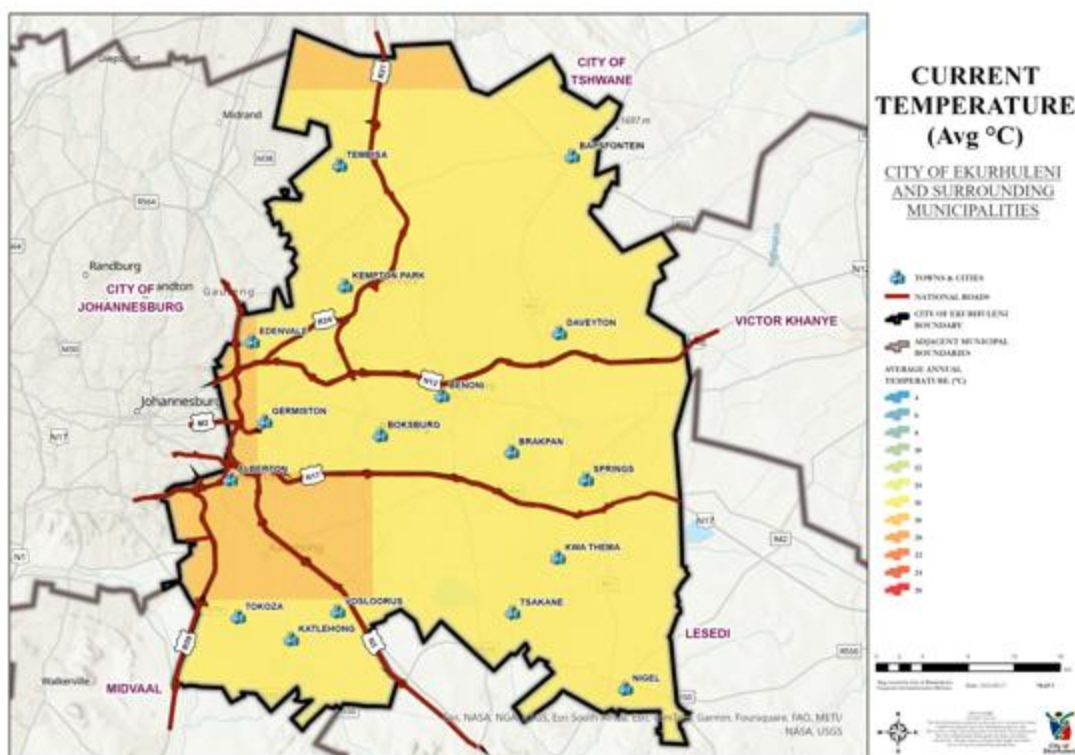


Figure 12 Baseline map showing Ekurhuleni's current temperature.

According to figure 12, the average temperature for Ekurhuleni is between 16 to 18 °C.

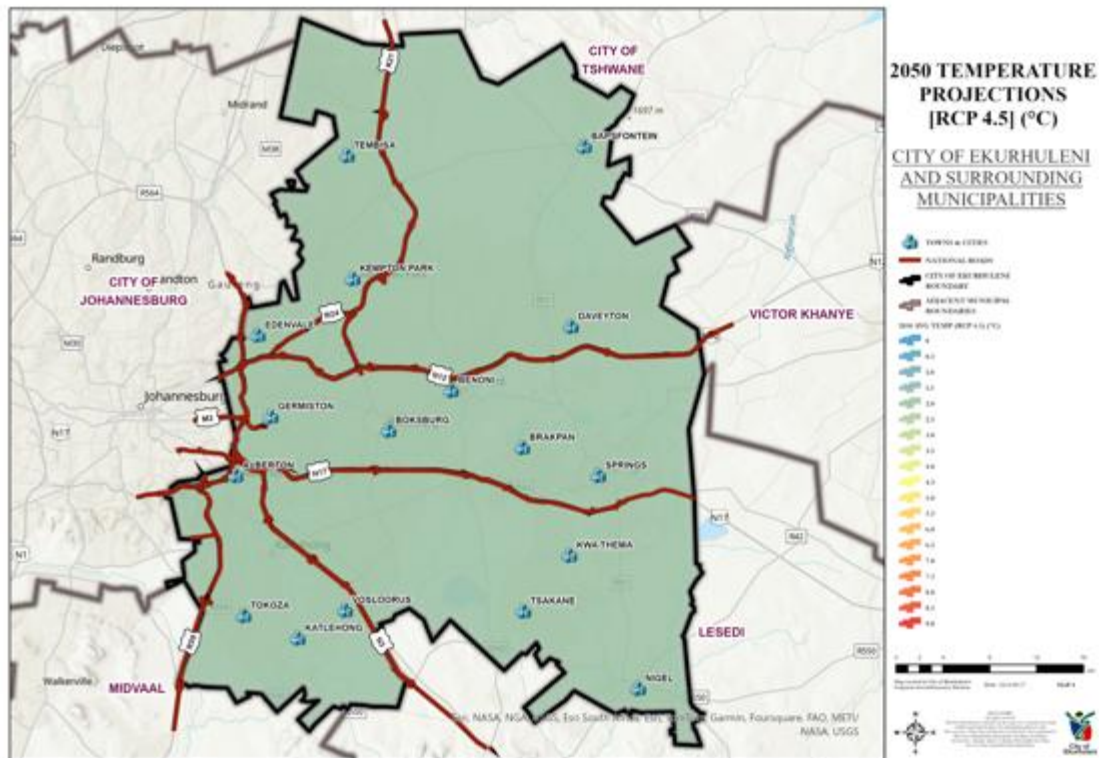


Figure 13 Ekurhuleni's 2050 temperature projections (RCP 4.5)

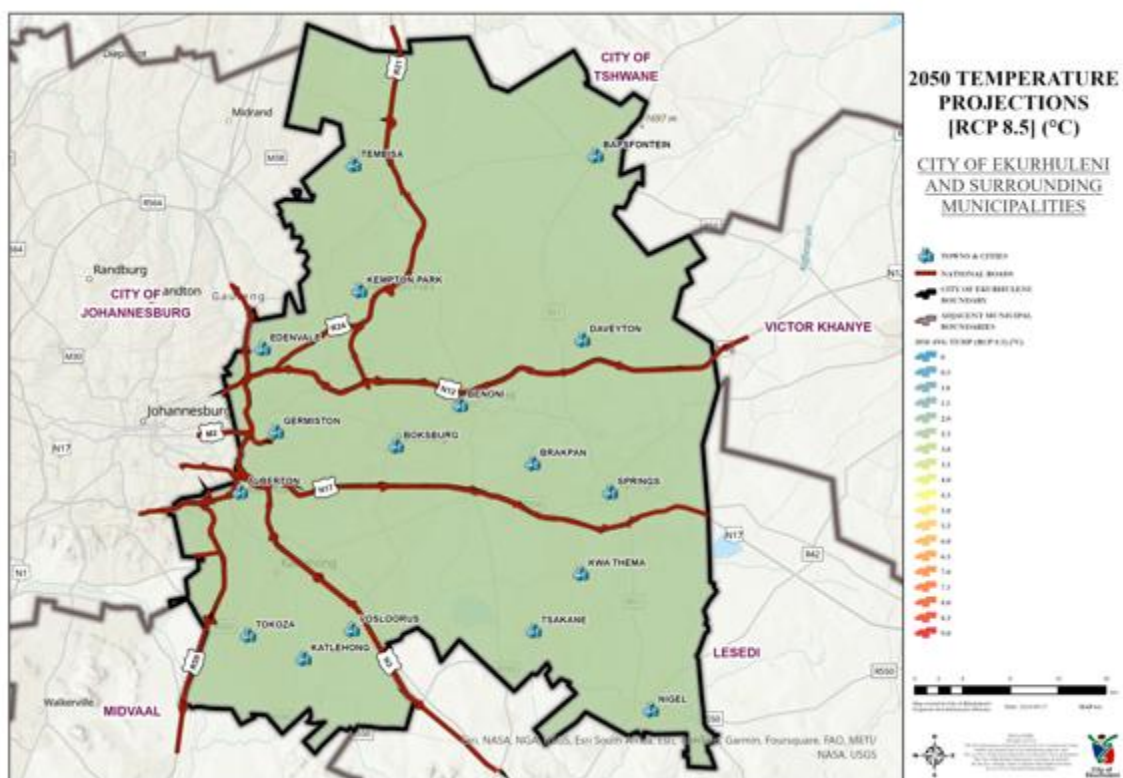


Figure 14 Ekurhuleni's 2050 temperature projections (RCP 8.5)

Average temperature increases for Ekurhuleni are projected to be between 2.22⁰-2.82⁰ (RCP 4.5) and 2.68⁰ -3.08⁰ (RCP 8.5) by 2050.

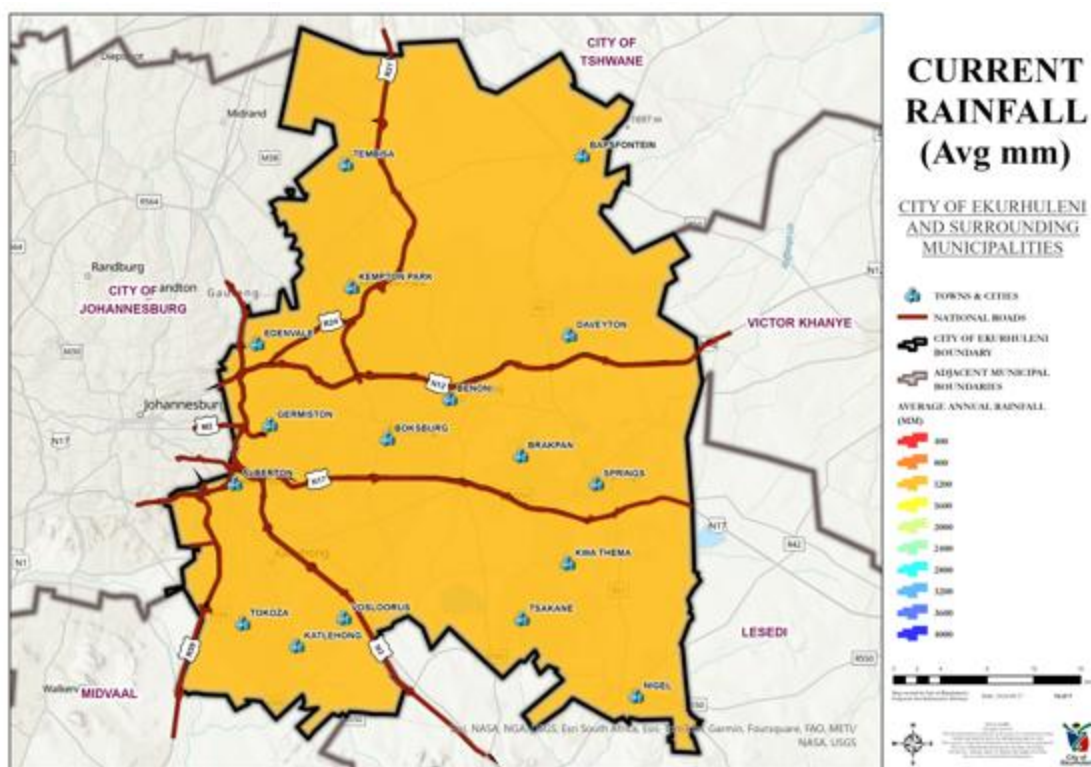


Figure 15 Baseline map showing Ekurhuleni's average rainfall

According to figure 15, the average rainfall for Ekurhuleni is 1200mm.

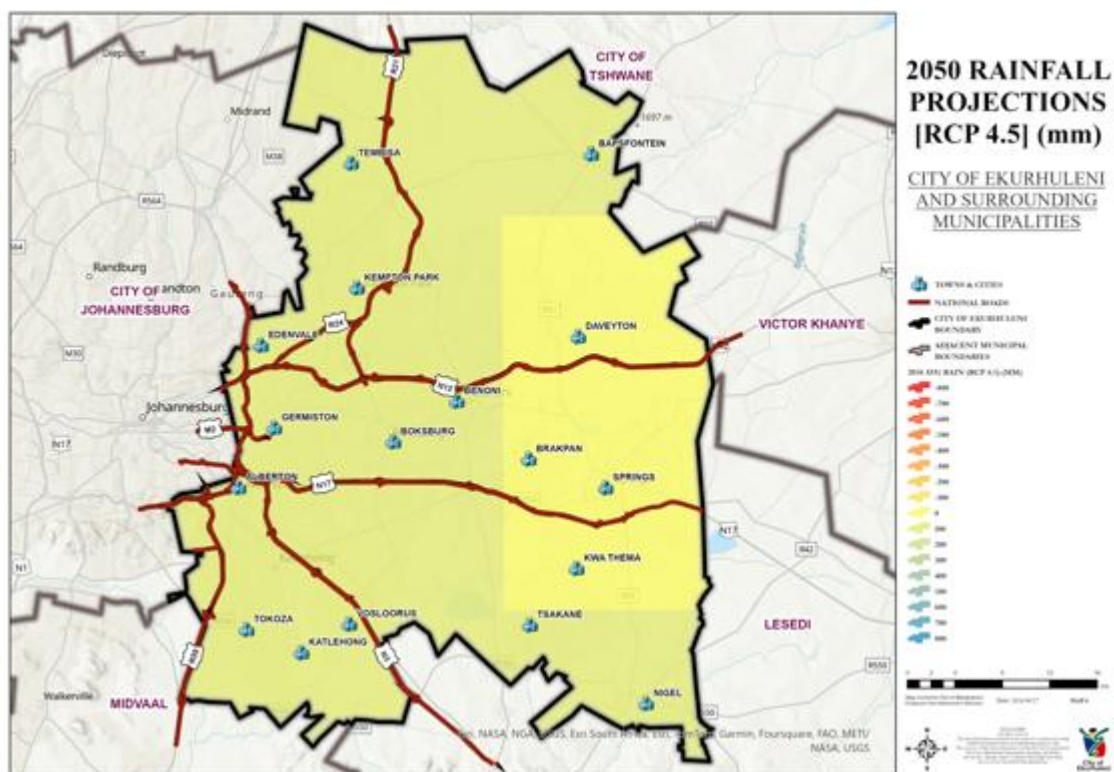


Figure 16 Ekurhuleni's 2050 rainfall projections (RCP 4.5)

The City of Ekurhuleni has experienced its fair share of devastating floods over the years. One of the most notable incidents was the 2016 Johannesburg flood, which occurred on the 9th of November 2016. This disaster was triggered by a severe thunderstorm that brought heavy rainfall, resulting in widespread flooding in Johannesburg and Ekurhuleni (South Africa Today, 2016). The floods caused significant damage to infrastructure, homes and vehicles with 6 people losing their lives and many more displaced. The disaster highlighted the need for better disaster preparedness and response measures. More recently, in February 2022, severe flooding was reported in Tshwane and Ekurhuleni municipalities, with 3 people reported missing and dozens evacuated from their homes (Davies, 2022). To mitigate the impacts of flooding, the CoE needs to invest in identifying areas prone to flooding and develop strategies to prepare and respond to these events.

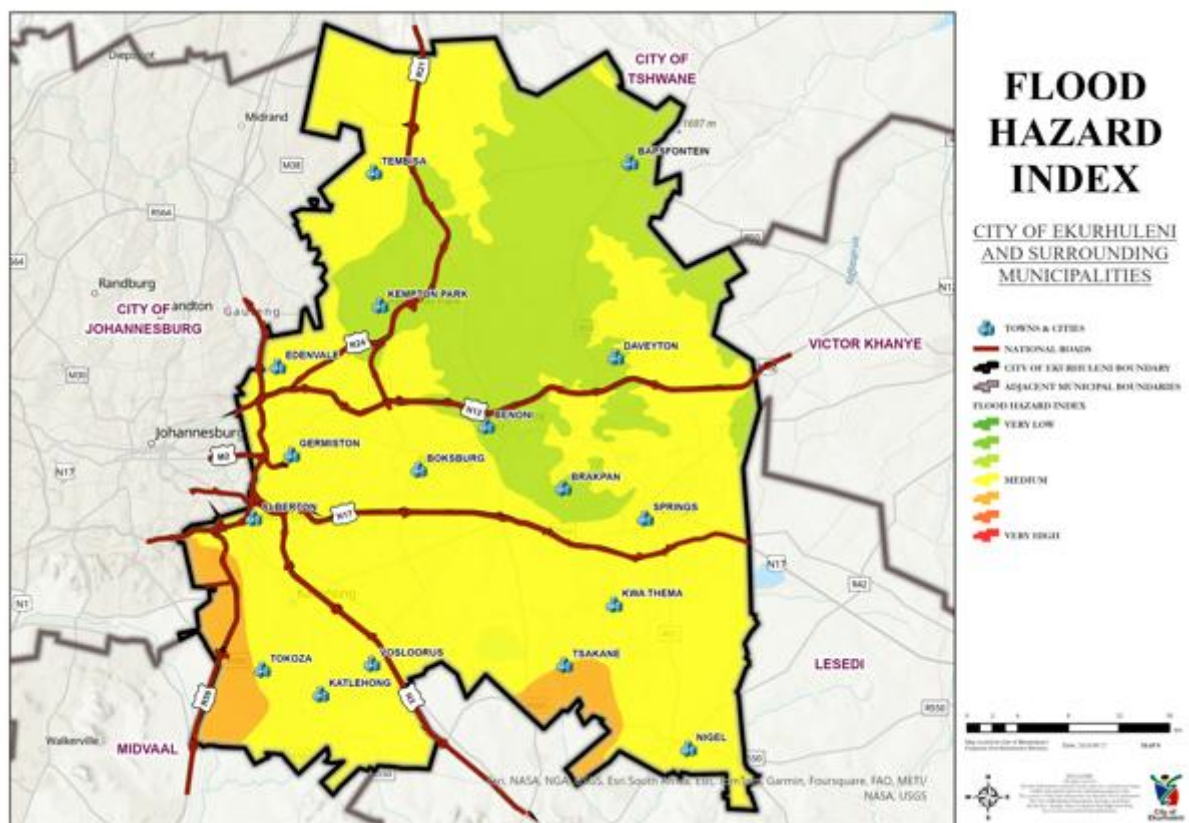


Figure 18 Baseline map showing Ekurhuleni's flood hazard index.

Figure 18 shows the flood hazard index of the different quinary catchments present with Ekurhuleni. The flood hazard index is based on the catchment characteristics and rainfall averaged at the quinary catchment level. The high-level assessment shows a medium flood hazard in most parts of the City in the south and a low flood hazard in the north parts of the City.

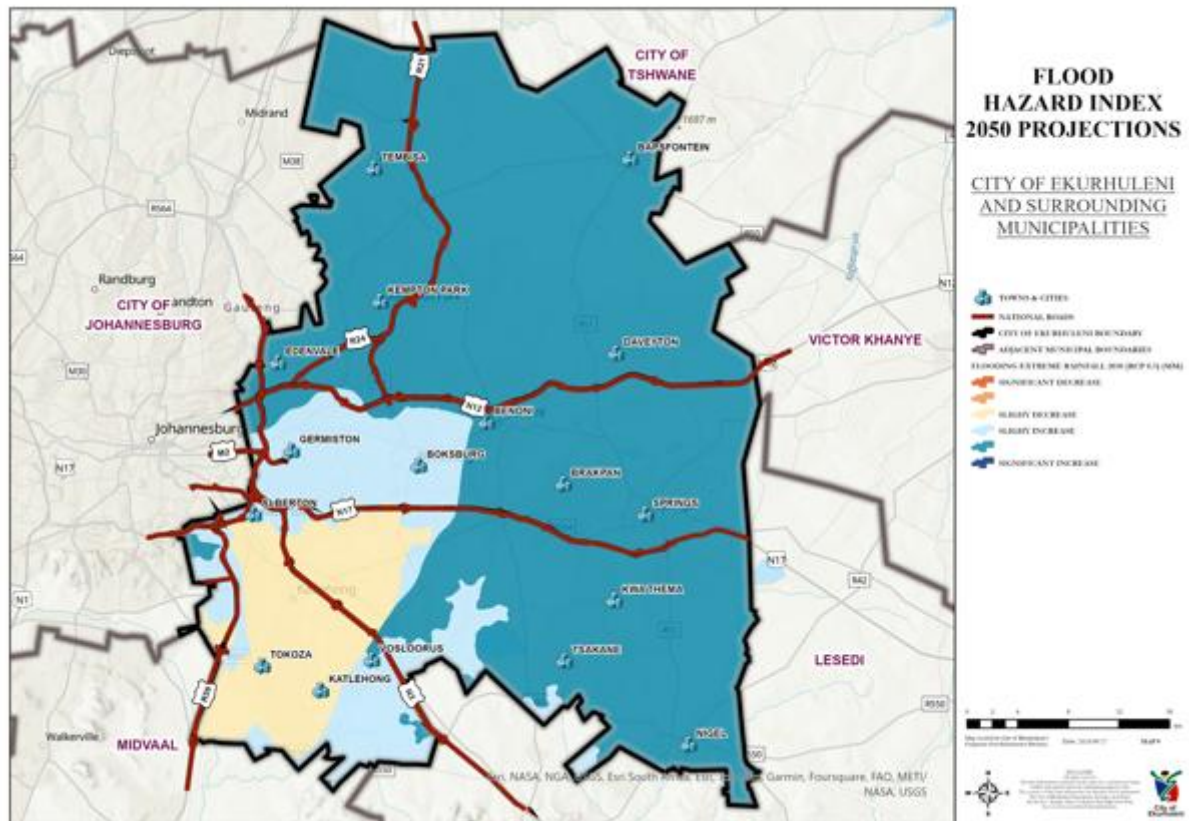


Figure 19 Ekurhuleni's flood hazard index, 2050 projections

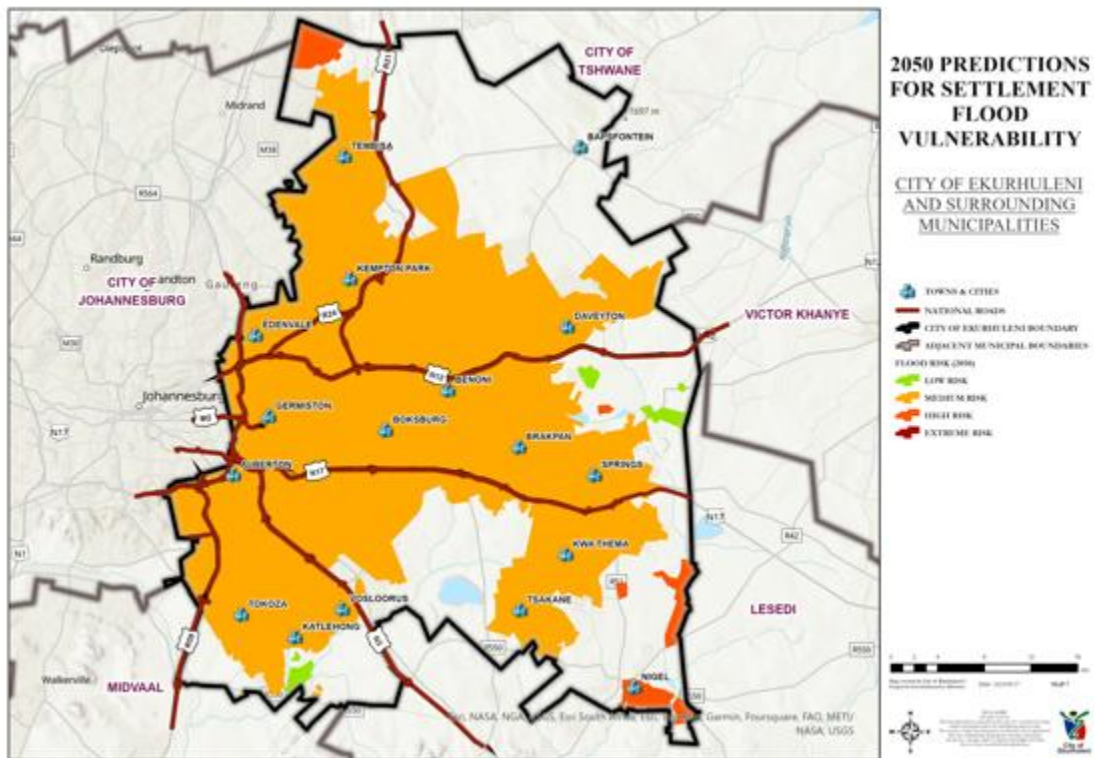


Figure 20 Ekurhuleni's flood vulnerability, 2050 projections

Figure 20 depicts the settlements that are at increased risk of urban flooding under an RCP 8.5 low mitigation (worst case) scenario by 2050.

Urban areas always present some risk of flooding when rainfall occurs. Buildings, roads, infrastructure and other paved areas prevent rainfall from infiltrating into the soil and so produce more runoff. Heavy and prolonged rainfall produces very large volumes of surface water in any city, which can easily overwhelm drainage systems. In well-governed cities, this is rarely a problem because good provision for storm and surface drainage is easily built into the urban fabric, with complementary measures to protect against flooding for instance the use of parks and other areas of open space to accommodate floodwaters safely from unusually serious storms. In most cities, there is also scope for land-use management and incremental adjustments to increase flood-water management capacity. But in poorly governed cities, this does not happen. Most residential areas have no drainage system installed and rely on natural drainage channels, and it is common for buildings or infrastructure to be constructed such that they obstruct these drainage channels.

In many areas in Ekurhuleni, a significant proportion of the population is not served by adequate solid waste collection services. In neighborhoods with inadequate solid-waste management or drain maintenance, garbage and plant growth can quickly clog drains, leading to localized flooding with even light rainfall. There is also a growing documentation on the inadequacies in drainage and flood protection for urban centers in Africa and Asia and of the trend towards increased numbers of deaths and injuries from flooding in urban areas. Floods are already having very large impacts on cities and smaller urban centers.



Figure 21 Ekurhuleni's flood impacts

Table 3 Impacts of flooding in the City

KEY SECTORS	HOW THE SECTOR IS IMPACTED & WHERE
Vulnerable Areas in Ekurhuleni	
Flood-Prone Areas: 1. Boksburg: Central, East Rand, and Jansen Park suburbs are prone to flooding due to the nearby Bronkhorstspuit and Klip Rivers. 2. Benoni: Areas surrounding the Klein Jukskei River, such as Benoni Central, Farrarmere, and Northmead, are at risk. 3. Brakpan: Suburbs like Brakpan Central, Dalpark, and Rand Collieries are vulnerable due to the nearby Vaal River. 4. Germiston: Areas near the Klip River, such as Germiston Central, Primrose, and Lambton, are prone to flooding. 5. Kempton Park: Suburbs like Kempton Park Central, Birchleigh, and Glen Marais are at risk due to the nearby Jukskei River. 6. Nigel: The area surrounding the Nigel Dam and the Vaal River is vulnerable to flooding. Low-Lying Areas: 1. Edenvale: Suburbs like Edenvale Central, Sebenza, and Dunnottar are at risk due to their low elevation. 2. Bedfordview: Areas near the Jukskei River, such as Bedfordview Central and St. Andrews, are prone to flooding. Informal Settlements: 1. Informal settlements along the Klip River are vulnerable to flooding. 2. Areas near the Jukskei River are at risk. 3. Other areas on marginal land and mining land are significantly threatened by high rainfall events. Other Areas: Alberton: Suburbs like Alberton Central, Verwoerdpark, and Randhart are prone to flooding due to the nearby Natal Spruit.	
Vulnerable Population Groups	
Low-income households	Low-income households suffer more deaths and recover more slowly from resulting economic damage caused by floods. This is often due to the location in informal settlements or areas prone to flooding. Low-income households have limited financial resources to cope with the aftermath of floods and area often located in areas which lack adequate infrastructure (e.g. drainage systems)
Women and girls	Women and girls take an additional responsibility caring for family members and managing households during floods. Women operate majority of the informal businesses such as street vending or home-based enterprises which are often severely impacted by floods
Elderly	The elderly residents may struggle to evacuate or access safe areas during a flooding event. They are largely dependent on caregivers for daily needs which complicates evacuation efforts. They also have limited access to flood warnings and updates.
Vulnerable Assets, Infrastructure & Sectors	
Water	Floodwater can contaminate water sources, treatment plants and distribution networks. During flood events water infrastructures is damaged thus leading to service interruptions (e.g., reduced water supply, disrupted water treatment processes)
Energy	Floods damage electrical infrastructure, leading to power outages. Water damage to substations disrupts electricity supply and exacerbates energy supply issues in Ekurhuleni. Floods affect transmission lines, reducing energy transmission.
Built infrastructure	Flooding damages the City's Road surfaces, bridges and culverts. Water and sewage systems are affected due to bursting pipes, contamination and treatment plant failures. Electrical (power lines, transformers) and buildings are also damaged during flood events.

5.3.2. Drought and Water Scarcity: An overview of the Hazard and Impacts within Ekurhuleni

The term drought may refer to meteorological drought (precipitation well below average), hydrological drought (low river flows and water levels in rivers, lakes and groundwater), agricultural drought (low soil moisture), and environmental drought (a combination of the above). The socio-economic impacts of droughts may arise from the interaction between natural conditions and human factors, such as changes in land use and land cover, water demand and use. Excessive water withdrawals can exacerbate the impact of drought.

Ekurhuleni is classified as a medium hazard level for water scarcity, with up to a 20% chance of drought occurring in the coming ten years. Historical drought events include the 2015-2017 drought where Ekurhuleni experienced severe water restrictions during this period and 2019-2020 drought where water shortages affected various northern and eastern suburbs. Ekurhuleni's drought vulnerability factors relate to rainfall variability which are unpredictable, aging water infrastructure and maintenance challenges which exacerbate water scarcity and the increasing population which puts pressure on already strained water resources. Climate change is expected to increase the likelihood and severity of droughts in the region, this is supported by the below assessments.

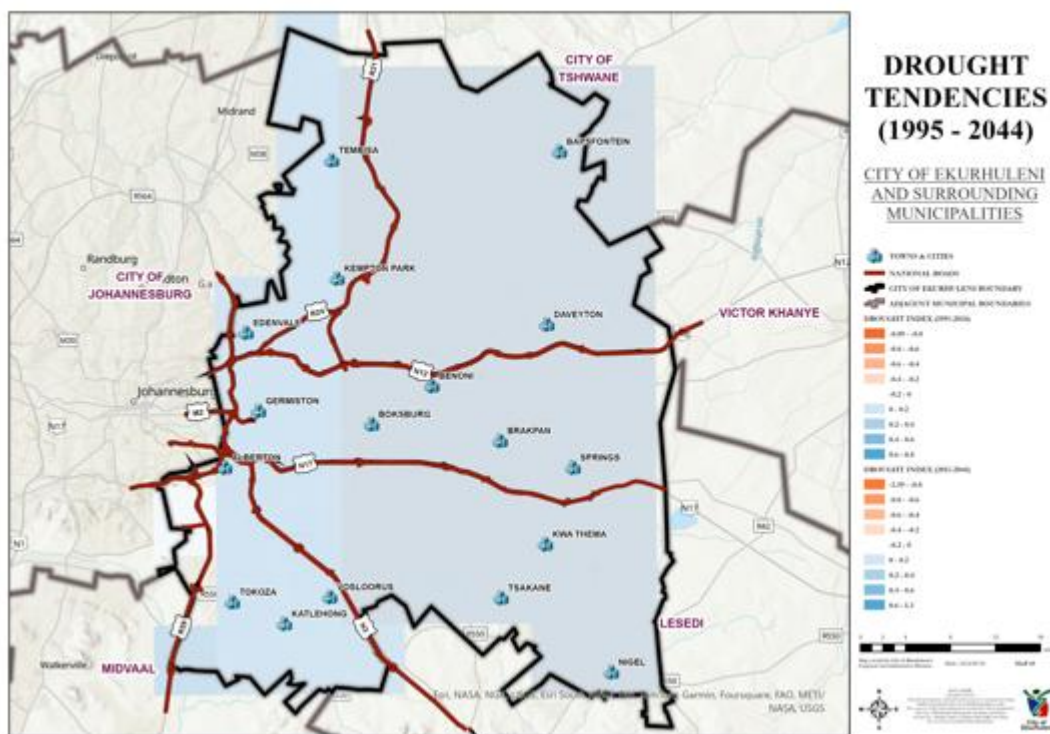


Figure 22 Baseline map showing Ekurhuleni's drought tendencies.

Figure 22 shows the change in drought tendencies for the period 1995-2024. A negative value is indicative of an increase in drought tendencies per 10 years. Based on the assessment, Ekurhuleni is sitting at -0.2 to >0, which is a medium to high drought tendency.

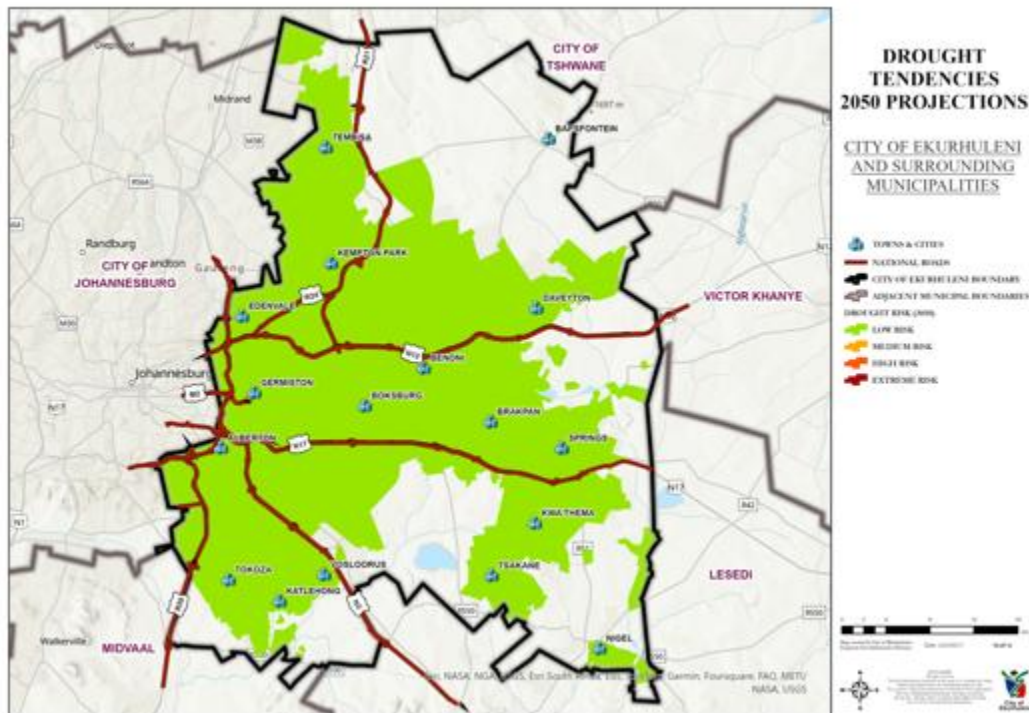


Figure 23 Ekurhuleni's drought tendencies, 2050 projections

Figure 23 shows the projected change in drought tendencies for the period 2035–2064 under the low mitigation scenario (RCP 8.5). Negative values are showing an increase in drought tendencies per 10 years. The map on the right depicts the settlements that are at risk of increases in drought tendencies.

Table 4 Impacts of droughts in the City

KEY SECTORS	HOW THE SECTOR IS IMPACTED & WHERE
Vulnerable Areas in Ekurhuleni	
Water-Scarce Areas: 1. Boksburg: Northern suburbs, such as Boksburg North, Witfield, and Impala Park, are prone to water scarcity. 2. Benoni: Eastern suburbs, including Benoni AH, Rynfield, and Fairleads, face drought-related challenges. 3. Brakpan: Western suburbs, such as Brakpan West, Dalpark, and Rand Collieries, are vulnerable. 4. Germiston: Southern suburbs, including Germiston South, Primrose, and Lambton, experience water scarcity. 5. Kempton Park: Eastern suburbs, such as Kempton Park East, Birchleigh, and Glen Marais, face drought risks. Drought-Prone Informal Settlements: 1. Informal settlements lack reliable water infrastructure, exacerbating drought vulnerabilities. 2. Residents in these areas face challenges accessing clean water during drought periods. Areas with High Water Demand: 1. Edenvale: Suburbs like Edenvale Central, Sebenza, and Dunnottar have high water demand. 2. Bedfordview: Areas like Bedfordview Central and St. Andrews experience increased water demand.	
Vulnerable Population Groups	
Low-income households	Low-income households struggle to access clean water due to inadequate infrastructure and lack of resources. This can lead to increased water-borne illnesses, further exacerbating health issues. With limited financial resources, these households are often unable to afford alternative water sources or invest in water saving technologies.
Women and girls	Women and girls take on additional roles of collecting and managing water. Women in informal businesses such as farming are severely affected by droughts.

Elderly	The elderly have limited mobility and access to water collection points. They are also largely dependent on others for daily needs. Their inability to afford water-related expenses increases their vulnerability.
Vulnerable Assets, Infrastructure & Sectors	
Water	The Ekurhuleni is characterized by the following concerns: aging infrastructure, high water demand, limited water storage capacity and dependence on nearby water sources (e.g., Vaal River). These concerns exacerbate water supply impacts (e.g., reduced dam levels), water quality impacts (e.g., decreased water treatment efficiency) and infrastructural impacts (e.g., increased risks of pipe bursts and leaks)
Energy	The City is faced with high energy demand, aging infrastructure, limited energy storage capacity and dependence on nearby power stations (e.g., Kendal Power Station). Drought occurrences worsen energy production impacts, energy distribution impacts and consumption impacts.
Built infrastructure	The City experiences the following challenges; aging infrastructure, high population density and limited water storage. These challenges exacerbate infrastructural (e.g., increased risks of backups and overflows of sewage systems), economic impacts (e.g., increased costs for replacement and upgrading infrastructure) and social impacts (e.g. increased risk of water-borne diseases)

5.3.3. Heat Waves: An overview of the Hazard and Impacts within Ekurhuleni

Temperatures in Ekurhuleni can soar to highs of over 30°C, posing significant health risks to residents, particularly the most vulnerable populations. The urban heat assessment, conducted in 2023 Heat Assessment Study, highlighted the increased vulnerability of informal settlements and townships to heat stress. To address these vulnerabilities, Ekurhuleni is implementing a range of nature-based solutions. This includes the establishment of parks, green corridors, and urban forests to mitigate the urban heat island effect. The City also needs to invest in providing heat stress monitoring and promoting public awareness campaigns to educate the residents on heatwave risks and prevention strategies. Some of the historical heat events in Ekurhuleni include a severe heatwave in 2018 with temperatures exceeding 35°C and one in 2020 with temperatures reaching 38°C.

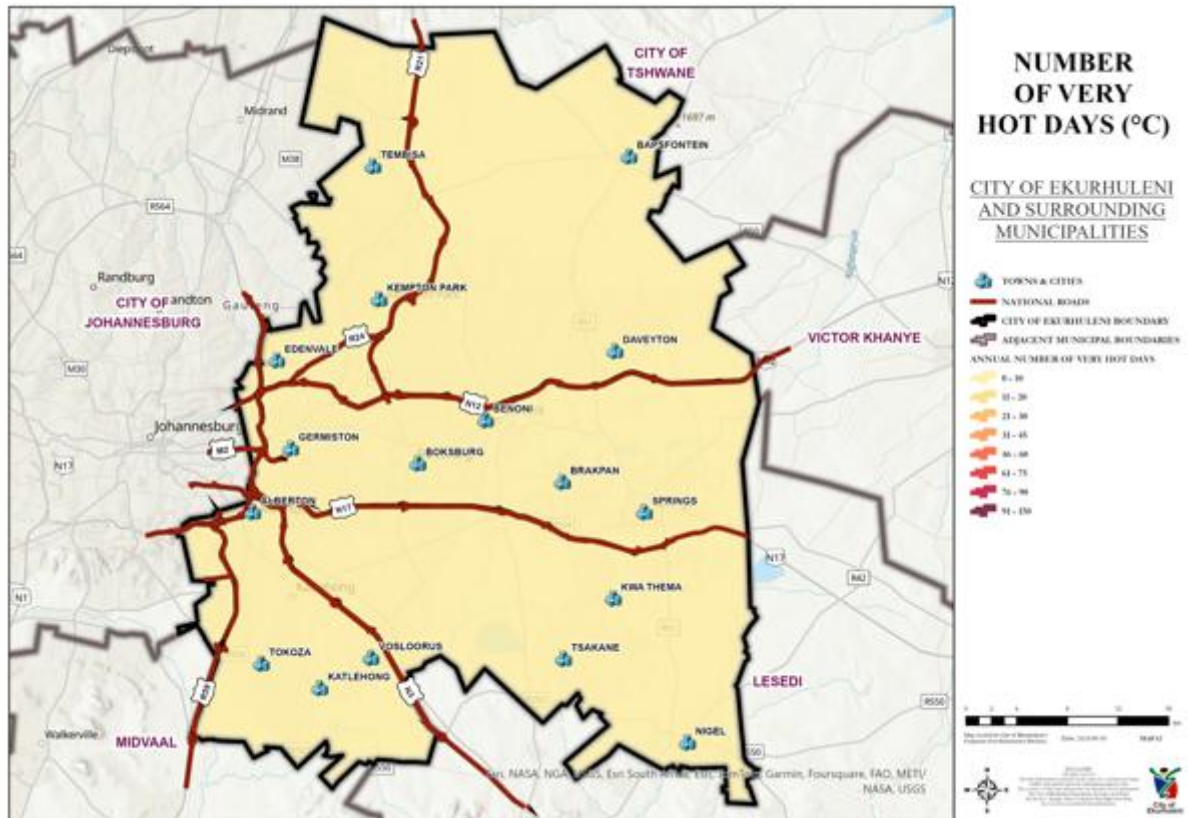


Figure 24 Baseline map showing Ekurhuleni's very hot days.

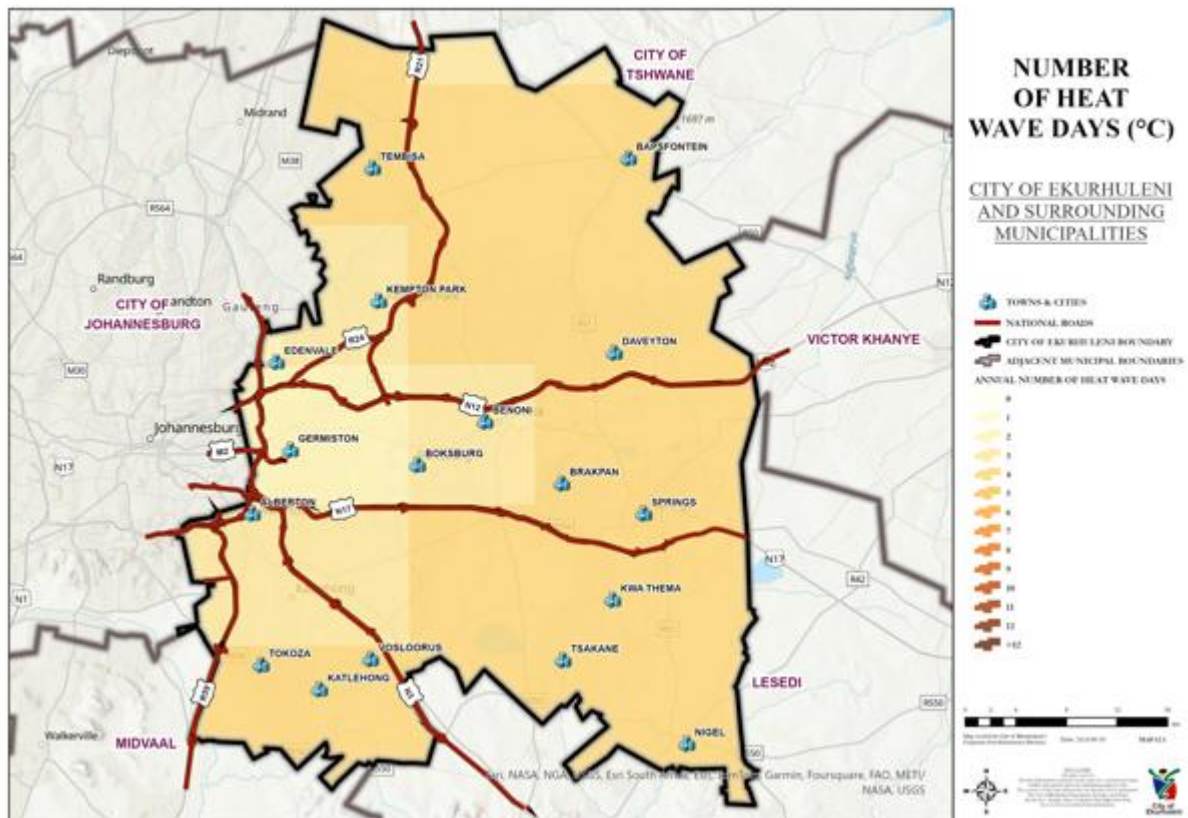


Figure 25 Baseline map showing Ekurhuleni's heatwave days.

Figure 25 is showing the number of very hot days where the maximum temperature exceeds 35°C. While the annual heat-wave days depicts the number of days where the maximum temperature exceeds the average maximum temperature of the warmest month of the year at that location by 5°C for a period of at least three consecutive days. According to the Urban Heat Assessment, strong to very strong heat stress is encountered, especially in densely built city quarters such as Tembisa, and in open sun-exposed areas. Due to the cooling effect of trees, green residential areas often fall in the 'no heat stress' category.

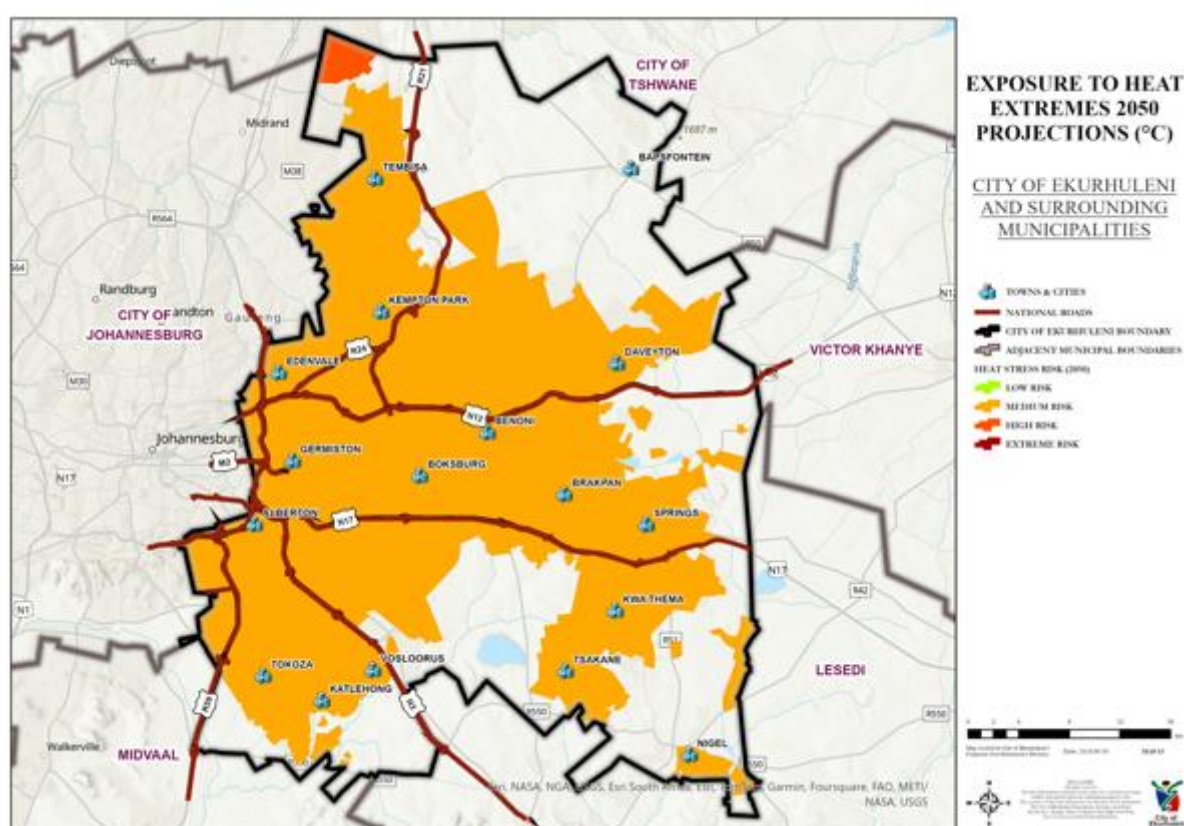


Figure 26 Ekurhuleni's increased exposure to heat extremes, 2050 projections.

Figure 26 indicates settlements at risk of encountering increasing heat stresses under an RCP 8.5 low mitigation scenario (classified as either low, medium, high, or extreme risk). According to the Urban Heat Assessment, the average number of heatwave days will increase from a current value of 1.3 days per year (period 2001-2020) to 8.4 days per year (2041-2060, high climate scenario).

Table 5 The impacts of heatwaves in the City

KEY SECTORS	HOW THE SECTOR IS IMPACTED & WHERE
Vulnerable Areas in Ekurhuleni	
Heat-Vulnerable Areas: 1. Boksburg: Central, East Rand, and Jansen Park suburbs experience high temperatures. 2. Benoni: Areas surrounding the Klein Jukskei River, such as Benoni Central, Farrarmere, and Northmead, are heat prone. 3. Brakpan: Suburbs like Brakpan Central, Dalpark, and Rand Collieries face heat-related challenges. 4. Germiston: Areas near the Klip River, such as Germiston Central, Primrose, and Lambton, are vulnerable.	

5. Kempton Park: Suburbs like Kempton Park Central, Birchleigh, and Glen Marais experience high temperatures. Informal Settlements: 1. Tembisa, Etwatwa, Germiston, Thokoza: Informal settlements lack shade, green spaces, and adequate housing, exacerbating heat vulnerabilities. 2. Informal settlements across the city: Residents face heat-related challenges due to inadequate infrastructure. Urban Heat Islands: 1. Edenvale: Suburbs like Edenvale Central, Sebenza, and Dunnottar experience urban heat island effects. 2. Bedfordview: Areas like Bedfordview Central and St. Andrews face increased temperatures. The Heat Assessment Report 2023: 1. High-Risk Areas: Boksburg, Benoni, and Brakpan are classified as high-risk areas for heat-related illnesses. 2. Heat Index: Ekurhuleni's heat index is expected to increase by 2-3°C by 2050. 3. Heat-Related Mortality: Heat-related mortality rates are expected to increase.	
Vulnerable Population Groups	
Low-income households	Densely built areas are home to mostly black residents, having a low per capita income and lacking green vegetation. High urban densities and associated heat exposure levels generally coincide with poor housing conditions, buildings often being constructed with unsuitable materials such as corrugated metal sheeting, which adds to people's vulnerability to excessive heat.
Women, youth and the elderly	Overall, informal employment concerns more women than men, and more the young and old than the middle-aged within the population. The informal economy is characterized by high levels of poverty, inequality and the lack of social safety nets and occupational health protection, thus making the informally employed within these population groups very vulnerable to the negative impacts of heat stress on their livelihood.
Densely populated areas	Densely built and populated areas such as Tembisa and Katlehong generally experience the highest urban heat island intensities. This is not surprising, as a high built density is associated with the abundant occurrence of impermeable surfaces and little vegetation.
Laborers	Rising temperatures mostly affect workers already exposed to extreme temperatures, such as outdoor workers, and those that are employed in workshops that are not adequately protected from overheating
Vulnerable Assets, Infrastructure & Sectors	
Water	Heatwaves cause the following impacts in the City: water supply impacts (e.g. increased water demand), water quality impacts (e.g., decreased water treatment efficiency), infrastructural impacts (e.g., reduced water storage capacity), health impacts (e.g., dehydration and heat-related illnesses) and economic impacts (e.g. economic losses due to reduced industrial and commercial activity)
Energy	The impact of heat on critical infrastructure may affect a variety of sectors such as extreme heat causing a failure in the electricity distribution network (e.g., caused by transformer overheating).
Built infrastructure	Ekurhuleni is faced with the following challenges: aging infrastructure, high population densities, limited green spaces and dependence on nearby critical infrastructure (e.g., power stations). Hence the City is vulnerable to heatwaves which impacts built infrastructure in the following ways: water supply system disruptions, economic losses due to disrupted services and many more.

4.3.4. Bushfires: An overview of the Hazard and Impacts within Ekurhuleni

Wildfires are a significant concern in Ekurhuleni and are classified as having a high wildfire hazard. The region is susceptible to wildfires during the winter seasons when dry vegetation and strong winds create a high-risk environment. Historically, Ekurhuleni experienced bushfires in Boksburg in 2019 which burned over 100 hectares and bushfires in Benoni in 2020 which ravaged 50 hectares of land.

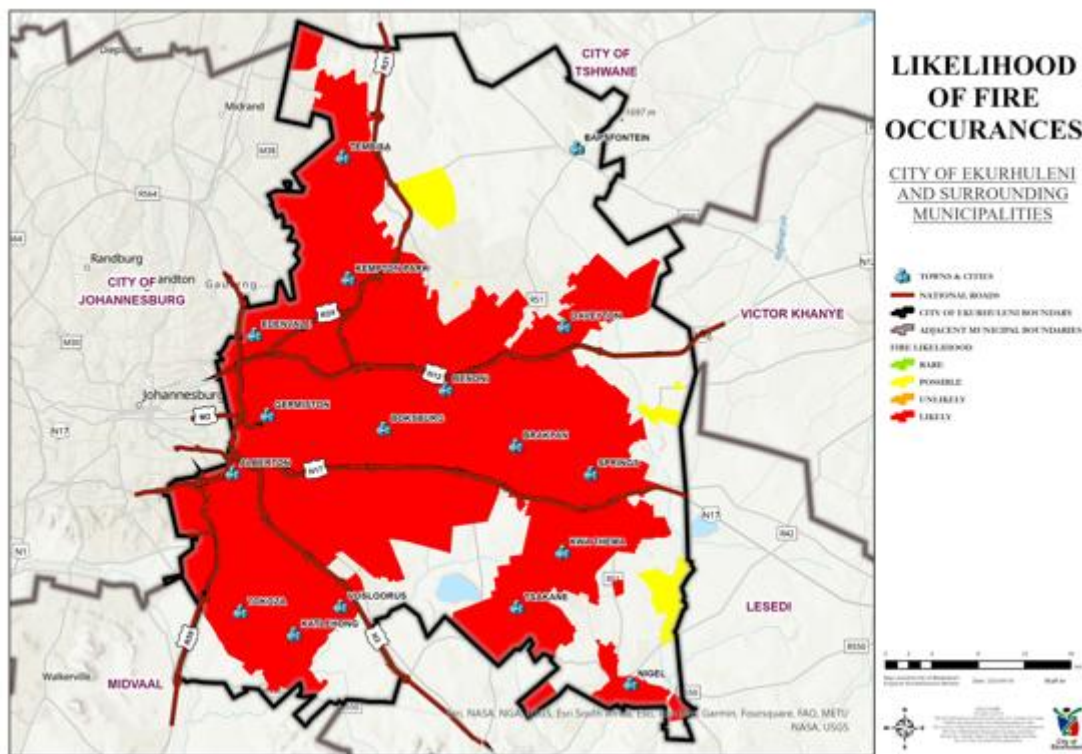


Figure 27 Baseline map showing the likelihood of fires in Ekurhuleni.

Figure 24 shows the likelihood of wildfires occurring in the wildland-urban interface (the boundary or interface between developed land and fire-prone vegetation) of the settlement. Based on the assessment, Ekurhuleni has a high likelihood of occurrence of wildfires in most parts on the City.

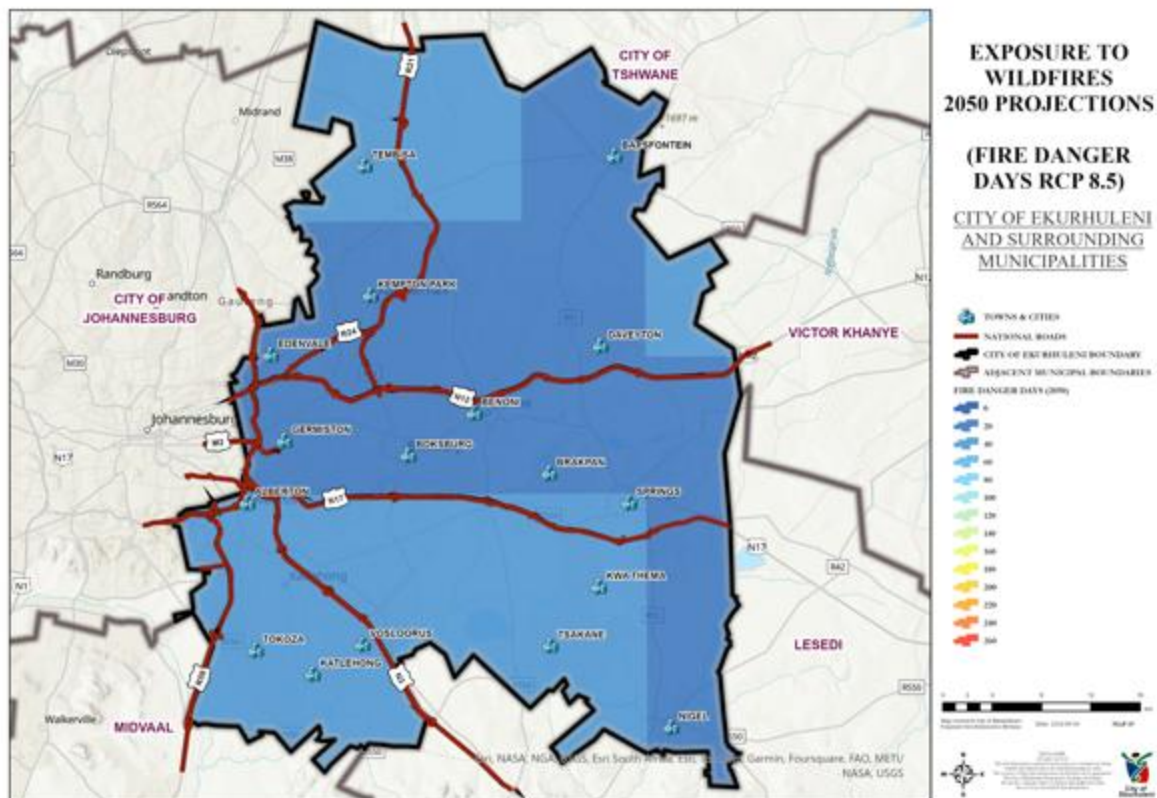


Figure 28 Ekurhuleni's exposure to wildfires (fire danger days RCP 8.5), 2050 projections

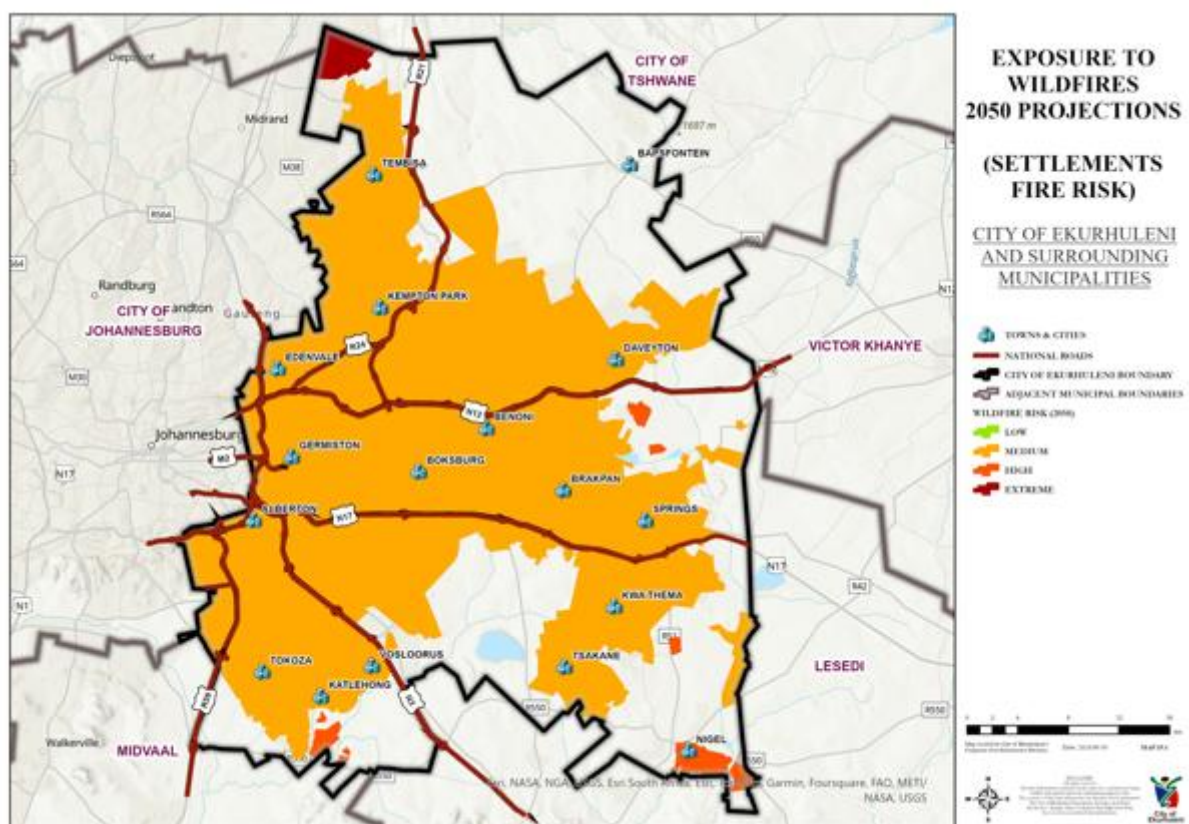


Figure 29 Ekurhuleni's potential increase to exposure of wildfires, 2050 projections

Figure 28 shows the projected number of fire danger days under an RCP 8.5 low mitigation (worst case) scenario while Figure 29 shows the settlements that are at risk of increases in wildfires by the year 2050.

Table 6 The impacts of bushfires in the City

KEY SECTORS	HOW THE SECTOR IS IMPACTED & WHERE
Vulnerable Areas in Ekurhuleni	
High-Risk Areas: 1. Boksburg: Areas surrounding the Boksburg Nature Reserve. 2. Benoni: Suburbs near the Benoni Lake and the Klein Jukskei River. 3. Brakpan: Areas surrounding the Brakpan Dam and the Rand Collieries. 4. Germiston: Suburbs near the Germiston Lake and the Klip River. 5. Kempton Park: Areas surrounding the Kempton Park Golf Course and the Birchleigh suburb. Moderate-Risk Areas: 1. Edenvale: Suburbs near the Edenvale Golf Course and the Sebenza suburb. 2. Bedfordview: Areas surrounding the Bedfordview Nature Reserve. 3. Alberton: Suburbs near the Alberton Dam and the Randhart suburb. Informal Settlements: 1. Informal settlements lack firebreaks and access for emergency services. 2. Residents face increased risk due to proximity to open spaces. Heat Assessment Report 2023 Findings: 1. Fire Risk Index: Ekurhuleni's fire risk index is classified as high to very high. 2. Vegetation: Areas with dense vegetation, such as grasslands and woodlands, are prone to bushfires. 3. Temperature Increase: Ekurhuleni's rising temperatures increase bushfire risk. 4. Drought: Prolonged drought periods exacerbate bushfire vulnerabilities.	
Vulnerable Population Groups	
Low-income households	Low-income households have limited access to emergency services and resources, they have inadequate insurance coverage, limited financial reserves and are dependent on informal livelihoods. Hence are susceptible to the following impacts as a result of exposure to wildfires: loss of livelihoods and income, respiratory problems from smoke inhalation, displacement and relocation and many more.
Women and girls	
Elderly	The elderly have limited access to emergency services, inadequate mobility and transportation options, are dependent on caregivers or family members and are at a higher risk of medication disruption and management. Exposure to bushfires exacerbates chronic health conditions, disrupts social networks and support systems.
Vulnerable Assets, Infrastructure & Sectors	
Water	Bushfires significantly impact water resource quality (e.g., ash and sediment contamination) and supply (e.g., increased risks of water supply disruptions).
Energy	Bushfires impact energy infrastructure (e.g., damage to powerlines, substations and transmission towers) and supply (e.g., damage to critical energy infrastructure increases risk to energy poverty) in the City.

5.3.5. An overview of other Hazards that affect Ekurhuleni

Biodiversity loss

Climate change is emerging as a serious threat to native species and ecosystems and is expected to be an on-going challenge to the effective conservation of these assets. Rising temperatures and flooding/drought, as well as climate-induced changes in fire regimes, water quality and ocean chemistry, will have wide-ranging impacts on biodiversity and will intensify existing threats such as habitat loss, weeds, pest animals and drought. Species that have survived previous climatic shifts by evolving, moving or modifying their behavior may find it more difficult to use these coping strategies when the change is rapid, especially if their habitat is degraded or lost. The most vulnerable ecosystems include those that are coastal, alpine, rainforest or fragmented terrestrial, or those that are in areas vulnerable to fire or low freshwater availability. Species that could become endangered or extinct include those living near the upper limits of their temperature range (for example, in alpine regions); those with restricted climatic niches; and those that cannot migrate to new habitats because of habitat fragmentation or lack of alternatives. For those species capable of dispersal, action is required to ensure that there is sufficient remnant habitat, that invasive species are controlled, and that links (including dispersal vectors) exist between habitats. In Ekurhuleni, the biodiversity is significantly threatened by the loss of conservation areas, invasive alien species, encroachment of informal settlements on ecosystems and inadequate waste disposal services.

Hail and Frost

Hail and frost are common in Ekurhuleni. Hail can be expected periodically, resulting in extensive damage. Severe frost occurs frequently from mid-April to September. According to provincial climate projections, this is likely to continue and increase as a result of climate change impacts.





Figure 30 Hail cover at Benoni after a heavy storm hit the Ekurhuleni ([Hail storm hits Ekurhuleni | The Citizen](#))

Strong Winds

Northerly and north-westerly winds blow during winter and spring and north-easterly to north-easterly winds during summer. Winds are usually gentle, and strong winds are only experienced 15% of the time. Moderately high-speed winds occur from late winter to early spring. Wind damage to field crops is rare, but damage to deciduous fruit is quite common. (CRSCP: 2018). In the past, strong winds have significantly damaged infrastructure (buildings, roofs, roads, vehicles) in Ekurhuleni.





Figure 31 Impacts of strong winds in Ekurhuleni

CHAPTER 6: Vision, goals, objectives and responses

1. Vision

The City of Ekurhuleni's vision is to be an equitable, carbon-neutral and resilient City by 2050 that is safe and provides sustainable economies for all its people.

2. Mitigation goals, objectives & responses

Goals and Objectives:

Ekurhuleni commits to being a net zero emissions city by 2050, demonstrating leadership, and leveraging support for improving the livability of the city and the health and well-being of its residents. This commitment will complement the national and provincial government's mitigation commitments and efforts and address the city's primary development needs with regards to energy, transport, sanitation and waste management. The targets are to reduce GHG emissions by at least 70% by 2050 compared to the base year (2019) level of 20.71 MtCO_{2e} and an interim target of 19% below base year levels by 2030.

Responses:

The following principles need to be applied with regards to climate mitigation within Ekurhuleni. Reduce greenhouse gas emissions through:

Clean energy supply:

- the promotion of green technologies in the industry sector;
- the promotion and advocacy for alternative energy production i.e. solar, wind, biogas etc.; and
- increase penetration of rooftop solar electricity generation in private and municipal buildings.

Improved energy efficiency:

- the promotion of green technologies in the industrial sector;
- the promotion of green building, solar technologies and alternative energy;
- the promotion of green building retrofits and energy efficient new buildings; and

- the promotion of energy efficient infrastructure.

Sustainable transport:

- enhance spatial planning and promotion of public transport, increasing the share of public and non-motorized transport, and reducing reliance on private vehicles;
- investigate options for improving freight efficiency and alternative fuels for freight transport; and
- promoting a shift towards electric transportation for private vehicles, buses and minibuses.

Sustainable waste management:

- promotion of reduce reuse and recycling methods in order to reduce waste at landfill sites; including anaerobic digestion and composting of organic waste;
- promotion of waste exchange programme between industries, manufactures and businesses;
- capturing and utilizing biogas from wastewater and landfill gas; and
- reduction of methane from agricultural sector.

3. Adaptation goals, objectives & responses

Goals and Objectives:

Ekurhuleni commits to building resilience to climate-related impacts and improving the quality of life for its citizens by investing in natural resource management, sustainable agriculture, disaster management and the creation of green jobs.

Responses:

The following principles need to be applied with regards to climate adaptation within Ekurhuleni. Increasing climate resilience and adapting the City through:

Increased protection of natural resources:

- increasing the percentage of biodiversity priority areas;
- reducing alien invasive alien plant species; and
- protecting and restoring open spaces.

Improved water efficiency:

- the promotion of green building, rainwater collection for flood attenuation on-site;
- the better control of storm-water systems; and
- the promotion of water recycling technologies.

Enhanced disaster preparedness:

- reducing climate related risks from natural disasters;
- establishing climate change advocacy networks and raising city wide awareness on climate change and its impacts.

Facilitate green employment:

- increase local green jobs and education to implement the mitigation and adaptation targets.

4. Ekurhuleni's key commitments

As part of the delegation and input to COP17 Durban 2011, Ekurhuleni became a lead signatory to the Durban Adaptation Charter for local government. The charter looked at several key aspects of local government's position with respect to climate change. As a signatory to the Durban Adaptation Charter, Ekurhuleni joined the international community in calling upon local and sub-national governments to commit and upscale action to accelerate their adaptation efforts by committing to the following:

1. *Mainstreaming adaptation as a key informant of all local government development planning*

2. *Understand climate risks through conducting impact and vulnerability assessments*
3. *Prepare and implement integrated, inclusive and long-term local adaptation strategies designed to reduce vulnerability*
4. *Ensure that adaptation strategies are aligned with mitigation strategies*
5. *Promote the use of adaptation that recognizes the needs of vulnerable communities and ensures sustainable local economic development*
6. *Prioritize the role of functioning ecosystems as core municipal green infrastructure*
7. *Seek the creation of direct access to funding opportunities*
8. *To develop an acceptable, robust, transparent, measurable, reportable and verifiable (MRV) register*
9. *Promote multi-level and integrated governance and advocate for partnerships with sub-national and national governments on local climate action*
10. *Promote partnerships at all levels and city-to-city cooperation and knowledge exchange*

5. Declaration

In terms of the above focus areas, Ekurhuleni therefore undertakes to implement a strategy to fight against climate change, by:

- Adapting global objectives, defined by international negotiation and the scientific community
- Implementing a climate response plan for each key department, outlining concrete actions, in order to reach a local objective. The creation of this climate plan must begin with a detailed understanding of the department's role and objectives.
- Regularly measuring and reporting reductions in emissions of greenhouse gases in order to assess and evaluate the efficiency of the climate plan's actions, using truthful and reliable techniques;

Ekurhuleni is committed to reducing its contribution to global warming and ensuring that the impacts of climate change are abated. As part of this commitment Ekurhuleni has become a signatory to the Compact of Mayors. This is a global coalition of city leaders addressing climate change by pledging to cut greenhouse gas emissions and prepare for the future impacts of climate change. In order to formalize this level of commitment with the City the development of the "Ekurhuleni+ Challenge: A culture of sustainability" was developed. This climate change action pledge will need political and official support from all decision makers within the organization in order to ensure that the issues around climate change are addressed adequately.

6. Alignment of Ekurhuleni's climate mitigation and adaptation goals with the Sustainable Development Goals

The United Nation's Sustainable Development Goals (SDGs) provides a set of targets to address global social, economic, and environmental challenges. Cities play an important role for local action aimed at achieving the set targets. Addressing climate change issues contributes significantly to national and international efforts directed at achieving the SDG targets. Ekurhuleni's climate mitigation and adaptation targets are aligned with the UN's Sustainable Development Goals.

Climate Mitigation in Ekurhuleni

Outcome	Goals	CoE Target	Relevant SDG Targets	Addressed climate hazard or risk
Climate Mitigation: aimed at reducing the City's greenhouse gas (GHG) emissions.				
Outcome 1: Secure sustainable and clean energy for the City.	Goal 1: Investigate, promote, and adopt alternative sources of renewable energy to reduce reliance on fossil fuel energy.	-25% reduction in fossil fuel energy use by 2030 (GCAP, 2022). -20% of electricity is sourced from renewable sources by 2050. -80% of electricity is sourced from renewable sources by 2050.	Target 7.2: Increase the share of renewable energy in the global energy mix by 2030.	-Reducing greenhouse gas emissions which contribute to increased temperatures and variable rainfall patterns.
Outcome 2: Wide adoption of green buildings and solar electricity generation.	Goal 2: Improve energy efficiency in existing buildings, construct new green buildings, and increase solar electricity generation.	-20% reduction in GHG emissions by 2030 (GCAP, 2022). -100% of all new buildings are net-zero carbon and resource efficient by 2030. -100% of all existing buildings are net zero and resource efficient by 2050.	Target 9.1: Develop quality, reliable, sustainable, and resilient infrastructure, including regional and transborder infrastructure, to support economic development and human well-being, with a focus on affordable and equitable access for all by 2030.	-Reducing greenhouse gas emissions which contribute to increased temperatures and variable rainfall patterns.
Outcome 3: Access to safe and sustainable green transportation system.	Goal 3: Shift travel from private cars to public transit, as well as electrify cars and buses. Address efficiency and energy alternatives for freight transport.	-20% reduction in private fossil fuel vehicle kilometers travelled by 2030 (GCAP, 2022). -20% of city owned buses and fleet are electric by 2030. -80% of city owned buses and	Target 11.2: Provide access to safe, affordable, accessible, and sustainable transport systems for all by 2030.	-Reducing greenhouse gas emissions which contribute to increased temperatures and variable rainfall patterns.

		fleet are electric by 2050. -50% of passenger km travelled in public and non-motorized transport by 2030. -100% of passenger km travelled in public and non-motorized transport by 2050.		
Outcome 4: Zero waste City which promotes sustainable waste management practices.	Goal 4: Eliminate waste sent to landfill sites.	-50% reduction in waste sent to landfills by 2030 (GCAP, 2022). -100% reduction in waste sent to landfills by 2050. -100% of garden waste composted and 80% of food waste treated with anaerobic digestion by 2050. -90% recycling rate and 60% of legacy landfill gas captured by 2050. -75% biogas from wastewater captured by 2050.	Target 11.6: Reduce the adverse per capita environmental impact of cities by paying special attention to air quality and waste management by 2030.	-Reducing greenhouse gas emissions which contribute to increased temperatures and variable rainfall patterns.

Climate Adaptation in Ekurhuleni

Climate Adaptation: aimed at identifying climate hazards and adaptive responses that will enhance the City's overall climate resilience.

Outcomes	Goals	Ekurhuleni 2030 & 2050 Targets	SDG Targets	Addressed climate hazard or risk
Outcome 5: Natural Resource Management: Reverse the loss of natural resources by increasing freshwater security, protecting & restoring wetlands, controlling and invasive species.	Goal 5: To protect, conserve, and manage biodiversity to retain ecosystems services and adapt to climate change impacts.	-30% increase in the percentage of biodiversity priority areas by 2030. -80% increase in the percentage of biodiversity priority areas by 2050. -10% increase in protected biodiversity areas by 2030. -80% increase in protected biodiversity areas by 2050. -30% reduction of alien invasive plant species by 2030. -80% reduction of alien invasive plant species by 2050.	Target 15.5; Take urgent and significant action to reduce the degradation of natural habitats, halt the loss of biodiversity and by 2030.	-Droughts: Preserving green spaces maintains water cycles and increases water retention. -Heatwaves: Preserving green spaces mitigates the urban heat island effect. -Flooding: Preserving green spaces ensures flood attenuation during heavy rainfall seasons.
	Goal 6: To rehabilitate water bodies to improve water quality and ensure compliance with water standards.	-20% improvement in water security by 2030 (GCAP, 2022) -80 % improvement in water security by 2050. -Reduction in 10% of polluted rivers and wetlands by 2030. -Reduction in 80% of polluted river and wetlands by 2050.	Target 6.3: Improve water quality by reducing pollution, eliminating dumping, and minimizing release of hazardous chemicals and materials, halving the proportion of untreated wastewater, and substantially increasing recycling and safe reuse.	-Droughts: rehabilitating water bodies and improving water quality increase water availability, reduce water pollution and promote sustainable water use practices. -Heatwaves: Urban water bodies (e.g., rivers, wetlands) mitigate the urban heat island effect, reducing the severity of heatwaves and improving air quality.
	Goal 7: To upgrade and maintain open	-20% increase of recreational open spaces by 2030.	Target 11. 7: Provide universal access to safe, inclusive, and	-Droughts: Preserving green spaces maintains water cycles

	spaces to ensure communities have access to well-developed parks.	-80 % increase of recreational open spaces by 2050.	accessible, green, and public spaces.	and increases water retention. -Heatwaves: Preserving green spaces mitigates the urban heat island effect. -Flooding: Preserving green spaces ensures flood attenuation during heavy rainfall seasons.
Outcome 6: Improve climate resilience and disaster preparedness	Goal 8: To enhance disaster preparedness and implement disaster risk reduction programmes related to climate change.	-10% reduction in climate-related disaster risks by 2030. - 80% reduction in climate-related disaster risks by 2050.	Target 13.1: Strengthen resilience and adaptive capacity to climate-related hazards and natural disasters in all countries	-Ensure Ekurhuleni residents, especially the most vulnerable are resilient to the identified hazards (heatwaves, wildfires, droughts, floods) by enhancing the City's ability to respond to disasters.
Outcome 7: Encourage sustainable agricultural practices	Goal 9: To improve sustainable local food production and harness the agricultural potential of the region.	- At least 20% of the food consumed in the region is grown locally and sustainably by 2030. -At least 80% of the food consumed in the region is grown locally and sustainably by 2050.	Target 2.4: Ensure sustainable food production systems and implement resilient agricultural practices that increase productivity, maintain ecosystems and that strengthen capacity for adaptation to climate change.	-Sustainable agricultural practices like agroforestry, drip irrigation help reduce water usage, improve soil moisture retention and reduce soil erosion which reduces the risk of droughts and flooding. In addition, reduces soil temperatures, promotes heat tolerant crops and reduce the destruction of natural resources thus protecting the City against heatwaves and accelerated biodiversity loss.
	Goal 10: To increase investment in energy saving and renewable energy technologies for agricultural practices.	- 50% of farms implement energy efficiency and renewable energy upgrades by 2030. -80% of farms implement energy efficiency and renewable energy upgrades by 2050.	Target 7.2: Substantially increase the share of renewable energy in the global energy mix. Target 7.3: Double the global rate of improvement in energy efficiency.	
	Goal 11: To implement water efficiency interventions, including drip irrigation systems and exploring the	-50% of farmers implement drip irrigation systems by 2030. -80% of farmers implement drip	Target 6.4: By 2030, substantially increase water-use efficiency across all sectors	

	potential for secondary, non-potable water sources.	irrigation systems by 2050.		
Outcome 8: Establish a Green Workforce and Education	Goal 12: To increase local green jobs and education to implement the mitigation and adaptation targets.	-Create 500 new green jobs in local economy focusing on sectors like renewable energy, sustainable construction and eco-tourism by 2030. -Create 2000 new green jobs in local economy focusing on sectors like renewable energy, sustainable construction and eco-tourism by 2050 -Provide training and upskilling programmes for 500 local residents, enabling them to transition into green jobs by 2030. -Provide training and upskilling programmes for 2000 local residents, enabling them to transition into green jobs by 2050.	-Target 8.9: Implement policies to promote sustainable tourism that creates jobs. -Target 9.2: Promote inclusive and sustainable industrialization and significantly raise industry's share of employment and gross domestic product.	-The successful set up of green jobs will ensure that the City's climate mitigation and adaptation actions and targets are achieved in response to the identified climate hazards.
Outcome 9: City wide awareness on climate change impacts and adaptation.	Goal 13: To raise awareness about climate change resilience.	-Establish a Climate Change Advocacy network with 50 stakeholders every year till 2050. -Conduct 5 advocacy events and campaigns yearly till 2050.	Target 13.1: Strengthen resilience and adaptive capacity to climate-related hazards and natural disasters in all countries. Target 13.3: Improve education, awareness-raising and human and institutional capacity on climate change mitigation, adaptation, impact	-Ensure city wide awareness about the climate hazards and risks (droughts, flooding, heatwaves and wildfires) that threatened Ekurhuleni citizens.

			reduction and early warning.	
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CHAPTER 7: Implementation of the strategy

This chapter details the implementation of the CAP. Nine (9) strategic outcomes together with the relevant programmes and actions have been outlined to ensure that Ekurhuleni is an equitable, carbon-neutral, and resilient City by 2050. Synergy between mitigation and adaptation actions has been considered and is reflected in the different outcomes. For each action, a specific time frame has been determined,

- Short term: 0 to 5 years (2025-2030)
- Medium term: 5 to 10 years (2031 to 2035)
- Long term: 10 to 20 years (2036 to 2045)
- Ultra-long term: More than 20 years (2046 to 2050)

Due to budget and capacity constraints, the City will not achieve the set goals independently. Therefore, innovative resource mobilization and partnerships will have to be at the core of CAP implementation. To ensure city-wide buy-in of the CAP, awareness raising, and education will be crucial. A preliminary powers assessment has been undertaken to determine the city's power and capacity to implement climate action in key sectors. This will assist in identifying potential barriers to climate action implementation and key partners to be involved in the process. The City's influence within the key sectors has been captured in the below diagram (figure 32) and further explained in the table below.

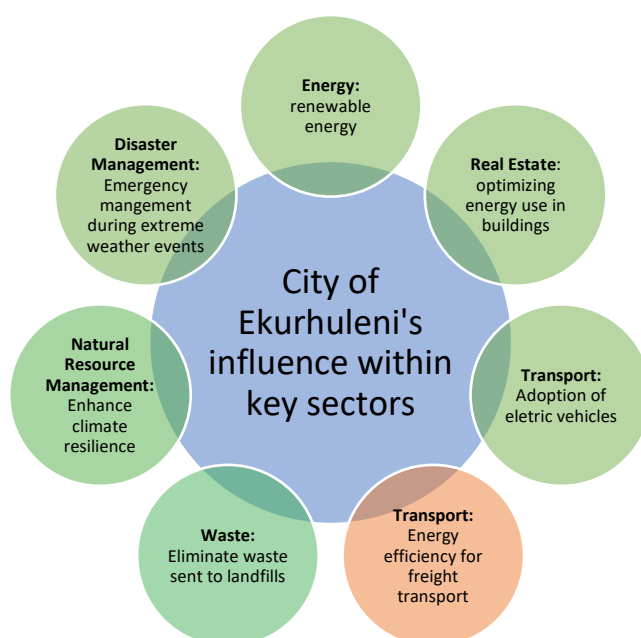


Figure 32 City of Ekurhuleni's influence within key sectors

City of Ekurhuleni's Powers Assessment				
City Powers Category	Primary responsibility	City Power	City Capacity	Comments / Improvement opportunities
MITIGATION				
Decarbonising the electricity grid Goal 1: Promote renewable energy to reduce reliance on fossil fuel energy	Energy Department	H	H	The main responsibility for promoting renewable energy and decarbonizing the electricity grid in Ekurhuleni lies with the Energy Department. This department is responsible for the distribution of electricity and ensuring that electricity services are provided effectively, efficiently, and sustainably. Additionally, the Department of Environment Resources Management plays a significant role in promoting renewable energy solutions and implementing sustainable practices. This department focuses on integrating renewable energy sources, such as solar power, into the city's energy mix to reduce greenhouse gas emissions and promote environmental well-being.
Optimizing energy use in buildings Goal 2: Improve energy efficiency in existing buildings, construct new green buildings, and increase solar electricity generation.	Real Estate & Development Planning	H	M	Improve Energy Efficiency in Existing Buildings: Responsibility/Authority: Real Estate & Development Planning and Energy, departments are primarily responsible for implementing energy efficiency measures. Level of Influence: High, as the city can enforce regulations and provide incentives for retrofitting and energy audits. External Stakeholder: Private sector and residents play a role in adopting energy-efficient practices. City's Power and Capacity: High, due to the ability to regulate and incentivize energy efficiency improvements. Construct New Green Buildings: Responsibility/Authority: Real Estate & Development Planning and Energy, departments are responsible for enforcing green building standards. Level of Influence: High, as the city can mandate green building codes and provide incentives for compliance. External Stakeholder: Developers and the private sector are key players in constructing new green buildings.

				○ City's Power and Capacity: High, given the authority to enforce building codes and provide financial incentives. 3. Increase Solar Electricity Generation: ○ Responsibility/Authority: The Energy, Environment & Waste Management, departments are responsible for promoting solar energy projects. ○ Level of Influence: High, as the city can facilitate solar PV installations and implement net metering policies. ○ External Stakeholder: Private sector and residents are involved in installing and utilizing solar energy systems. ○ City's Power and Capacity: High, due to the ability to promote and support solar energy initiatives.
Enabling next generation mobility Goal 3: Electrify cars and buses. Address efficiency and energy alternatives for freight transport.	Roads & Transport Management	M	M	1. Electrify Cars and Buses: ○ Responsibility/Authority: The Roads & Transport Management, Energy, departments are primarily responsible for promoting the electrification of cars and buses. ○ Level of Influence: High, as the city can implement policies, provide incentives, and develop infrastructure for electric vehicles (EVs). ○ External Stakeholder: Private sector and vehicle manufacturers play a crucial role in supplying and adopting EVs. ○ City's Power and Capacity: High, due to the ability to regulate, incentivize, and support the transition to electric vehicles. 2. Address Efficiency and Energy Alternatives for Freight Transport: ○ Responsibility/Authority: The Roads & Transport Management, Environment & Waste Management, departments are responsible for improving the efficiency and exploring energy alternatives for freight transport. ○ Level of Influence: Medium, as the city can promote the use of alternative fuels and technologies but relies on logistics companies and freight operators for implementation. ○ External Stakeholder: Logistics companies and freight operators are key players in adopting energy-efficient practices and alternative fuels. ○ City's Power and Capacity: Medium, given the ability to promote and support initiatives but limited direct control over freight operations.
Improving solid waste/wastewater management	Environment & Waste Management	H	H	1. Eliminate Waste Sent to Landfill Sites: ○ Responsibility/Authority: The Environment & Waste Management department are primarily responsible for implementing strategies to eliminate waste sent to landfill sites.

Goal 4: Eliminate waste sent to landfill sites				○ Level of Influence: High, as the city can enforce regulations, promote recycling and composting, and provide incentives for waste reduction. ○ External Stakeholder: Private sector and waste management companies play a crucial role in adopting and implementing waste management practices. ○ City's Power and Capacity: High, due to the ability to regulate, incentivize, and support waste management initiatives.
ADAPTATION				
Enhancing climate resilience (structurally reducing and preventing impacts from identified climate risks)	Flood and Storms			To enhance climate resilience in Ekurhuleni, the city must focus on conserving biodiversity, rehabilitating water bodies, maintaining open spaces, and raising awareness about climate change. These efforts are crucial in mitigating the impacts of floods, storms, heatwaves, droughts, and wildfires. The Environment & Waste Management, Water and Sanitation, and Communications departments play key roles, with high authority to implement conservation programs, enforce regulations, and engage the community. Collaborating with external stakeholders such as NGOs, private sector, and community groups will further strengthen these initiatives, ensuring a comprehensive approach to building a resilient and sustainable city. Additionally, the city can undertake key adaptation measures such as developing early warning systems for extreme weather events, enhancing green infrastructure to absorb stormwater, and promoting water conservation practices. Coordination with the City Resilience and Just Transition Forum will ensure that these efforts are aligned with broader resilience strategies, fostering a collaborative approach to addressing climate risks and ensuring a just transition for all residents. This forum can serve as a platform for sharing knowledge, resources, and best practices, ultimately enhancing the city's capacity to adapt to and mitigate the impacts of climate change. 1. Conserve Biodiversity: ○ Responsibility/Authority: The Environment & Waste Management and Water and Sanitation departments are primarily responsible for biodiversity conservation efforts. ○ Level of Influence: High, as the city can implement conservation programs, enforce regulations, and collaborate with stakeholders. ○ External Stakeholder: NGOs and environmental groups play a crucial role in supporting conservation initiatives. ○ City's Power and Capacity: High, due to the ability to regulate, incentivize, and support biodiversity conservation efforts.
(Note: add other hazard themes if not included)	Environment & Waste Management, Water and Sanitation	H	H	
	Heat			
	Community Services, Environment & Waste Management	H	H	
	Drought			
	Water and Sanitation, Environment & Waste Management,	L	L	
	Wildfires			
Goal 5: To conserve biodiversity.	Environment & Waste Management	M	L	
Goal 6: To rehabilitate water bodies & improve water quality.				
Goal 7: To maintain open spaces.				
Goal 8: To raise awareness about climate change resilience.				

				2. Rehabilitate Water Bodies & Improve Water Quality: ○ Responsibility/Authority: The Water and Sanitation and Environment & Waste Management departments are responsible for water body rehabilitation and water quality improvement. ○ Level of Influence: High, as the city can implement rehabilitation projects, enforce water quality standards, and collaborate with stakeholders. ○ External Stakeholder: Private sector and community groups are key players in supporting and participating in water quality improvement initiatives. ○ City's Power and Capacity: High, given the authority to regulate and implement water quality improvement projects. 3. Maintain Open Spaces: ○ Responsibility/Authority: The Environment & Waste Management and Parks & Cemeteries departments are responsible for maintaining open spaces. ○ Level of Influence: High, as the city can implement maintenance programs, enforce regulations, and collaborate with stakeholders. ○ External Stakeholder: Community groups and NGOs play a crucial role in supporting and participating in open space maintenance initiatives. ○ City's Power and Capacity: High, due to the ability to regulate, incentivize, and support open space maintenance efforts. 4. Raise Awareness about Climate Change Resilience: ○ Responsibility/Authority: The Environment & Waste Management and Communications, Marketing & Tourism departments are responsible for raising awareness about climate change resilience. ○ Level of Influence: High, as the city can implement awareness campaigns, collaborate with stakeholders, and engage the community. ○ External Stakeholder: Media, NGOs, and educational institutions play a crucial role in supporting and participating in awareness initiatives. ○ City's Power and Capacity: High, given the authority to implement and support awareness campaigns.
Emergency management during extreme weather events (e.g., cyclones, tsunamis, extreme rain, heat or drought)	Flood and Storms			To enhance disaster preparedness and implement disaster risk reduction programs in Ekurhuleni, the city must focus on strategies that address the impacts of floods, storms, heatwaves, droughts, and wildfires. The Community Safety, Environment & Waste Management, and Communications departments play key roles, with high authority to implement preparedness programs, conduct drills, and engage the community. Collaborating with external stakeholders such as NGOs, the private sector, and community groups will further strengthen these initiatives. Key adaptation measures

Goal 9: To enhance disaster preparedness and implement disaster risk reduction programmes related to climate change				include developing early warning systems, enhancing green infrastructure, and promoting water conservation practices. Coordination with the City Resilience and Just Transition Forum will ensure these efforts are aligned with broader resilience strategies, fostering a collaborative approach to addressing climate risks and ensuring a just transition for all residents. This forum can serve as a platform for sharing knowledge, resources, and best practices, ultimately enhancing the city's capacity to adapt to and mitigate the impacts of climate change. 1. Enhance Disaster Preparedness: ○ Responsibility/Authority: The Community Safety, Environment & Waste Management, and Communications departments are primarily responsible for enhancing disaster preparedness. ○ Level of Influence: High, as the city can implement preparedness programs, conduct drills, and engage the community. ○ External Stakeholder: NGOs and community groups play a crucial role in supporting and participating in preparedness initiatives. ○ City's Power and Capacity: High, due to the ability to regulate, incentivize, and support disaster preparedness efforts. 2. Implement Disaster Risk Reduction Programs: ○ Responsibility/Authority: The Community Safety, Environment & Waste Management, and Finance departments are responsible for implementing disaster risk reduction programs. ○ Level of Influence: High, as the city can develop and enforce risk reduction strategies, allocate funding, and collaborate with stakeholders. ○ External Stakeholder: Private sector and NGOs are key players in supporting and participating in risk reduction initiatives. ○ City's Power and Capacity: High, given the authority to regulate and implement risk reduction programs.
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Action prioritization for mitigation

For the development of the GCAP, mitigation actions for each sector were prioritized in an internal consultative process using Apex to explore measures in a workshop setting. This involved successive phases of a process including the development of a long list of actions. These actions drew on a range of initiatives, including (as an example) various initiatives to support energy efficiency and the use of renewable energy at a national level. The actions were identified from the City's baseline data, plans already in existing City plans and strategies and examining examples from other cities. The process for developing the short-list of measures is also described in detail in the GCAP, however in essence this involved consideration of municipal powers, barriers, risk, financial implications, feasibility and impact. Measures in the final short-list were included in the Green City Action Plan analysis, green investment pipeline, and implementation roadmap.

To fulfil on the goals and targets presented in this strategy, further measures were included based on:

- a) The ambitious scenario with the extended modelling horizon to 2050, and
- b) The best practice examples of actions committed to in the Paris-aligned plans of neighbouring cities Tshwane and Johannesburg.

Action prioritization for adaptation

Ekurhuleni's climate risk assessment reveals that the City is most vulnerable to heatwaves, droughts, flooding, wildfires, wind, storms and hail. To mitigate these impacts, the City must prioritize climate adaptation actions that address its unique needs and circumstances. The following climate adaptation actions have been prioritized.

- Natural Resource Management to reverse the loss of natural resources by increasing freshwater security, protecting & restoring wetlands and controlling invasive species.
- Sustainable agricultural practices focused on sustainable production, renewable energy technologies and water saving interventions (e.g., drip irrigation systems) to reduce greenhouse gas emissions and manage water use.
- Climate resilience and disaster preparedness by implementing disaster risk reduction programmes related to climate change.
- Green job creation to implement the identified climate mitigation and adaptation targets.
- City wide awareness on climate change impacts and adaptation.

Climate Mitigation goals and outcomes

1. Sustainable and Clean Energy: The City aims to ensure affordable, reliable, sustainable, and modern energy for all.

Description		Timeframes				Lead implementing entity (CoE)	Financing source	Climate benefit	Core benefits
		0-5 years 2025-2030	5-10 years 2031-2035	10-20 years 2036-2045	20 +years 2046-2050				
Outcome 1	Secure sustainable and clean energy for the City.								
Programme 1	Upgrades all streetlights (approx. 85 000) and traffic lights (approx. 800) with energy efficient bulbs.					Transport Department & Energy Department	National grants, City budgets, the private sector, including through lease-to-own models, ESCOs and PPPs.	Energy savings are achieved by reducing fossil fuel energy consumption, which encompasses reducing fossil fuel-generated electricity and replacing energy sources with renewables. This contributes to the overall reduction of carbon dioxide emissions and supports efforts to limit warming to 1.5°C.	-New job opportunities -Reduced dependence on fossil fuels and increase energy security -Decreasing air pollution & increased environmental protection. -Lower energy costs (cost effective energy alternatives)
Programme 2	Encourages installation of solar panels on 10% of rooftop area of buildings (99.5% of this roof area is private buildings and 0.5% is municipal buildings) and procure					Energy Department	Private sector investment Development Financial Institutions		

Programme 3	renewable electricity directly from independent power producers (IPPs).								
	Offer solar subsidies to residents by partnering with private solar companies to offer financing options, installation services and other incentives for solar adoption.					Energy department	Private sector investment		
	Develop parallel regulations to match the national Small-scale Embedded Generation (SSEG) regulations to further ease the deployment of renewable energy systems or develop and implement new policies and pilots					Energy department	City budget		

Programme 5	like net metering and wheeling.								
	Encourage community aggregated buying and installing of solar PVs.					Energy department	City's capacity and budget		

Impacted groups and sectors: Shifting to renewable energy sources is anticipated to have significant impacts on various groups and sectors within Ekurhuleni. Independent power producers, who are pivotal in driving this transition, will play a crucial role. However, indigent groups and the middle class may find self-generation unaffordable, posing a challenge to equitable access to renewable energy. Industries such as mining, construction, manufacturing, and transportation are identified as those most likely to be affected by the transition to renewable energy. Additionally, the city's revenue stream from electricity sales will be impacted by savings from cleaner and more efficient assets, and job losses in both skilled and unskilled labour are anticipated.

Just Transition recommendations: To support a just transition, the City has established partnerships with various enterprises with a key focus on cost saving initiatives. To facilitate retraining and upskilling, the City needs to form partnerships with training organizations, identify staff and community members in need of training, and enhance internship programs.

To ensure affordability for all groups, the City plans to implement several measures:

- **Subsidies and Incentives:** Offering subsidies and financial incentives to lower-income households to make renewable energy technologies more accessible.
- **Financing Options:** Partnering with private solar companies to provide affordable financing options and installation services.
- **Community Aggregated Buying:** Encouraging community aggregated buying and installing of solar PVs to reduce costs through bulk purchasing.

- **Public-Private Partnerships:** Leveraging public-private partnerships to fund and support renewable energy projects, ensuring that the financial burden does not fall solely on residents.
- **Education and Awareness Campaigns:** Conducting education and awareness campaigns to inform residents about the benefits and available support for adopting renewable energy solutions.

These measures aim to ensure that the transition to sustainable and clean energy is inclusive, equitable, and supports the goal of providing affordable, reliable, sustainable, and modern energy for all.

2. Green Buildings: The City aims to embrace sustainable construction practices in order to reduce carbon emissions.

Description		Timeframes				Lead implementing entity (CoE)	Financing source	Climate benefit	Core benefit
		0-5 years 2025-2030	5-10 years 2031-2035	10-20 years 2036-2045	20 +years 2046-2050				
Outcome 2	Wide adoption of green buildings and solar electricity generation.								
Programme 1	Finance energy efficiency improvement & renewable energy in 50% of all the buildings through the Property Assessed Clean Energy (PACE) programme.					Energy Department and Real Estate and Development Planning	PACE programme	Energy savings are achieved by reducing fossil fuel energy consumption, which encompasses reducing fossil fuel-generated electricity and replacing energy sources with renewables. This	-New job opportunities in green construction. -Reduced construction & operational waste. -Decreasing air pollution & increased
Programme 2	Ensure adherence to energy performance standards by privately owned buildings						EPL programme		

	and establish programme(s) which will support residential retrofit.								
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Impacted groups and sectors: Adopting green buildings will impact low-income households which may face increased costs associated with green building technologies, potentially leading to financial burdens. However, some green building features, like energy-efficient appliances can reduce energy consumption and costs in the long run. Sectors such as manufacturing, construction and industries may need to invest in new technologies and practices to comply with green buildings standards, which can be costly. The transition to green buildings may require construction workers and contractors to acquire new skills and adapt to innovative building materials and techniques.

Just transition recommendations: In order support the most impacted groups during the transition to green buildings, the City needs to explore opportunities such as offering subsidies to assist low income households cover the costs of green building upgrades, implement programs providing energy-efficient appliances to reduce energy consumptions, educate low-income households on benefits of green buildings, provide guidance on accessing available support, recognize environmentally friendly businesses and provide training and upskilling programmes for construction workers and contractors on green building construction.

To ensure widespread and fair adoption, the City plans to implement several measures:

- **Financing options:** Assist with securing government or private lenders to provide financing to low-income building owners, which helps pay for the upfront costs.
- **Financial incentives attached to green building certification:** Offering various tax credits, funds, and rebates to green building developers.
- **Technical support:** Provide technical assistance for developers who want their properties to be green certified. This support is useful since green building requirements are often new or unfamiliar for private sector initiators.

These measures aim to ensure that the transition to green buildings is inclusive, feasible and affordable.

3.Green Transportation: The City aims to transition to more sustainable, efficient and safe transportation options to reduce greenhouse gas emissions, improve air quality and adapt the City to climate change.

Description		Timeframes				Lead implementing entity (CoE)	Financing source	Climate benefit	Core benefit
		0-5 years 2025-2030	5-10 years 2031-2035	10-20 years 2036-2045	20 +years 2046-2050				
Outcome 3	Access to safe and sustainable green transportation system.								
Programme 1	Encourages residents & businesses to switch from vehicles with internal combustion engines to electric vehicles					Roads &Transport Management Department and Energy Department	The cost of electric vehicles is primarily borne by vehicle owners. The City and national government could contribute with incentives. City-owned vehicles and charging infrastructure could be funded through grants, PPPs, or other private sector	By adopting green transportation systems, the City will reduce transportation related carbon and methane emissions. This contributes to the overall reduction of carbon dioxide emissions and supports efforts to limit	-Improved air quality and public health -Reduced fuel costs -New jobs for the electric vehicle industry and infrastructure development.

							business models.	warming to 1.5°C.	
Programme 2	Implement parking restrictions for new developments, paid street parking in heavily congested areas and public transportation.						City budget		-Reduced traffic congestion and noise -Reduced air pollution from vehicle emissions
Programme 3	Implement an enhanced bus system along planned bus rapid transit (BRT) route, operate new buses (some of which are electric) and implement priority bus lanes to improve bus services and reduce travel time.						City budget		-Reduced traffic congestion and noise -Reduced air pollution from vehicle emissions
Programme 4	Implement a cashless payment system that is integrated with other public transport modes								

	for minibus taxis to improve personal safety of both passengers and drivers.								
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Impacted groups and sectors: Transitioning to sustainable transportation systems for Ekurhuleni is centred around encouraging the use on electric vehicles, developing infrastructure for non-motorised transport and electric vehicles, improving the efficiency, safety and accessibility of public transport, reducing private car usage and encouraging better spatial planning. The transition is likely to de-prioritised jobs such as bus inspectors, sliding door operators (for mini-bus taxis), petrol attendants and motor mechanics. Potential job losses are expected in industries such as vehicle parts manufacturing, petrol filling station and more. New jobs related to self-service facilities, warehouse automation, and electric vehicle maintenance are likely to emerge.

Just transition recommendations: Mitigating the negative impacts of the transition, requires considering the entire value chain and the lifecycle of transportation. There is a need for policy adaptation, legal changes, stakeholder readiness and reskilling workers to facilitate a just transition. Additionally, aligning academic curricula with the skills needed for the transition is crucial, along with charging station services for electric vehicles and the conversion of current vehicles to electric vehicles. Additional measures include encouraging mixed-use developments and efficient public transport, providing subsidies to incentivise change, addressing community resistance through engagement, securing funding for the city's transition efforts, promoting awareness of various modes of transport, creating job opportunities in technical fields, investing in training for the transition and engaging with the taxi industry.

To ensure affordability for all groups, the City plans to implement several measures:

- **Policy adoption:** Passing supportive policies to remove existing barriers.
- **Incentives:** Offering incentives to encourage initial uptake of electric vehicles.
- **Private sector partnerships:** Partnering with the private sector (e.g., fueling companies, large retailers) to build charging infrastructure on their premises.

4.Sustainable waste management The City aims to reduce carbon emissions from waste sent to landfills by implementing sustainable waste management practices.

Description		Timeframes				Lead implementing entity (CoE)	Financing source	Climate benefit	Core benefit
		0-5 years 2025-2030	5-10 years 2031-2035	10-20 years 2036-2045	20 +years 2046-2050				
Outcome 4	Zero waste City which promotes sustainable waste management practices.								
Programme 1	Open centralized composting facilities. Large garden waste producers (golf courses and schools) are required to compost on site.					Environmental Resource and Waste Management Department	Composting facilities can be funded with City budgets, financial institutions, and/or PPP arrangements.	Sustainable waste management practices reduce methane which contributes significantly to the GHG emissions and reduces nitrous oxides from waste treatment and disposal.	-Job creation for workers in the composting operations -Reduced waste disposal costs -Revenue generation from compost sales -Reduced waste related diseases and odors
Programme 2	Collect and processes food waste using anaerobic digestion.					Environmental Resource & Waste Management Department	City budget and through PPPs.		-Reduced waste management costs

Programme 3									-Reduced waste related diseases and orders
	Work with the private sector to open and operate a materials recovery facility (MRF) that produces marketable end products. As well as implement waste collection and sorting cooperatives and independent waste pickers to synergies efforts.					Environmental Resource & Waste Management Department, private sector partners and independent waste pickers.	An MRF could be financed through City budgets, financial institutions, and/or PPP arrangements		-Reduced waste management costs -Reduced waste related diseases and orders -Job creation for workers in material recovery chain -Stimulate local economy (local businesses and industries using recyclable material)
Programme 4	Generate energy from landfill gas captured at existing landfill sites.					Energy Department and Environmental Resource & Waste Management Department	Funded by the City, through financial institutions, and/or with PPP		

							arrangements.		
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Impacted groups and sectors: Sustainable waste management practices have the potential to impact the following groups; informal waste pickers who may face changes in their livelihoods, formal waste management workers needing to adapt new technologies and practices thus requiring training, SMEs involved in waste management or related industries faced with new opportunities, communities living near landfills may experience improved environmental and health conditions due to reduced waste disposal and recycling cooperatives benefiting from increased access to recyclable materials and new market opportunities. The green job opportunities arising from the establishment of buy-back centres, cooperatives, community education programs and resource provisions will improve the local economy.

Just transition recommendations: It is significantly important to involve local communities in the planning and implementation of the transition. Therefore, the starting point should be on offering income-generating opportunities linked to waste management. Including roles like informal waste recyclers or reclaimers, Information and Communication Technology (ICT) technicians, researchers, biodigester operators and administrative positions. The transition's potential to encourage local innovation and entrepreneurship is dependent on retraining and upskilling waste management workers and forming partnerships with training institutions.

To ensure profitability for all groups undertaking business in the waste sector, the City plans to implement several measures:

- **Private sector partnerships:** Partner with the private sector to open and operate a materials recovery facility (MRF) that produces marketable end products.
- **Support informal sector:** Work with communities to implement waste collection and sorting cooperatives, as well as the independent waste pickers to synergies efforts.

Climate Adaptation goals and outcomes

1.Protect and conserve biodiversity: The City aims to adapt the City to climate change impacts and increase resilience by protecting and conserving biodiversity and its ecosystem services.

Description		Timeframes				Lead implementing entity (CoE)	Financing source	Climate benefit	Core benefit
		0-5 years 2025-2030	5-10 years 2031-2035	10-20 years 2036-2045	20 +years 2046-2050				
Outcome 5	Protect and conserve biodiversity								
Programme 1	Increase percentage and area of Critical Biodiversity Area (CBA) and Ecological Support Area (ESA) that are under some form of conservation management (including both formal protection, conservation stewardship agreements or municipal zoning which achieve conservation objectives)						City budget	-Carbon sequestration (vegetation) -Temperature and heat regulation from urban forests. -Retention of ecosystem services (air purification, flood attenuation, improved water security etc.).	-Eco-tourism and job creation -Increased property values -Improved human wellbeing

Programme 2	Increase percentage of CBAs/ESAs receiving biodiversity management interventions (alien invasive plant clearing, wetland restoration).					Environmental Resource & Waste Management Department	City Budget and through PPPs.		
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2.Protect and conserve water resources: The City aims to protect water resources for the present and future generations by decreasing water losses and promoting efficient water use practices.

Description		Timeframes				Lead implementin g entity (CoE)	Financing source	Climate benefit	Core benefit
		0-5 years 2025- 2030	5-10 years 2031- 2035	10-20 years 2036- 2045	20 +years 2046- 2050				
Outcome 6	Protect and conserve water resources.								
Programme 1	The City and Ekurhuleni Water Care Company (ERWAT) work with large users of non-potable water to supply treated effluent from wastewater					The Ekurhuleni Water Care Company (ERWAT) and City of Ekurhuleni	Implemented with commercial finance, private investment supported by creditworthiness of industries and other off takers. The City utility	-Reduced GHG emissions from treating and pumping water (energy intensive) -Improve water security	-Reduced water bills and treatment costs -Job creation in water conservation and efficiency. -Reliable water supply for

Programme 2	treatment works, such as for industrial and irrigation uses,						could generate revenue from the sales.		households and business. -Water equity and social justice.
	Reduce unaccounted-for water losses (e.g., repairing and replacing leaking water pipes and tanks, improvements to metering systems, removal of unauthorized connections, and controlling water use through fire hydrants)					The Ekurhuleni Water Care Company (ERWAT) and City of Ekurhuleni	Funded by the City and through a private sector deployment model.		
	Requires all new buildings to have water-efficient fittings (taps and showers) and water efficient toilets.					The Ekurhuleni Water Care Company (ERWAT) and City of Ekurhuleni	Costs borne primarily by developers. The City & national government could contribute incentives.		
	Upgrade water fittings in existing buildings.					The Ekurhuleni Water Care Company (ERWAT) and	Water saving equipment could be provided free of charge, subsidized with a		

						City of Ekurhuleni	rebate, or tied to another incentive provided by the City. Grants, incentives & private sector deployment models could be explored.		
Programme 5	Install smart water meters on certain buildings					The Ekurhuleni Water Care Company (ERWAT) and City of Ekurhuleni	Funded by the City's budget.		
Programme 6	ERWAT captures biogas from wastewater treatment plants and uses it to generate electricity and heat in a combined heat and power (CHP) system.					The Ekurhuleni Water Care Company (ERWAT)	Biogas projects could be funded with national grants, City utility, financial institutions & PPP.		

3.Protect and restore open spaces: The City aims to protect and restore open spaces to ensure that these spaces continue to provide environmental, recreational and tourism benefits.

Description		Timeframes				Lead implementing entity (CoE)	Financing source	Climate benefit	Core benefit
		0-5 years 2025-2030	5-10 years 2031-2035	10-20 years 2036-2045	20 +years 2046-2050				
Outcome 7	Protect and restore open spaces.								
Programme 1	Increase green cover and improve air quality					Environmental Resource and Waste Management Department	City Budget	-Carbon sequestration, - -Reduction of greenhouse gas emissions -Temperature regulation -Air purification -Cooling effects, reduced heat stress.	-Improved health and wellbeing of residents -Increase recreational, tourism activities -Increased property values -Job creation
Programme 2	Maintain and upgrade parks and open spaces								
Programme 3	Plant and maintain trees in urban areas								

4.Improve climate resilience and disaster preparedness: The City aims to enhance its ability to anticipate, absorb and recover from climate-related impacts.

Description		Timeframes				Lead implementing entity (CoE)	Financing source	Climate benefit	Core benefit
		0-5 years 2025-2030	5-10 years 2031-2035	10-20 years 2036-2045	20 +years 2046-2050				
Outcome 8	Improve climate resilience and disaster preparedness								
Programme 1	Enhance disaster (climate related) preparedness for effective response, recovery, and rehabilitation					Disaster & Emergency Management Services Department &	City budget	-Enhanced resilience to climate-related disasters (thunderstorms , wildfires etc.) -Reduced vulnerability to climate impacts -Improved disaster preparedness and response	-Minimized loss of life and property -Enhanced community cohesion and social justice -Reduced migration and displacements.
	Programme 2	Strengthen synergy between climate change & disaster management.							

5.Encourage sustainable agricultural practices: The City aims to encourage sustainable production, investment in renewable energy technologies and water efficient systems within the agricultural sector.

Description		Timeframes				Lead implementing entity	Financing source	Climate benefit	Core benefit
		0-5 years 2025-2030	5-10 years 2031-2035	10-20 years 2036-2045	20 +years 2046-2050				
Outcome 9	Improve climate resilience and disaster preparedness								
Programme 1	Improve sustainable local food production and harness agricultural potential of the region					Gauteng Agriculture & Rural Development	Local farmers with the support from the Gauteng Agriculture & Rural Development	Sustainable agricultural practices sequester carbon in soils, reducing atmospheric CO2 levels. They also reduce water waste, promote drought resilience and reduce greenhouse gas emissions by	Sustainable agriculture will enhance food security by promoting sustainable local production, improving crop yields and create green jobs in the sector.
Programme 2	Increase investment in energy saving and renewable energy technologies for agricultural practices								

Programme 3	Implement water efficiency including drip irrigation systems and exploring the potential for secondary non potable water sources							minimizing synthetic fertilizer use.	
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5.Establish a green workforce and education: The City aims to facilitate the creation of green jobs and provide training opportunities for the City’s residents.

Description		Timeframes				Lead implementing entity	Financing source	Climate benefit	Core benefit
		0-5 years 2025-2030	5-10 years 2031-2035	10-20 years 2036-2045	20 +years 2046-2050				
Outcome 10	Increase local green jobs and education to implement the CAP targets.								
Programme 1	Create new green jobs focusing on sectors such as renewable energy, sustainable construction and eco-tourism.					City of Ekurhuleni in partnership with key external stakeholders	City of Ekurhuleni in partnership with key external stakeholders	The creation of green jobs will advance climate actions around the reduction of greenhouse gas emissions and enhance	Job creation and employment opportunities in green industries which will stimulate economic
Programme 2	Provide training and upskilling								

	programmes for local residents.							climate resilience for the City.	growth and new skills.
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6.City wide awareness on climate change impacts and adaptation: The City aims to advocate for climate resilience and raise public understanding of climate change causes, impacts, and consequences.

Description		Timeframes				Lead implementing entity (CoE)	Financing source	Climate benefit	Core benefit
		0-5 years 2025-2030	5-10 years 2031-2035	10-20 years 2036-2045	20 +years 2046-2050				
Outcome 8	City wide awareness on climate change impacts and adaptation.								
Programme 1	Establish and run Climate Change Advocacy networks.					Environmental Resource and Waste Management Department	Budgets from the City and partners/stakeholders	-Enhanced climate resilience -Improved disaster preparedness -Reduced vulnerability to climate impacts	-Enhance community engagement and participation -Increased public awareness and understanding
Programme 2	Host and attend climate advocacy events and campaigns.								

Enabling mechanisms for implementing climate actions

Governance Structure & Legislative Framework:

Strategic direction and operational planning for the City of Ekurhuleni is provided through the various city processes, this includes the Medium-Term Revenue and Expenditure Framework (MTREF), Integrated Development Plans (IDP) and Service Delivery Budget Implementation Plans (SDBIP). Local government have specific obligations and responsibilities when implementing environmental policies, legislation, plans, and programmes of national and provincial government, ensuring the alignment of the IDP and provincial environmental implementation plans (EIPs), and ensuring that IDP comply with the National Environmental Management Act (NEMA) principles (DEAT, 2006). Section 25 of the Local Government: Municipal Systems Act, No. 32 of 2000 includes two legal tools: the IDP and the Performance Management System (PMS). Du Plessis (2011: 12) points out that “An IDP is the key tool for developmental local government and aligns the resources and capacity of the municipality with the implementation of the plan and takes into account the legal obligations of the municipality in terms of different national and provincial laws.”

The Growth and Development Strategy (GDS) 2055 is the guiding mechanism for the IDP and provides an overarching strategic framework for the City’s development pathway. Based on the principles and goals of the GDS, the IDP has been integrating key principles of climate change, resilience and sustainable development within the various revisions every five years. The core principles are to ensure that the city in addition to other competing priorities, direct various priorities to not only encapsulate their key focus but further promote a sustainable environment that has increased resilience to all the impacts of climate change, and guide city adaptation for the protection all vulnerable communities within the region.

As with any high-risk factor, climate change has the potential to destabilize the city’s economy, infrastructure and communities, it is therefore paramount that the City focuses on climate action as a priority strategic direction. Climate change is causing a multitude of detrimental social, economic, health, and other impacts on vulnerable communities who have contributed the least to the climate crisis. The participation of local communities, inclusion of local knowledge and data, and co-produced solutions all contribute to the development of more equitable climate action in cities. Thereby utilizing a climate justice approach would allow the City to address some of the root causes of climate change, and simultaneously address a broad range of social, racial, and environmental injustices.

The IDP is set on a five-year basis and is informed by community engagement which occurs yearly for monitoring and amendments. Once budgets are approved the SDBIP is then revised yearly to address and balance all the needs. This is undertaken by the CoE departments in their individual Business Plans on a yearly basis starting in November and concluding in May. The City has over the past 3 years been working with departments to more closely align their key priorities and performance areas with the principles outlined above. As an institutional instruction to all Department’s for the 2024/25 IDP and SDBIP development process, the development of all departmental business plans would need to ensure the following consideration was met i.e. “The City’s sustainability goals for 2030, contained within the Green Cities Action Plan (GCAP) and the position to achieve net zero by 2050 requires the departments to implement measures to accomplish these key objectives. It is under this GCAP framework that the SDBIP’s developed for the 2024/2025 financial year should encompass various measures that would be directly linked to departmental Key Performance Indicator (KPI’s).

Departments would need to review the various GCAP, and various other plans developed by the Environmental Resource and Waste Management Department.” With the focus above, the table below (Table 8) highlights the efforts department have made in strategic aligning IDP priorities with a climate change and resilience link in order to ensure that the City meets its 2030 Climate Change targets as outlined in the CAP.

Table 8 Review of the SDBIP 2021-2022 outcomes and key performance indicators against climate change and resilience goals for the CoE

DEPARTMENT	OUTCOME	KEY PERFORMANCE INDICATOR	Climate Change & Resilience link
City Planning /Corporate Strategy	To achieve effective cooperative Governance	Percentage Functionality of the Integrated GIS Data Management	-Potential to link to CC data layers -Work towards ensuring that the Integrated GIS data management has updated CC layers
Communications and Brand Management Department	Enhanced city stakeholder relations	Number of Participative Stakeholder Engagements Coordinated	-Ensure communications department knows & is invited to all events
	Enhanced city stakeholder relations	Number of Awareness Campaigns Presented in Support to Other Departments	Climate change awareness campaign in collaboration with communication department
Disaster and Emergency Management Services Department Other Outcomes identified with no indicator link: Achievement of community resilience through the promotion of structural and non- structural public and private sector investments in disaster risk prevention and risk reduction in order to ensure effective recovery and rehabilitation	Enhance disaster preparedness for effective response, recovery, rehabilitation, and restoration	Number of Municipal Critical Infrastructure Plans in Place to deal with impending and actual disaster	-Ensuring that identified risk include climate change risks. -Synergy between climate change & DEMS Department need to be strengthened (e.g., vulnerability assessment)
Economic Development Department	Increased sustainability of enterprises developed	Number of Emerging Farmers Receiving Technical and Production Support	Links to the following Ekurhuleni + 2030 Targets -Local Food
	Increased sustainability of enterprises developed	Number of Farmers Provided with Access to Council Owned Land	-Smart Sustainable Communities -Green Workforce and Education

Ekurhuleni Water Care Company (ERWAT)	Improved Quality of Water including Wastewater	Percentage of Capital Expenditure on Planned Projects	Ensuring that planned projects include climate change adaptation projects &/or initiatives
Environmental Resource and Waste Management Department	Increased compliance with the minimum requirements for waste disposal by landfill	Number of landfill sites compliant and reported on with the minimum requirements for waste disposal by a landfill	Departments own work, ensure alignment with CC Response Strategy.
	Increased waste minimization	Number of public offloading facilities constructed in the Townships	
	Increased waste minimization	Percentage of recyclable waste reclaimed or diverted from the landfill sites	
	Increase implementation of the Greenhouse gas emissions policy	Amount of gas flared from the landfill sites (tons)	
	Increased provision of waste management services in line with the waste management services norms and standards.	Number of informal settlements provided with walk in bulk containers	
	Improved Water catchment management	Number of Water courses rehabilitated	
	Increased compliance with environmental legislation	Percentage of targeted members of the regulated community where regulatory actions were taken to ensure compliance with environmental legislation	
	Improved general ground maintenance and landscaping activities	Number of grass cutting cycles implemented throughout departmental facilities such parks, open spaces, and cemeteries.	
	Sustained inclusion of environmental protection principles in infrastructure development projects	Percentage of targeted CoE Infrastructure projects (CIF) advised on environmental aspects	

Health and Social Development Department	Improved nutritious food access for indigent households in CoE	Number of Indigent Households that have Received Agricultural Starter Packs	Links to the following Ekurhuleni + 2030 Targets -Local Food production – could we be looking at Climate Smart Agriculture starter packs (inclusion of climate resilience crops &/or livestock)
Human Settlement Department	Decrease in land invasion incidents	Percentage of Reported Property Invasion Incidents Attended To	-Protection of natural ecosystems and open spaces is important. Indicator is, however, more compliance based. -These indicators are more planning related, but important as they link to resilience & adaptation of human settlements (e.g., planning for adaptation in informal settlements)
	Increased procurement of well-located land in support of integrated human settlements and transport orientated development,	Hectares of Land Identified for Human Settlement Development	
	Improved Quality of life in the informal settlements	Number of Informal Settlements Realigned (Re-blocked)	
	Improved access to housing opportunities	Number of land use Specialist Studies submitted for approval	
Real Estate Department	Improved property portfolio management	Number of Land Parcels Released for Development of Agricultural Farming	Links to the following Ekurhuleni + 2030 Targets -Local Food production – could we be looking at Climate Smart Agriculture starter packs (inclusion of climate resilience crops &/or livestock)
Roads and Stormwater Department	Improved quality of municipal road network	Number of Eco-Systems upgraded and protected	Inclusion of Sustainable Urban Drainage systems techniques in the upgrades; need to ensure wetlands & other riparian areas are included as such rehabilitation will reduce flood risk.
Sports, Recreation, Arts and Culture Development	Increased provision of services to informal settlements	Number of informal settlements provided with (informal sports fields) SRAC interim basic services	Green spaces, urban corridors in informal settlements
Transport and Fleet Management Department	Increased provision of an integrated transport system that cuts across the Gauteng Region	Km of Harambee Routes Operationalized	GCAP link with efficient transport networks

Water and Sanitation Department	Increased access to sanitation services	Number of additional chemical toilets provided to informal settlements	Water provision and sanitation provision in informal settlements.
	Increased access to water services	Number of Additional Water Access Points Provided to Informal Settlements	

To facilitate and mainstream the CAP, the following governance structure has been adopted by the City of Ekurhuleni. The diagram (figure 33) provides a representation of the legislative and governance arrangements for the implementation of the CAP

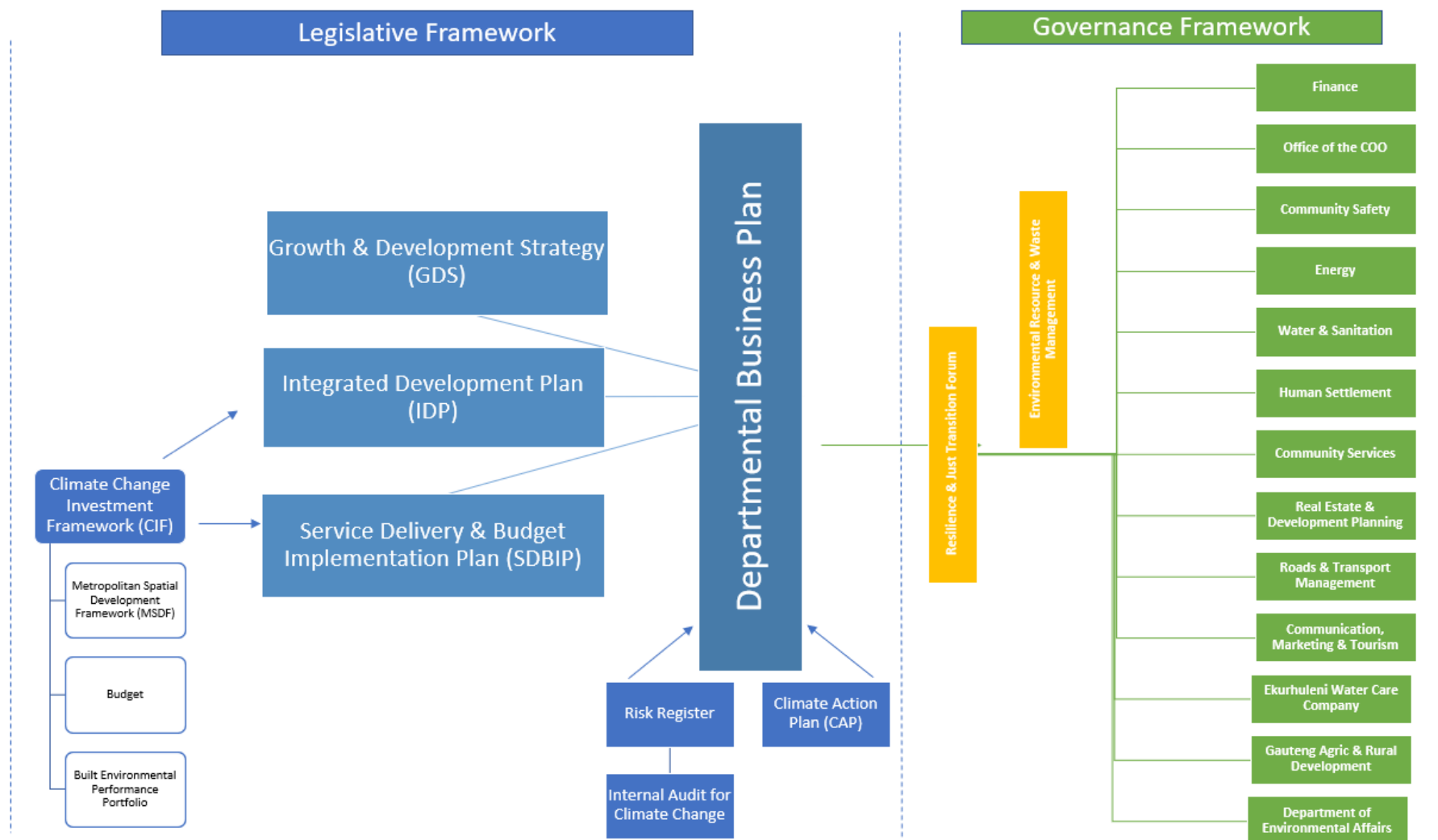


Figure 33 Governance structure for the CoE CAP

Figure 33 is a graphical representation of the legislative and governance framework which provides strategic direction and operational planning for the City's various processes including the CAP. The framework for climate change planning in Ekurhuleni is structured to ensure comprehensive and coordinated action across all relevant departments and stakeholders. As shown in the diagram, the framework includes the following key components.

Legislative Framework:

- **Climate Change Investment Framework (CIF):** The CIF is a foundational element that guides investments in climate change initiatives. It feeds into the Metropolitan Spatial Development Framework (MSDF), which outlines the spatial planning and development priorities for the city.
- **Metropolitan Spatial Development Framework (MSDF):** The MSDF integrates climate change considerations into the city's spatial planning and development strategies. It ensures that climate resilience and sustainability are embedded in urban development projects.
- **City Budget and Built Environmental Performance Portfolio:** The city's budget allocates financial resources for climate change initiatives and projects. The Built Environmental Performance Portfolio tracks and evaluates the performance of these projects in terms of sustainability and climate impact.
- **Integrated Development Plan (IDP):** The IDP is a strategic plan that outlines the city's development goals and priorities. It incorporates climate change objectives and aligns them with broader development goals.
- **Service Delivery and Budget Implementation Plan (SDBIP):** The SDBIP operationalizes the IDP by detailing specific projects, budgets, and timelines. It includes key performance indicators (KPIs) to monitor progress on climate change initiatives.
- **Growth & Development Strategy (GDS):** The GDS provides a long-term vision for the city's growth and development. It integrates climate change mitigation and adaptation strategies to ensure sustainable development.
- **Departmental Business Plans:** Each department develops business plans that align with the IDP, SDBIP, and GDS. These plans incorporate climate change actions and targets, ensuring that all departments contribute to the city's climate goals.
- **Risk Register and Internal Audit for Climate Change:** The Risk Register identifies and assesses climate-related risks to the city. The Internal Audit for Climate Change evaluates the effectiveness of climate actions and ensures compliance with climate policies.
- **Climate Action Plan (CAP):** The CAP outlines specific actions and targets for reducing greenhouse gas emissions and enhancing climate resilience. It is informed by the CIF, MSDF, IDP, SDBIP, and GDS.

Governance Framework:

- **Resilience and Just Transition Forum (Oversight Body):** The implementation of the CAP is overseen by the Resilience and Just Transition Forum. This forum serves as a platform for addressing inter-departmental issues related to climate change and ensuring that the city's climate targets for 2030 and 2050 are achieved. The forum includes representatives from:
- **Internal Departments:** Environmental Resource & Waste Management, Finance, Office of the COO, Community Safety, Energy, Water & Sanitation, Human Settlement, Community

Services, Real Estate and Development Planning, Roads & Transportation Management, Communication Marketing & Tourism.

- **External Departments:** Ekurhuleni Water Care Company, Gauteng Agriculture and Rural Development, Department of Environmental Affairs.

The legislative and governance framework for climate change planning in Ekurhuleni is designed to ensure a coordinated and comprehensive approach to climate action. By integrating climate considerations into all aspects of city planning and development, and by fostering collaboration across departments and stakeholders, the city aims to achieve its climate goals and build a sustainable, resilient future for all residents.

CHAPTER 8: Monitoring and Evaluation

Monitoring & Reporting

This chapter details the framework for monitoring, evaluating, and reporting on the implementation of the actions and the progress towards the intended outcomes of the CAP. The framework covers internal and external reporting and monitoring (figure 34).

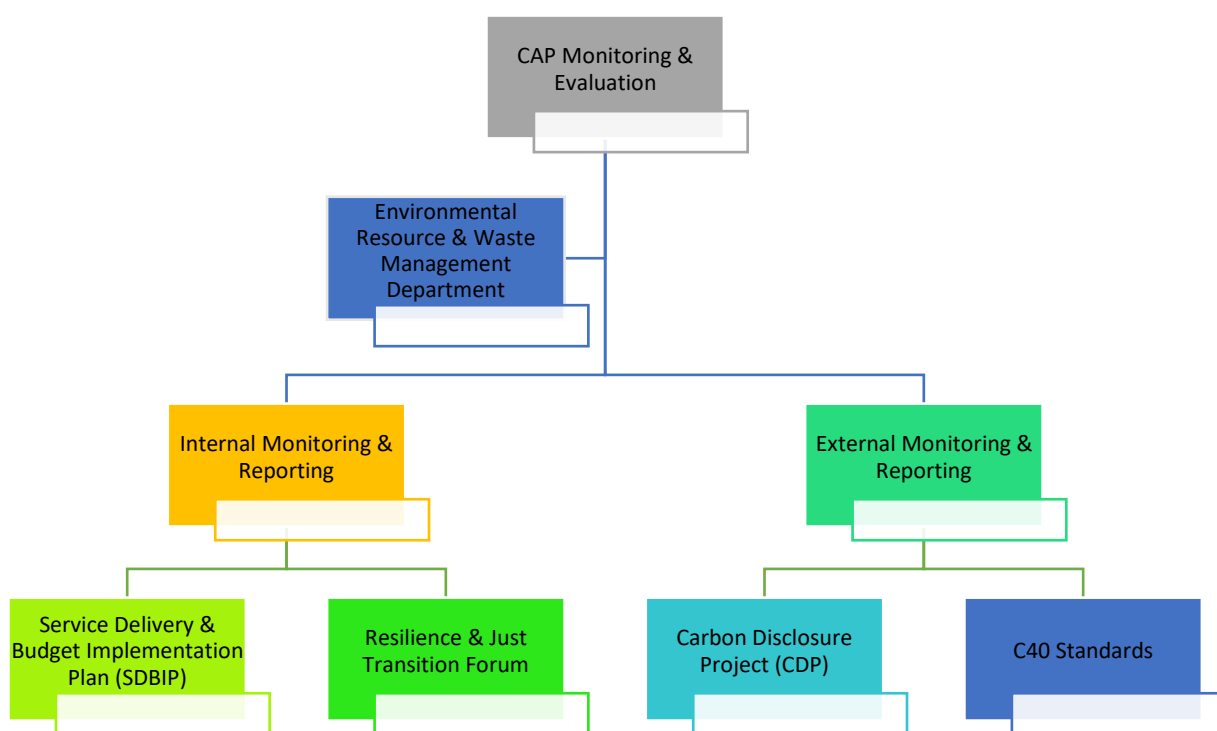


Figure 34 Reporting and Monitoring Framework for the CAP implementation

1.Internal Monitoring & Reporting:

The CAP of the City of Ekurhuleni has been mainstreamed into the City's strategic processes, such as the Growth and Development Strategy, Integrated Development Plans and Service Delivery Budget Implementation Plans ([SDBIP](#)) These strategic processes inform the development of all departmental business plans which are needed to ensure that the City's sustainability goals for 2030 and 2050 are achieved. To ensure further alignment with current processes and the City's plans, regular monitoring and evaluation of CAP implementation will be managed using existing internal reporting systems which is the Service Delivery and Budget Implementation Plan (SDBIP) as well as the Resilience and Just Transition Forum.

1.1. Service Delivery Budget Implementation Plans (SDBIP):

The City of Ekurhuleni's projects and programmes are integrated into yearly Service Delivery and Budget Implementation Plans (SDBIP), such as the 2024/2025 Draft SDBIP, which allocate the necessary budgets for implementation. The SDBIP serves as a detailed plan that outlines how the city's budget will be spent over the fiscal year, ensuring that all projects and programmes align with the city's strategic goals, including those related to climate action.

The SDBIP is a critical tool for operationalizing the city's Integrated Development Plan (IDP) and Climate Action Plan (CAP). It translates the strategic objectives of the IDP and CAP into tangible projects and programmes with specific budgets, timelines, and performance indicators. Here's how the system works:

Project Identification and Planning:

- Departments identify projects and programmes that align with the city's strategic goals, including climate action initiatives.
- These projects are then included in the SDBIP, with detailed descriptions, budgets, and timelines.

Budget Allocation:

- The city's budget is allocated to the various projects and programmes outlined in the SDBIP.
- This ensures that each project has the necessary financial resources for implementation.

1. Implementation and Monitoring:

- Projects and programmes are implemented by the respective departments.
- The SDBIP includes key performance indicators (KPIs) to monitor progress on a quarterly basis.
- Departments report on their progress, including project spending and implementation status.

Evaluation and Adjustment:

- The city's performance against the SDBIP is evaluated quarterly.
- Adjustments are made as necessary to ensure that projects stay on track and within budget.

- This process ensures accountability and transparency in the use of public funds.

The SDBIP includes several useful KPIs that are linked to the city's climate action goals. These KPIs help monitor and evaluate the effectiveness of climate action initiatives. Some of the key KPIs include as examples below:

- Renewable Energy Capacity Installed (MW): Measures the amount of renewable energy capacity added through various projects.
- Percentage of Buildings with Energy Efficiency Improvements: Tracks the progress of energy efficiency upgrades in municipal and private buildings.
- Reduction in Greenhouse Gas Emissions (tons CO₂e): Monitors the reduction in emissions achieved through various climate action projects.
- Number of Trees Planted: Measures the progress of urban greening initiatives aimed at enhancing biodiversity and reducing the urban heat island effect.
- Water Savings Achieved (litres): Tracks the amount of water saved through efficiency measures and conservation projects.
- Waste Diverted from Landfills (tons): Measures the effectiveness of waste management initiatives in reducing landfill waste.

These KPIs are crucial for ensuring that the city's climate action initiatives are on track and achieving their intended outcomes. By linking the SDBIP to these KPIs, the City of Ekurhuleni can effectively monitor and evaluate its progress towards its climate goals, ensuring a sustainable and resilient future for all residents.

1.2. Resilience and Just Transition Forum (Oversight Body):

The City established the Resilience Forum in 2019. The purpose of establishing the Forum was to facilitate the prioritization of climate change and resilience issues into city planning processes by ensuring that all relevant departments are coordinated and committed to climate and resilience actions. Therefore, the Forum acts as a coordination umbrella for addressing inter-departmental issues that relate to the environment, climate change, and resilience thereby ensuring that the Ekurhuleni 2030 and 2050 targets are achieved.

The Forum meetings take place on a quarterly basis and are chaired by the Divisional Head of Strategic Planning Division in the Environmental Resource and Waste Management Department. To date, senior members from various City Departments serve as standing members and representatives for their departments (figure 33). This representation ensures that key department actions relating to enhancing the cities resilience and reducing vulnerability to climate hazards are implemented. This also ensures that the Forum is kept abreast of progress that the departments are making towards building climate resilience in their sectors.

Additionally, in 2023 the City in partnership with C40 Cities Climate Leadership Group (C40 Cities) and supported by the South African Cities Network (SACN), initiated a process to establish a Just Transition Commission for the City. The establishment of a Just Transition Commission represented a key step towards planning for and implementing an inclusive, sustainable transition in the City of Ekurhuleni. The City has made significant strides in terms of combating climate change and building climate resilience. Various City Departments have strategies, plans, programmes, and initiatives in place that address some aspects of climate change and aim at building resilience. Establishing a city-wide central platform where climate change response efforts are consolidated and aligned to achieve greater results was key. Hence the City integrated the Resilience Forum and Just Transition initiative to become the Resilience and Just Transition Forum. The platform provides for coordinating and acting on climate change issues, facilitating the just transition and building greater resilience within the City. It also serves as a monitoring and reporting platform for inter-departmental initiatives that relate to the environment, climate change, the just transition and resilience thereby ensuring that the Ekurhuleni's 2030 and 2050 targets are achieved (refer to annexure 1 for the terms of reference).

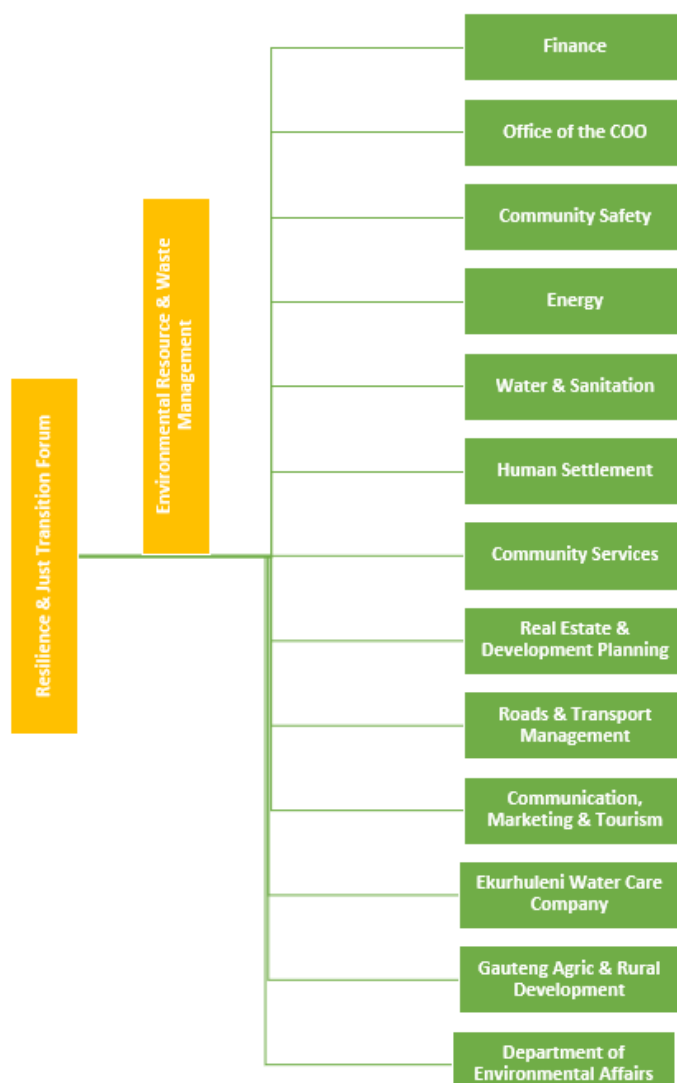


Figure 35 Resilience and Just Transition Forum Structure

2.External Monitoring & Reporting:

2.1. Carbon Disclosure Project (CDP)

The City of Ekurhuleni reports annually to the Carbon Disclosure Project (CDP), an international reporting system for climate action. The CDP platform tracks progress on greenhouse gas emissions reductions, climate risks and vulnerability assessments, adaptation and mitigation targets and actions as well as climate governance and planning. Regular reporting on this platform enables the City to transparently monitor, measure and report on progress regarding the City's climate action.

2.2. C40 Leadership Standards

C40's Leadership Standards set the minimum requirements for all member cities (including the City of Ekurhuleni) which guide collective climate action. As a C40 City, Ekurhuleni reports on the;

- Climate Action Plan which is aligned to the 1.5° ambition of the Paris Agreement and updates every 5 years.
- Financial and regulatory tools used to address the climate crisis;
- Innovative, inclusive, and resilient actions to address emissions beyond the direct control of the City; and
- Mayor's and the City's global climate leadership in support of the Paris Agreement.

2.3. Public reporting: Advocacy & awareness communication plan

The following plan outlines the strategy for communicating the CAP to different stakeholders in Ekurhuleni. Once the CAP has been approved by Council, it will be shared with the following target audiences.



The plan aims to raise awareness, build support, encourage participation in climate action efforts and report on progress. Climate advocacy and awareness will be guided by the following four sets of objectives.



Figure 35 Public reporting, advocacy & awareness objectives

The CAP outlines a comprehensive strategy for reducing greenhouse gas emissions and adapting to the impacts of climate change. Everyone has a role to play in this endeavor, hence it is crucial to raise city wide awareness, encourage participation in climate action initiatives and report on progress. This will be achieved by implementing the following activities.

- Developing social media campaigns,
- Creating a series of informational brochures,
- Engaging stakeholders (communities, residents, business, NGOs, councilors and municipal staff), and
- Regularly providing updates within the internal CoE newsletters and platforms.

The communication activities will be led by the Communications, Marketing and Tourism Department, which is represented within the Resilience and Just Transition Form (oversight body for the CAP). The following pre-approval and post-approval activities will be undertaken by the Department.

Table 9: Pre-Approval Communication and Marketing Plan

Stakeholder Engagement	Description
Business, NGOs and government bodies	Webinar
Public and NGOs	Engagements will be undertaken in each of the three CoE regions
Councilors	Presentations within the Council chamber or webinar
Media	Media briefing session

Table 10: Post-Approval Communication and Marketing Plan

Communication Channel	Description	Time (TBC)
Media statement	Issue statement on the approval and explain its implications.	
Podcast	-Experts will explain the CAP and its implications for Ekurhuleni. -Publish the podcast on websites, screens in buildings and social media.	
-EkuPeople -EkuVoice	-Publish article on internal e-publication to staff. -Publish article on external e-publication to the community	
Business newsletter/communique	-Publish article on CoE business newsletter/communique. -Send emails to communities.	
Messages on digital platforms	Share bite-size messages for social media and link to the plan on the website.	
Pamphlets explaining the CAP	Share pamphlets on social media and on website.	
Website	Publish CAP on website and have banner on landing page linking to the plan.	
SMS message	Send sms to residents and provide link to the CAP for more information.	

The City of Ekurhuleni will consider developing a reporting platform or dashboard on the City's website for public disclosure of CAP progress.

Evaluation metrics

To track progress in delivering the CAP outcomes, the City has developed a few indicators captured in the table below (table 9). The indicators are linked to the mitigation and adaptation goals and targets for each outcome. These will be measured and evaluated annually as part of the greenhouse gas emissions inventory process and every 5 years as part of the Climate Change Response Strategy/CAP updates which will inform target setting as part of the planning process cycle.

Table 9 Indicators for tracking the outcomes of the CAP

Goal	Outcome Indicator
Secure sustainable and clean energy for the City	
Investigate, promote, and adopt alternative sources of renewable energy to reduce reliance on fossil fuel energy.	- Renewable energy capacity installed (MW) - Total percentage of renewable energy generation. - Number of jobs created in the sustainable energy sector.

	● Number of households with access to reliable, efficient and affordable energy services.
Wide adoption of green buildings and solar electricity generation	
Improve energy efficiency in existing buildings, construct new green buildings, and increase solar electricity generation.	● Energy consumption of public buildings and facilities (kWh/m2) ● Percentage of new and existing municipal buildings that are net-zero carbon ● Percentage of new and existing private buildings that are net-zero carbon ● Number of buildings which adhere to the energy performance standards ● Number of large developments with green building certification. ● Number of jobs created during the design, construction and operation of green buildings.
Access to safe and sustainable green transportation system	
Shift travel from private cars to public transit, as well as electrify cars and buses. Address efficiency and energy alternatives for freight transport.	● Percentage of municipal buses that are electric ● Percentage of municipal vehicles (excluding buses) that are electric ● Number of priority zones which implemented parking restrictions ● Number of minibuses with cashless payment systems. ● Percentage of residents with access to reliable, efficient and affordable public transportation. ● Number of jobs created in the green transportation sector.
Zero waste City which promotes sustainable waste management practices	
Eliminate waste sent to landfill sites.	● Total waste (tons) recycled ● Total waste (tons) diverted from landfill sites ● Percentage of food and organic waste diverted from landfill. ● Number of jobs created in the waste management sector. ● Revenue generated from waste recycling and composting initiatives.
Protect and conserve biodiversity	
To protect, conserve, and manage biodiversity to retain ecosystems services and adapt to climate change impacts.	● Percentage increase of biodiversity priority areas ● Percentage increase of protected biodiversity areas ● Percentage reduction of alien invasive plants.
Protect and conserve water resources	
To rehabilitate water bodies to improve water quality and ensure compliance with water standards.	● Percentage reduction in water consumption ● Percentage increase in water reuse and recycling ● Percentage reduction in water loss.
Protect and restore open spaces	

To upgrade and maintain open spaces to ensure communities have access to well-developed parks.	• Percentage increase of recreational open spaces • Number of upgraded parks and open spaces a year • Number of trees planted every year.
Improve climate resilience and disaster preparedness	
To enhance disaster preparedness and implement disaster risk reduction programmes related to climate change.	• Cost of damage and remediation of City infrastructure/assets due to climate related disasters • Number of mortalities due to climate-related disasters.
Encourage sustainable agricultural practices	
To improve sustainable local food production and harness the agricultural potential of the region.	• Number of farmers using sustainable agricultural practices • Water pollution levels around agricultural land.
To increase investment in energy saving and renewable energy technologies for agricultural practices	• Number of farmers using energy saving and renewable energy technologies.
To implement water efficiency systems including drip irrigation systems.	• Number of farmers using drip irrigation systems
Establish a green workforce and education	
To increase local green jobs and education to implement the CAP targets.	• Number of green jobs created within the energy, waste, water and transportation sectors. • Number of trainings undertaken yearly to develop green skills and number of attendees.
City wide awareness on climate change impacts and adaptation	
To raise awareness about climate change resilience.	• Number of climate change advocacy events and campaigns hosted and attended every year.

Barriers identified for the implementation of the CAP

The City of Ekurhuleni recognizes the potential barriers to the implementation of the CAP which are categorized as institutional, financial, technical and social.

Table 10 Barriers for the implementation of the CAP

Barrier	Description	Proposed solution
Institutional barriers	• Insufficient Resources and Personnel: There is a lack of adequate resources and personnel to implement and manage climate action initiatives. • Insufficient Stakeholder Involvement: Key stakeholders, including residents, businesses, and community groups, are not sufficiently engaged.	• Solution: Organize capacity-building workshops to equip staff with the necessary skills. Develop public-private partnerships to leverage additional funding, expertise, and resources. • Solution: Enhance stakeholder engagement through targeted outreach and involvement strategies. Foster

	● Limited Monitoring and Evaluation Capacity: There is a lack of capacity to effectively monitor and evaluate the effectiveness of climate actions.	collaboration and partnerships to ensure broad-based support and participation. ● Solution: Strengthen monitoring and evaluation frameworks by building capacity within departments. Utilize technology and data analytics to track progress and outcomes.
Financial barriers	● Limited Budget Allocations: Budget allocations for climate action initiatives are limited, making it challenging to implement and sustain projects. ● High Initial Investment Costs: The initial investment costs for climate action initiatives are high. ● Difficulty Accessing Financing Mechanisms: Challenges in accessing grants, loans, or carbon credits to support climate action initiatives.	● Solution: Partner with national government agencies and international organizations to access technical assistance, funding, and expertise. Explore innovative financing mechanisms such as green bonds and climate funds. ● Solution: Develop financing mechanisms that spread costs over time, such as green bonds. Leverage private sector investment through public-private partnerships. ● Solution: Strengthen relationships with financial institutions and international donors. Provide technical assistance for preparing funding proposals and applications.
Technical barriers	● Inadequate Infrastructure: Existing infrastructure may not support climate actions, such as the adoption of electric vehicles (e.g., lack of charging stations).	● Solution: Invest in new infrastructure by partnering with private companies to develop and finance electric vehicle infrastructure projects. Implement pilot projects to demonstrate feasibility.
Social barriers	● Behavioural and Habitual Challenges: Difficulty in changing behaviours and habits to support climate action, such as using public transport.	● Solution: Intensify public awareness campaigns to educate citizens about the benefits of using public transport and the impacts of climate change. Implement incentive programs to encourage behaviour change, such as subsidies for public transport use and rewards for sustainable practices.

CHAPTER 9: Communication and Stakeholder Engagement

The development of this CAP recognizes that effective climate action requires the active participation and commitment of diverse stakeholders. Stakeholder engagement is essential to ensure that the CAP is inclusive, equitable, and responsive to the needs and concerns of all stakeholders. Stakeholder inputs that have been included in the updated Climate Change Response Strategy (climate targets, actions, impact of actions on different population groups and sectors as well as indicators for the targets) were drawn from the following processes: Green City Action Plan (GCAP), Just Transition Dialogues and Listening Exercises. Stakeholders from all relevant departments from the City of Ekurhuleni were represented during the consultation processes for the GCAP and Just Transition Dialogues. Additionally for the Just Transition dialogues, external stakeholders from the following organizations were represented: City of Johannesburg, GIZ, Ekurhuleni Water Care Company, Department of Water and Sanitations, South African Cities Network, Gauteng Department of Agriculture and Rural Development, Rand West City Local Municipality, Conservancies, IUCN, South African Local Government Association, C40, SACAP, Kempton Express, CSIR and a few private consultants.

Consultation: Green City Action Plan

Due to the Covid 19 restrictions, the GCAP stakeholder engagement meetings and workshops took place virtually. A total of four (4) stakeholder meetings were undertaken, some independently and others as part of the Resilience Forum.

Kick-off Meeting:

In October 2020, Ekurhuleni scheduled a kick-off meeting which discussed the City's work on climate change actions, ambitions, and targets. The session also introduced the APEX Online Modelling Application Tool and the Green City Action Plan process.

Sector Data Meeting:

In November 2020, sector leads and colleagues from the energy, transportation, city planning, waste and water sectors met with the IFC to review available data and identified additional data sources needed for the APEX analysis.

Sector Measure Workshops:

In December 2020 and February 2021, sector leads and colleagues participated in a working session with the IFC to explore project, policy and planning measures using the APEX Online App. The workshop discussions centered around applicability of a longlist of measures within the Ekurhuleni context and extent to which these may support achieving the targets.

Draft Action Plan Presentation:

As part of the March 2021 Resilience Forum, sector leads and the IFC team presented the draft GCAP which was peer reviewed by third-party sector experts from the engineering consulting firm WSP, as well as internal and external stakeholders. The GCAP was then finalized considering the reviewers' comments and suggestions.

Consultation: Just Transition Dialogues

The Just Transition Dialogues held between 15 August 2023 and 26 September 2023 were a series of structured discussions aimed at generating valuable insights and recommendations to shape Ekurhuleni's transition to a more sustainable, low-carbon, inclusive, and resilient city. These dialogues focused on five key sectors: biodiversity & agriculture, transport, energy, waste, and water. Here is an explanation of the process of unpacking and hosting these dialogues, as well as how the benefits were incorporated following the dialogues:

Process of unpacking and hosting the Just Transition dialogues

Preparation and Planning:

- **Stakeholder Identification:** Key stakeholders from various sectors, including government departments, businesses, community groups, and international organizations, were identified and invited to participate.
- **Agenda Setting:** Specific agendas were developed for each sector, focusing on the unique challenges and opportunities within biodiversity & agriculture, transport, energy, waste, and water.
- **Logistics Coordination:** Venues, dates, and times were coordinated to ensure maximum participation. Virtual platforms were also set up to accommodate remote participants.

Dialogue Sessions:

- **Sector-Specific Discussions:** Each dialogue session was dedicated to a specific sector, allowing for in-depth discussions on sectoral issues.
- **Expert Presentations:** Subject matter experts presented on current challenges, potential solutions, and best practices within each sector.
- **Interactive Workshops:** Participants engaged in interactive workshops to brainstorm and develop actionable recommendations.
- **Feedback Collection:** Feedback was collected from participants through surveys and open discussions to capture diverse perspectives.

Post-Dialogue Analysis:

- **Data Compilation:** Insights and recommendations from each session were compiled and analysed.
- **Thematic Analysis:** Key themes and common challenges across sectors were identified.
- **Actionable Recommendations:** Specific, actionable recommendations were developed based on the insights gathered.

Importance of Stakeholder Engagement

Stakeholder engagement was a critical component of the Just Transition Dialogues. The process was designed to ensure that all voices were heard, and that the perspectives of diverse groups, including vulnerable communities, were considered. Here are some key aspects of the stakeholder engagement process:

- **Opportunity for Voices to Be Heard:** The dialogues provided a platform for stakeholders to express their views, concerns, and suggestions. This inclusive approach ensured that the needs and priorities of different groups were taken into account.
- **Learning from Communities:** Engaging with local communities allowed the city to gain valuable insights into the lived experiences of residents. This helped in understanding the specific challenges faced by different communities and identifying tailored solutions.
- **Engagement with Field and Key Experts:** The involvement of field experts and key stakeholders brought in-depth knowledge and expertise to the discussions. This enriched the dialogues with evidence-based insights and innovative ideas.
- **Involvement of Vulnerable Groups:** Special efforts were made to include vulnerable groups in the dialogues. This ensured that their voices were not marginalized and that the proposed solutions addressed their unique needs and challenges.

Incorporating Benefits Following the Dialogues

- **Integration into Policy and Planning:**
 - **Policy Alignment:** The recommendations from the dialogues were aligned with existing policies and strategic plans, such as the Climate Action Plan (CAP) and Integrated Development Plan (IDP).
 - **Action Plans:** Detailed action plans were developed for each sector, incorporating the recommendations from the dialogues.
- **Stakeholder Engagement and Collaboration:**
 - **Partnerships:** New partnerships were formed with stakeholders who participated in the dialogues, fostering collaboration and shared responsibility.
 - **Ongoing Communication:** Regular communication channels were established to keep stakeholders informed and engaged in the implementation process.
- **Monitoring and Evaluation:**
 - **KPIs Development:** Key performance indicators (KPIs) were developed to monitor the progress of the recommendations.
 - **Regular Reporting:** Progress reports were prepared and shared with stakeholders to ensure transparency and accountability.
- **Capacity Building and Training:**
 - **Workshops and Training:** Capacity-building workshops and training sessions were organized to equip stakeholders with the skills needed to implement the recommendations.
 - **Resource Allocation:** Resources were allocated to support the implementation of the recommendations, including funding, technical assistance, and expertise.

The Just Transition Dialogues were a critical step in shaping Ekurhuleni's transition to a sustainable, low-carbon, inclusive, and resilient city. By engaging stakeholders, gathering insights, and developing actionable recommendations, the city has laid a strong foundation for effective climate action. The integration of these recommendations into policy and planning, ongoing stakeholder engagement, and robust monitoring and evaluation frameworks ensure that the benefits of the dialogues are

realized and sustained over the long term. This inclusive approach ensures that all voices are heard, and that the transition is equitable and responsive to the needs of all residents.

Insights from the Just Transition dialogues

1. Biodiversity & Agriculture Dialogue:

The City of Ekurhuleni recognizes the importance of transitioning towards a sustainable future in biodiversity management and agriculture. In the pursuit of this, a Just Transition Dialogue on Biodiversity and Agriculture took place on 28 August 2023. Approximately 54 participants which consisted of City experts, external stakeholders from neighboring Cities (City of Johannesburg) and International Development agencies. The dialogue focused on discussing challenges, opportunities, and strategies for a more sustainable and equitable future in these two sectors. The high-level inputs provided an overview of the City's Green City Action Plan and targets and how these are linked to the Just Transition in the two sectors. The input from the City of Johannesburg demonstrated the similarities of the challenges faced by both Cities and facilitated knowledge exchange on some lessons.

In the biodiversity sector, a Just Transition seeks to ensure that the protection, restoration, and sustainable use of biodiversity and ecosystems are achieved without disproportionately burdening marginalized communities, workers, or other vulnerable stakeholders. Similarly in the Agricultural sector, a Just Transition should ensure that food production, land use and agricultural practices are transformed in ways that prioritize ecological health, fair treatment of workers and the well-being of communities, particularly those that are historically marginalized. In support of this, stakeholders in attendance shared the following insights:

- Ekurhuleni's biodiversity is threatened by the loss of conservation areas, encroachment of informal settlements on ecosystems and inadequate waste disposal services.
- Stakeholders raised questions and provided insights on various topics, including river pollution, greenwashing, informal waste pickers and the importance of stewardship for catchments and rivers. In addition, job opportunities in biogas, recycling, and composting were highlighted.
- Within the agriculture sector, economic opportunities and job creation can be realized from agroecology and organic farming as part of the green economy. The sector needs to address challenges related to illegal land occupation and livestock farming. As well as promote local markets, agro-tourism, and sustainable value chains.

These discussions highlighted the importance of community involvement, innovative approaches, and strategic planning in achieving a Just Transition in agriculture and biodiversity management in the City of Ekurhuleni. They also underscored the need for collaboration, training, and effective policy alignment to make the transition successful. The recommendations and insights gathered from the Just Transition dialogues on biodiversity and agriculture will inform the city's policies and actions in pursuit of a more sustainable and equitable future.

2. Transport Dialogue:

The City of Ekurhuleni hosted a Just Transition dialogue on the transport sector on 15th August 2023. Approximately 37 participants which consisted of internal City stakeholders attended the session. The discussion focused on the pathway toward a low-carbon, sustainable, resilient, and inclusive economy

within the transport sector. The high-level inputs provided an overview of the City's Green City Action Plan and targets and how these are linked to the Just Transition in the transport sector. The Divisional Head: Transport, mentioned that tackling the complexities of service delivery, transforming transport systems within the City and exploring the avenues for generating new employment opportunities within the sector were some of the priorities of the Transport department. In support of this, stakeholders in attendance shared the following insights:

- Piloting initiatives will assist the City to gain experience in sustainable transportation. This reduces risks and assists in mobilizing resources for larger-scale implementation.
- The need for inclusivity, robust engagement with stakeholders and a commitment to a comprehensive socio-economic impact assessment was highlighted.
- Potential job losses were identified in industries such as vehicle parts manufacturing and filling station attendants. Conversely, the emergence of new jobs related to self-service facilities, warehouse automation, and electric vehicle maintenance were discussed.
- The importance of considering the entire value chain and the lifecycle of transportation from energy sources to by-products was highlighted. As well as the need for policy adaptation, legal changes, stakeholder readiness and reskilling workers to facilitate a Just Transition.
- The need for developing infrastructure for non-motorized transport and electric vehicles; improving the efficiency, safety, and accessibility of public transport; reducing private car usage and encouraging mixed-use developments and better spatial planning was emphasized.

This dialogue highlighted the pressing need for a shift toward a low-carbon, sustainable, resilient, and inclusive economy within the transport sector. Participants offered valuable insights and recommendations, emphasizing the importance of policy adaptation, stakeholder readiness, community engagement and reskilling to ensure a successful transition.

3. Energy & Buildings Dialogue:

The City of Ekurhuleni hosted a dialogue on the Just Transition within the context of energy and buildings. The session was held on 21 August 2023 with approximately 52 participants in attendance from several departments within the City. The dialogue focused on exploring the complexities and opportunities associated with transitioning to sustainable energy sources and environmentally friendly building practices. The high-level input provided an overview of the City's Green City Action Plan and targets and how these are linked to the Just Transition in the energy and buildings sectors. In the energy sector, the panelists' discussed how the city is actively working to diversify its energy sources. This transition involves moving away from traditional, fossil-fuel-based energy towards a mix of cleaner and more sustainable alternatives. These efforts align with broader global goals of reducing carbon emissions and mitigating climate change. The building sector was another focal point of the discussion, highlighting the importance of transforming the city's infrastructure to be more environmentally friendly. This includes the development of green buildings that are energy-efficient, using sustainable materials and contributing to a healthier urban environment. Some of the key stakeholder insights were as follows:

- Independent power producers are the driving force behind the transition.
- Potential disadvantages for indigent groups and the middle class, who may find self-generation unaffordable.
- Industries such as mining, construction, manufacturing, and transportation are most likely to be affected by the Just Transition, underscoring the need for reskilling and upskilling programmes for workers.
- Need for leveraging existing strengths for green job creation, including supporting independent power producers, cooperatives, and waste pickers.
- To ensure effective coordination and collaboration among City departments involved in the Just Transition, participants there is a need for Key Performance Indicators (KPIs) in the Service Delivery Budget Implementation Plan (SDBIP) and elevating the function of the Just Transition to the City Manager's office.

The dialogue on energy and buildings generated diverse and insightful discussions and showcased a commitment to addressing complex challenges and opportunities related to sustainable energy and environmentally friendly building practices. The insights and recommendations from the dialogue will serve as valuable guidance for the city's journey towards a greener, more equitable future.

4.Waste Management Dialogue:

The City of Ekurhuleni hosted a dialogue on waste management on the 22 August 2023 with approximately 34 participants. The dialogue focused on strategies to address the needs of underserved areas, the creation of green job opportunities, support for workers in the transition, revenue implications, coordination among city departments and potential implementation challenges. The high-level inputs provided an overview of the City's Green City Action Plan and targets and how these are linked to the just transition in the waste sector. Initiatives in Ekurhuleni and their contribution to the Green City Action Plan were highlighted. These initiatives aim to maximize the value of waste and address various aspects of waste management, such as diverting organic waste and creating bankable projects. Some key stakeholder insights are as follows:

- The challenges of financing waste management (e.g., limited municipal budgets) were illuminated. Hence alternative sources of funding beyond traditional budgets, potentially involving producers and manufacturers through Extended Producer Responsibility (EPR) regulations are key.
- The Just Transition underscores the need to integrate informal waste pickers into the waste management process ethically and responsibly thus creating new job opportunities for them.
- Importance of well-defined goals, specific targets and strategies linked to material recovery facilities, anaerobic digestion and alternative waste treatment facilities were highlighted.
- Need for strengthening partnerships with organizations such as the C40 Cities, the World Bank, ICLEI Africa, the Development Bank of Southern Africa (DBSA), the United Nations (UN) and Producer Responsibility Organizations was encouraged.
- Potential green job opportunities arising from the establishment of buy-back center's, cooperatives, community education programs and resource provisions was discussed.

The insights, recommendations and strategies provided through the dialogue will inform policy decisions and actions taken by the City. By addressing the needs of underserved areas, creating green job opportunities, and supporting workers through the transition, the city aims to ensure a just and sustainable future for all its residents.

5. Water Dialogue:

The City hosted a Just Transition dialogue on water on the 31 August 2023 with approximately 36 participants. The session started with high-level inputs from the CoE, along with ERWAT and C40 Cities. The dialogue brought together key stakeholders from the water sector to discuss the implications of a Just Transition. The interconnections between climate change, the energy-water nexus, and the importance of addressing water-related challenges for the city's sustainability were highlighted. Some of the key inputs from the stakeholders are as follows:

- Waste management and water treatment sectors are inherently connected.
- The ERWAT is committed to improving water security for the City and recognizes its role in supporting other industries.
- During the development of the Green City Action Plan (GCAP), it was estimated that the water sector could contribute about 6-7% of the required emission reductions. Hence the ERWAT is exploring technologies, albeit at a high cost, to make sustainable water treatment more feasible.
- Public-private partnerships were highlighted as a means to addressing issues such as acid mine drainage and water quality improvement.
- Management of non-revenue water was encouraged.
- Further research is required to investigate investment trends in the water sector, promoting water education programs to encourage responsible water use and improving water service delivery to align with Just Transition objectives.
- Infrastructure maintenance, wastewater services, budget considerations and implementing the 50-year master plan was deemed to be of utmost importance.
- Need for exploring strategies to support workers facing obsolete roles, such as waste-to-energy initiatives, wastewater reclaiming projects, biogas harvesting and sustainable urban drainage systems.

The diverse insights, innovative solutions and collaborative spirit exhibited by participants across multiple groups illuminated a path toward a more sustainable and equitable water future.

Consultation: Internal Listening Exercise

The City of Ekurhuleni hosted a Listening Exercise on the 26 September 2023 with approximately 17 participants. The Listening Exercise brought together City officials predominantly from the Human Resources Division of the City to deliberate on the critical aspects of managing the workplace changes that will come with transitioning towards a more sustainable and equitable future in the context of the city's commitment to addressing climate change. The particular focus of the discussions was to look at solutions to the changes that will come as a result of the transition, where increased social inequality, job losses, worker disillusionment, reduced productivity, but also at the opportunity space that the transition opens up from the integration of green jobs and the reskilling of workers to the promotion of clean industries and the fostering of inclusive growth. The session began with

presentations from the Environmental Resource and Waste Management Department of the City of Ekurhuleni and international organizations such as Building and Wood Workers' International (BWI) and C40 Cities. Some key stakeholder insights are as follows:

- The creation of jobs should be an integral part of the decarbonization process.
- The importance of organizational change management to align departments with climate goals was highlighted.
- There is a need for collective bargaining to address job losses, advocating for workers' rights and providing capacity-building and training opportunities.
- The city's Human Resources department is actively involved in addressing challenges facing skilled and unskilled workforce as part of the transition. Studies have been conducted to assess the skills base and recommendations have been made to address skills gaps. The city aims to align its skills profile with its status as a manufacturing hub, focusing on the need for upskilling and specialization.
- The city is actively forging working relationships with various departments, including City Planning, Human Resources, and Infrastructure, to ensure collaborative action is taken to support neglected groups and sectors.
- Residents and stakeholders need to be made aware of the GCAP's benefits to ensure its widespread support.
- City leadership needs to actively champion climate change actions, provide strategic alignment with key decisions and link employees' daily tasks to the GCAP to foster a sense of ownership. This can be achieved by incorporating Just Transition targets into performance agreements, particularly among Heads of Departments and Divisional Heads.
- There is a need for securing adequate funding and resources for effective implementation.
- There is a need for forming partnerships with other governmental bodies for a holistic approach.
- Establishing a comprehensive monitoring system for the Just Transition will track progress effectively.

The Listening Exercise offered profound insights into the mainstreaming of sustainability within the City, addressing workforce challenges and promoting a Just Transition. The recommendations generated through the breakaway sessions provide a clear directive for the City as it embarks on this critical transformation, ensuring a sustainable, equitable and promising future for its residents and workforce.

Concluding Remarks

A call for action: Join the fight against climate change in Ekurhuleni.

The Climate Action Plan (CAP) for Ekurhuleni is a critical step towards creating a sustainable, resilient, and net-zero city for all by 2050. This plan outlines the City's commitment to reducing greenhouse gas emissions, adapting to the impacts of climate change, and promoting sustainable development.

Climate change poses significant risks to Ekurhuleni, including increased temperatures, variable rainfall patterns, and extreme weather events such as floods and heatwaves. These changes threaten the city's economy, infrastructure, and residents' well-being. The CAP underscores the urgency of addressing these challenges to protect vulnerable communities and ensuring sustainable development.

Some of the key takeaways from the CAP are: (1) the need for urgent action as climate change poses significant risks to Ekurhuleni's economy, infrastructure, and residents, (2) the importance of collaboration and coordination among government, business, civil society, and residents to successfully implement the CAP and (3) the importance of inclusivity and equity to prioritize the needs of the most vulnerable populations.

The CAP reflects Ekurhuleni's unwavering dedication to addressing climate change, promoting social empowerment, and ensuring a sustainable future for its residents. By fostering community partnerships, enhancing resilience planning, and implementing key adaptation and mitigation measures, Ekurhuleni aims to build a climate-resilient city that protects vulnerable communities and promotes inclusive, sustainable development.

The City of Ekurhuleni calls on all stakeholders to join in implementing this plan and making Ekurhuleni a leader in climate action. Together, we can reduce greenhouse gas emissions and transition to a low-carbon economy, adapt to the impacts of climate change and improve the quality of life for all residents.

The Climate Action Plan for Ekurhuleni is a living document that will evolve over time. We are committed to regularly reviewing and updating this plan to ensure that we are on track to meet our climate goals.

Thank you for your commitment to climate action. Together, we can create a sustainable and thriving future for Ekurhuleni.

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