MSUNDUZI MUNICIPALITY

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MSUNDUZI MUNICIPALITY

CLIMATE CHANGE POLICY

27th MAY 2019

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CHAPTER 1: CLIMATE CHANGE POLICY FOR MSUNDUZI MUNICIPALITY

Climate change refers to an ongoing trend of changes in the earth's general weather conditions as a result of an average rise in the temperature of the earth's surface, known as global warming. This rise in the average global temperature is due, primarily, to the increased concentration of gases known as Greenhouse Gases (GHGs) in the atmosphere that are emitted (majority) via anthropogenic activities. According to numerous studies and research tracking climatic conditions, there is a consensus that temperatures are fluctuating and climatic conditions within each country / region is changing. The last few years have been the hottest on record (National Climate Change Response White Paper). Evidence of rapid climate change, including more frequent and intense weather systems and greater climate variability, has been observed and includes:

a) Increases in the average global temperature; with the past decade being the hottest on record;
b) rises in the average global sea level;
c) changes in average rainfall patterns, with some regions experiencing higher rainfall and flooding events and other areas experiencing severe drought conditions;
d) increased frequency of heavy rainfall and extreme weather events over most land areas; and
e) more intense and longer droughts (currently being experienced in Southern Africa)

This policy is guided by the principles set out in The Constitution, the National Environmental Management Act, The Millennium Declaration, the United Nations Framework Convention on Climate Change, The Paris Agreement (came into effect on 4 November 2016), the National Climate Change Response Objective, the Climate Change Green Paper, Climate Change White Paper, and the Draft Climate Change Bill (2018).

This policy is intended to be a comprehensive approach to managing Climate Change in the City of Pietermaritzburg; setting the direction in which strategies should be established and enabling action by key stakeholders. It is envisaged that the City's leadership and communities will work in partnership toward a resilient City that can respond to impacts and opportunities presented by climate change (SRK, 2008). This will contribute to the goal of limiting global average temperature increases to less than 2°C[1], minimising dangerous climate change and adapting to climate change impacts. This policy intends to build Msunduzi Municipality's effective Climate Change response and long-term transition to becoming climate resilient and lower carbon economy. To effectively manage inevitable climate change affects through interventions that build and sustain social, economic and environmental resilience and emergency response capacity.

1.1. Climate Change Adaptation

Climate change adaptation involves managing the unavoidable impacts, and developing strategies / plans, in order to reduce the impacts of climate change. Even if emissions are stabilized relatively soon, climate change and its effects will last many years, and adaptation will be necessary (Farber, 2007). Climate change adaptation is important in developing countries since those countries are predicted to withstand the worst of the effects of climate change (Daniel, 2008).

1.2. Climate Change Mitigation

Climate change mitigation focuses on reducing the amount of GHG's that are emitted into the atmosphere. This action will aid in the reduction of future impacts of climate change beyond that which is already projected, and involves implementing strategies, which would reduce and limit the current GHG percentages. An example of such strategies would be to reduce loss of open spaces areas as these areas sequester carbon.

1.3. Vulnerable Sectors identified and focused on in this policy

Various sectors have been identified which will be affected by climate change / climate change related impacts in the City, these are:

a) Impacts on **biodiversity**, ecosystems and sensitive natural environments

[1]Current target set by the United Nations Framework Convention on Climate Change (UNFCCC).

b) Changes and impacts to **water resources** particularly water availability, quality and quantity
c) Impacts on **food provision and agricultural sustainability**
d) Impacts on **human health** due to temperature extremes and prevalence / occurrence of vector borne diseases
e) Impacts on **storm water** infrastructure and other infrastructure located in areas of flood potential
f) **Waste management**
g) Increased **energy utilisation** and impacts on electricity infrastructure
h) Impacts on the **transportation** sector and infrastructure

This Policy seeks to unpack these core issues and includes adaptation and mitigation measures to be implemented (i.e. each adaptation and mitigation option would be case / site specific) which would contribute to the reduction of climate change related impacts on each of the sectors mentioned above.

1.4. The Policy Is Structured Around The Following Focus Areas:

a) Council mitigation – investigating methods of measuring and establishing baseline data and levels concerning GHG emissions. Ensure that methods are established, which look at reduction of GHG emissions from Council's day to day operations, i.e. fleet and buildings, by making staff more environmentally aware of their activities and of the importance of reducing their carbon footprint. Targets, strategies and programs will be developed to help guide the implementation processes (i.e. Standard Operating Procedures).
b) Community mitigation – reduction of GHG emissions arising from residential / industrial activities, businesses and transportation sectors (i.e. measuring targets, strategies and programs).
c) Council adaptation – using the Municipal Corporate Risk Management Approach to respond to governance (i.e. measuring targets, strategies and programs).
d) Leadership and planning challenges - presented by climate change when delivering services to communities now and in the future (i.e. measuring targets, strategies and programs).
e) New / proposed development applications– ensure that all new developments consider and address the direct, indirect and cumulative impacts of their proposed activities. Developments must aim at reducing / limiting their carbon footprint and ensure that minimal environmental degradation is caused.
f) Ensure that key decisions in development planning consider the implications of possible climate futures facing the City i.e. climate change predictions are considered and addressed in decision-making.
g) Ensure that policies are developed which would ensure that building regulations and legislation are supported, implemented and refined if necessary.
h) Ensure that carbon sequestration is taken into account and bylaws are developed which ensure this is built into planning and development.
i) Ensure that alternative technology options are encouraged and incorporated into planning processes

CHAPTER 2: ACRONYMS, DEFINITIONS AND INTERPRETATION

2.1. Acronyms

CDS	Msunduzi City Development Strategy
DEDTEA	Department Of Economic Development, Tourism And Environmental Affairs
EIA	Environmental Impact Assessment
EMF	Msunduzi Municipality Environmental Management Framework
GHGI	Green House Gas Inventory
GHGs	Green House Gases
I&AP's	Interested And Affected Parties
IDP	Integrated Development Plan
IEMP	Msunduzi Municipality Integrated Environmental Management Policy

IPCC	Intergovernmental Panel On Climate Change
MDGs	Millennium Development Goals
NEMA	National Environmental Management Act (Act 107 Of 1998)
SDF	Sustainable Development Framework
SEA	Msunduzi Municipality's Strategic Environmental Assessment
SEASQ	Msunduzi Municipality's Strategic Environmental Assessment Status Quo
SEMP	Msunduzi Municipality's Strategic Environmental Management Plan
UNFCCC	United Nations Framework Convention On Climate Change

2.2. Definitions and Interpretation

'Alien invasive Species' any species whose establishment and spread outside of its natural distribution range—
(a) Threaten ecosystems, habitats or other species or have demonstrable potential to threaten ecosystems, habitats or other species; and
(b) May result in economic or environmental harm or harm to human health;
Species that are classified as such by the National Environmental Management: Biodiversity Act (10 of 2004).

'Anthropogenic influences' Human induced impacts which (in this case refers to climate change) result in climate change affects

'**Biodiversity'** means the variability among living organisms from all sources including, terrestrial, marine and other aquatic ecosystems and the ecological complexes of which they are part and also includes diversity within species, between species, and of ecosystems

'Business' Formal and informal businesses within Pietermaritzburg including commercial, industrial and agriculture businesses.

'Carbon Footprint' A measurement used to calculate the impact human activities have in the environment. Measured in terms of the amount of greenhouse gases emitted from each activity and reported in units of CO2

'Carbon Sequestration' is the process of removing carbon from the atmosphere and depositing it into a reservoir / sink.

'City / Council' Refers to the Msunduzi Municipal area

'Climate Change Adaptation' in relation to natural, human, social and ecological systems, means the process of adjustment to actual or expected climate and its effects, in order to moderate harm or exploit beneficial opportunities, in relation to natural systems, the process of adjustment to actual climate and its effects

'Climate Change Mitigation' a human intervention to reduce the emissions of greenhouse gases by sources or enhancing their removal from the atmosphere by sinks

'Civil Society' Non-governmental organisations, faith based organisations, schools, community based organisations, ward committees and other civil society organisations.

'Environmental Management Program (EMPr)' means an action oriented program or plan to implement environmental requirements or duties, which includes -
a) Environmental objectives,
b) Environmental targets, and
c) definition of what is planned to be done, who must do it, by when it must be done, how it must be done and the resources required for having it done, and
d) Penalties for non-compliance

'**Ecosystem Goods and Services'** means benefits which come as a result of ecosystems that are in a good condition or a set of diverse ecological functions and/or products that are essential to human welfare

'Environmentally sustainable' means the exercising of any decision-making powers or performance of any activities in a manner aimed at ensuring that-
(a) the risk of harm to the environment and to human health and safety is minimised to the extent reasonably possible under the circumstances;
(b) the potential benefits to the environment and to human health and safety are maximised to the extent reasonably possible under the circumstances;
(c) legislation intended to protect the environment and human health and safety is complied with; and
(d) development meets the needs of the present without compromising the ability of future generations to meet their own needs.

'Greenhouse Gases' Atmospheric gases that create a greenhouse effect by increasing the amount of heat retained by the Earth's atmosphere, thus contributing to an increase in global temperatures

'Green Building' means a building whose construction and lifetime of operation assures the healthiest possible environment while representing the most efficient and least disruptive use of land, water, energy and resources

'**Indigenous vegetation'** refers to vegetation consisting of plant species occurring naturally in an area, regardless of the level of alien infestation and where the topsoil has not been lawfully disturbed during the preceding ten years

'Local Agenda 21' (**LA 21)** is an action programme derived from the global plan of action for sustainable development called Agenda 21. It is aimed at achieving sustainable development of local urban and settlement communities.

'Msunduzi Municipality' local government of Pietermaritzburg. This includes all Municipal Business Units

'National Authorities' South African National Government departments and national entities such as Eskom.

'Offset' compensates for unavoidable impacts on significant environmental matters, (e.g. valuable species and ecosystems) on one site, by securing land at another site, and managing that land over a period of time, to replace those significant environmental matters which were lost. Offsets can take the form of positive management interventions such as restoration of degraded habitat, arrested degradation or averted risks.

'Residents' Citizens of Pietermaritzburg / the Msunduzi area.

'Researchers' individuals and organisations involved in climate change related research relevant to the Pietermaritzburg / Msunduzi area.

'**Resilience'** is the ability of a system or community to survive disruption and to anticipate, adapt, and flourish in the face of change.

'South Africa's Response to Climate Change 'has two objectives: (1) To effectively manage the inevitable climate change impacts through interventions that build and sustain South Africa's social, economic and environmental resilience and emergency response capacity; and (2) To make a fair contribution to the global effort to stabilise greenhouse gas (GHG) concentrations in the atmosphere at a level that avoids dangerous anthropogenic interference with the climate system within a timeframe that enables economic, social and environmental development to proceed in a sustainable manner.

'The Let's Respond Toolkit' a Guide to integrating climate change risks and opportunities into municipal planning (developed through the Local Government Climate Change Support (LGCCS) program).

'Paris Agreement' an agreement within the United Nations Framework Convention on Climate Change (UNFCCC), dealing with greenhouse-gas-emissions mitigation, adaptation, and finance, starting in the year 2020. As of November 2018, 195 UNFCCC members have signed the agreement, and 184 have become party to it. The Paris Agreement's long-term goal is to keep the increase in global average temperature to well below 2°C above pre-industrial levels; and to limit the increase to 1.5°C, since this would

substantially reduce the risks and effects of climate change. Under the Paris Agreement, each country must determine, plan, and regularly report on the contribution that it undertakes to mitigate global warming. No mechanism forces a country to set a specific target by a specific date, but each target should go beyond previously set targets

'Provincial and other Local Authorities' KwaZulu-Natal provincial government departments, authorities and provincial entities such as Umgeni Water, catchment management agencies/forums and neighbouring municipalities.

'Public Open Space' means any land which -
(a) is owned by an organ of State, or
(b) over which an organ of State has certain real rights arising from the filing in the Deeds Office or other registration office of a general plan of a township, agricultural holding or other division of land, or any alteration, addition to or amendment of such land approved by the Surveyor-General, on which is marked the land to which the public has a common right of use; and
(c) is controlled and managed by the Municipality; and
(d) is either -
(i) set aside in terms of any law, zoning scheme or spatial plan, for the purpose of public recreation, conservation, the installation of public infrastructure or agriculture; or
(ii) Predominantly undeveloped and open and has not yet been set aside for a particular purpose in terms of any law, zoning scheme or spatial plan;

CHAPTER 3: PURPOSE, OBJECTIVES & ALIGNMENT AND LEGAL OBLIGATIONS

3.1. Policy Purpose

The purpose of this policy is to provide guidance and direction regarding the plans and strategies to be implemented by Municipal Business Units to ensure that the Msunduzi Municipality has clear adaptive and mitigative measures in place, which address present, and future climate change impacts. This policy also aims at encouraging Municipal stakeholders and key roles-players towards integrating climate change ideology and innovative technology into planning processes, to ensure the protection of infrastructure, natural resources and protect communities against anticipated future extreme weather events. The relevance, effectiveness and implementation of this policy will be managed through on-going monitoring and review (in line with enacted legislation, including the Climate Bill and other relevant legislation when promulgated) to ensure it reflects the most recent developments in climate change science and technology, and delivers on the Municipality's statutory responsibilities.

3.2. Policy Objectives

a) Make a fair contribution to the global effort to achieve the stabilisation of greenhouse gas concentrations in the atmosphere at a level that prevents dangerous anthropogenic interference with the climate system
b) Effectively adapt to and manage unavoidable and potential damaging climate change impacts through interventions that build and sustain South Africa's social, economic and environmental resilience and emergency response capacity
c) Ensure Council continues to deliver services effectively to the community in a changing climate.
d) Reduce the vulnerability of the Pietermaritzburg community to potential future impacts of climate change.
e) Increase and improve climate change awareness
f) Ensure the availability of clear and concise climate change adaptation and mitigation strategies
g) Ensure Councils response to climate change is flexible and that processes are in place to respond and adapt to changing international protocols, technological advancements, community readiness, South African Environmental Policies and Legislative changes, and improved knowledge (technological advancements) etc.
h) Equip Council with a robust framework to pro-actively seek opportunities, knowledge and partners to effectively manage the challenges and opportunities of climate change into the future.
i) Build capacity and capability of the Msunduzi Municipality to lead communities in responding to the challenges and opportunities presented by climate change.
j) Provide an action plan that will equip Council with a program of practical and sustainable responses to the current and future projected risks and challenges posed by climate change.

k) Integrate climate change considerations into governance and operational structures, functions and inevitably, Municipal day-to-day operations.
l) Integrate environmental and social considerations into planning, construction and other relevant municipal functions or activities in order to make informed decisions promoting sustainable development.
m) Ensure that climate change strategies are considered and implemented within all Municipal Business Units.
n) Ensure that Msunduzi Municipality offers a safe, clean and hygienic City that manages all aspects of the environment in a safe and responsible manner in order to enhance resilience to climate change.
o) Ensure the implementation of strategies, which aim at identifying risks, and encourage the monitoring of predicted climate change events
p) Ensure the identification, implementation and development of tools to set targets, which have been identified.

3.3. Policy Alignment, Legal Obligations and Implementation

Should multi-lateral international action not effectively limit the average global temperature increase to below at least 2°C above pre-industrial levels, the potential impacts on South Africa in the medium- to long-term are significant and potentially catastrophic. Even under emission scenarios that are more conservative than current international emission trends, it has been predicted that by mid-century the South African coast will warm by around 1˚C, and the interior by around 2-3°C. After 2050, warming is projected to reach around 3-4°C along the coast, and 6-7˚C in the interior. With these kinds of temperature increases, life as we know it will change completely - parts of the country will be much drier; increased evaporation will ensure an overall decrease in water availability significantly affecting human health, agriculture and the environment in general; the increased occurrence and severity of veld and forest fires and especially extreme weather events such as floods and droughts will also have significant impacts; sea-level rise will negatively impact the coast and coastal infrastructure; mass extinctions of endemic plant and animal species will greatly reduce South Africa's biodiversity. Given the significance of these impacts, it is clear that urgent and decisive international and local action is required to achieve a real reduction of greenhouse gases in the atmosphere and in so doing limit the impacts of climate change into the future.

The National Climate Change Response White Paper (Point 10 Mainstreaming Climate-Resilient Development, point 10.2.6) states that *"Local government plays a crucial role in building climate resilience through planning human settlements and urban development; the provision of municipal infrastructure and services; water and energy demand management; and local disaster response, amongst others. Climate change considerations and constraints will be integrated into municipal development planning tools such as Integrated Development Plans, and municipal service delivery programmes".*

As stated in the Draft Climate Change Bill (8 June 2018, No. 41689) Chapter 2 Item 7: *"Every organ of state must coordinate and harmonise the polices, plans, programmes and decisions of the National, Provincial and Local spheres of government that exercise functions that effect or are effected by climate change or are entrusted with powers and duties aimed at the achievement, promotion and protection of a sustainable environment, in order to –*

a) Ensure that the risks of climate change impacts and associated vulnerabilities are taken into consideration, and
b) *Give effect to the national adaptation and mitigation objectives set out in this Act*

This Policy further acknowledges that it ought to be converted into practical local legislation, and affected business units should carefully study the provisions of the draft Policy and make the necessary inputs, as they would both be directly affected by and the drivers of climate change strategies. Business units should also ensure that the Policy, from their perspective, is in alignment with other macro/micro plans for the Municipality. It is clear that strategies to deal with Climate Change will receive a lot more attention in future, and the Municipality, as local organ of state, should prepare itself to deal with the next phase as soon as possible, namely practical implementation.

CHAPTER 4. POLICY APPROACHES, ACTIONS & STRATEGIES

The achievement of South Africa's Climate Change Response Objective will be brought about by employing the strategies outlined above and, through the implementation of various approaches and actions outlined below. These actions must be implemented and applied/enforced by Msunduzi Municipality Business Units, Provincial and other Local Authorities, National Authorities, Businesses, Residents, Civil Society:

4.1. BIODIVERSITY

Objectives:

a) To preserve, maintain and rehabilitate the City's biodiversity and Open Space Areas
b) To reduce the percentage of biodiversity lost due to developmental activities within the City
c) To sequester carbon emissions via the implementation of tree / vegetation protection and planting
d) To promote environmental and ecological sustainability and support future residential, commercial and industrial development through urban renewal and greening
e) Areas of high biological diversity are utilised and managed to promote the ecosystem goods and services they supply
f) Alien invasive plant species are controlled and managed to prevent further infestation

To address the concerns mentioned above, the City will aim to:

1. There is a need to establish the Environmental Management Framework (EMF) as a proactive environmental planning tool and to ensure that all residents have access to open and green space (Msunduzi CDS, 2015). The following are therefore proposed:
   a) Secure the natural resource base;
   b) Protect and enhance open space cores (adopt a no net loss of areas zoned as public open space/ areas found to contain significant biodiversity levels are to be retained);
   c) Create an integrated open space system; and
   d) Enhance the Msunduzi River as a regional parkway
2. Increase the implementation of 'greening' projects / programs (including tree planting strategies in accordance with the Msunduzi Tree Planting / Management Policy) to contribute to increasing and improving biodiversity within the City and surrounding areas.
3. All new developments to include and implement indigenous landscaping (i.e. landscape plans must ensure that existing indigenous species are retained and the incorporation of additional indigenous species).
4. Ensure that key areas are zoned as open space / public open spaces / conservation and areas already zoned for this purpose are retained and conserved in order to safe guard species and habitats.
5. Msunduzi Municipality adapts a NO NET LOSS of open space / public open space / conservation areas
6. All Municipal owned land is evaluated in terms of species richness (i.e. fauna and flora); areas with high levels of species richness / biodiversity must be conserved in order to safe guard species and habitats.
7. Ensure that development activities / proposals incorporate offset areas for rehabilitation and open space systems.
8. Implement and encourage environmental education and awareness programmes
9. Reduce land degradation and increase water availability by removing alien invasive plant species from municipal owned land
10. Reduce land degradation and increase water availability by aiding/assisting with the removal of alien invasive plant species from privately owned land / land not owned by the municipality
11. Develop and administer an alien invasive plant awareness campaign
12. Rehabilitate Land Owned by Msunduzi to reduce land degradation and maintain and improve ecosystem goods and services thereby creating more opportunities for economic and social development.
13. Ecosystem Goods and Services Assessments to include the value of ecosystem goods and services when planning developments. This aims at promoting efficient and sustainable usage of resources, which benefits communities, and promotes the conservation of biodiversity
14. Urban Greening Programs to improve amenities, and create green aesthetic appeal in the City. Key / priority areas will be identified within the Msunduzi area, which are in need of urban greening (e.g. along busy roads and intersections, within City centre, public areas such as parks / open spaces, etc.).
15. Refinement of Msunduzi Municipality's Conservation Plan and inclusion in the SDF and Town Planning Scheme
16. Address issues regarding inappropriate land uses and degradation, which contribute to the loss of agriculture and natural resources. Areas with high grazing potential are to be mapped to ensure that these areas are controlled and maintained.
17. Implementation of the ESP with associated land ownership and management policy, which aims at promoting alternative livelihood strategies, increase economic opportunities, and encouraging green design principles.

4.2. WATER RESOURCES

Objectives:

a) To ensure the quality of water from rivers, streams and wetlands is suitable for the maintenance of biodiversity and the protection of human wellbeing
b) To ensure the quality of potable water meets legislated requirements
c) Ensure adaptation and mitigation measures are identified and incorporated into decision and policy making, in order to adapt to climate change impacts on water sources
d) Monitor developments and emerging stresses, and propose effective methods of addressing them to ensure that water wastage and correct water management is addressed
e) Invest in monitoring capabilities across a range of disciplines in order to spot trends and understand them as well as track the effectiveness of adaptive strategies

To address the concerns mentioned above, the City will aim to:

1. Create and encourage flood management zones i.e. for water attenuation and retention during periods of excessive rainfall / flooding (Diederichs, Nichols & van Niekerk, 2009)
2. Implementation and improvement of storm water capture / retention and improved Storm Water Management Plans throughout the Msunduzi Municipal area
3. Improve potable water availability by laying new pipelines in and around the City
4. Develop a "future's demand" profile for the City in terms of water requirements, which would be evaluated in terms of climate / temperature influenced rainfall
5. Extreme precipitation considered when developing storm water designs, land use planning and zoning to avoid damage to infrastructure and buildings in flood / landslide prone areas
6. The formulation of flood evacuation information such as inundation and hazard maps must be generated and this information must be made available to the public, especially communities in high-risk areas
7. Improving and sustaining the water quality and quantity within the Msunduzi catchment area to support the biodiversity and associated ecosystem goods and services
8. Develop a detailed Flood Risk Assessment aimed at addressing the impacts of storm water management on the quality of water and risks associated with developments located within floodplains and other sensitive areas
9. Improving water quality by identifying areas of significant pollution levels and ensuring that polluters take responsibility for the environmental degradation / damage that they cause
10. Include greater wetland buffer areas as policy and make wetland / water guideline documents available to residential, commercial and institutional organizations
11. In order to prevent water - borne diseases and outbreaks e.g. cholera and bilharzia, continual monitoring of water resources is required.
12. Provide information on how to save water by implementing a Water Use Efficiency Programme on residential, commercial and institutional properties, i.e.: Water Conservation Guidelines (Price, Ross, Rabé, & Diederichs, 2009).
13. Regular review and update of the Disaster Management Plan.
14. Develop and implement a Storm Water Management Policy, Bylaws and Regulations.
15. Implement improved storm water capture / retention and improved Storm Water Management Plans throughout the Msunduzi Municipal area.
16. Increase the water absorption capacity of urban landscapes, and ensure areas such as wetlands, river courses, and riparian areas are conserved and these areas are not disturbed/ transformed via building / construction etc.
17. Improve / upgrade Urban Drainage Systems.
18. Implement and utilize storm water retention / detention ponds and constructed wetlands, for water storage and to improved water quality
19. Improving and sustaining the water quality and quantity within the City, and maintaining biodiversity and associated ecosystem goods and services.
20. Investigating and incorporating the reuse of water within the Msunduzi area
21. Encourage use of water conservation technologies such as rain water harvesting tanks / low flush toilets / low flow shower heads
22. Adopt and enforce simple, innovative, adaptive engineering approaches to water treatment that respond to projected changes in water quality as a result of climate change.

23. Adopt a risk-averse approach to water quality protection by imposing stringent controls on water polluting land uses and activities to ensure that the impacts of climate change are not exacerbated.
24. Recognize, make use of and manage the role that open spaces, natural areas and agricultural land can play in providing flood and storm water protection services.

4.3. FOOD SECURITY AND AGRICULTURE

Objectives:

a) To protect the City's agricultural sectors from climate change risks and vulnerabilities
b) To ensure that communities relying on agricultural sectors are aware of and develop resilience to climate change impacts (building on educational awareness).
c) To protect and safely utilize prime and unique agricultural land, the environment and other protected lands (IDP review for 2013/14-2016/17).

To address the concerns mentioned above, the City will aim to:

1. Develop education, training and extension services to prevent land degradation and unsustainable agricultural practices
2. Introduce alternative agricultural techniques to small-scale farmers regarding information on climate change impacts and possible responses, to ensure climate change resilience.
3. Encourage the implementation and utilisation of urban gardens i.e. Green Roofing and Urban Greening Projects
4. Encourage communities to create sustainable gardens whereby they can grow their own crops.
5. Community Based Adaptation and assistance should be implemented in communities in order to encourage capacity-building initiatives (Allen, 2006).
6. Identify and where appropriate, make land available for agricultural production.
7. Rehabilitation of Land Owned by Msunduzi would address the concern regarding the loss of agriculturally productive land and natural resources
8. Identify areas of grazing importance and implement strategies to support sustainable land use practices – this action plan and tasks acknowledge the need for improved sustainable agricultural production.
9. Identify appropriate Land Use Management Strategies for land identified (via the EMF) as containing Significant Agricultural Potential
10. Incorporate biodiversity into agricultural policies, guidelines and decision-making. This involves the implementation of interventions to mainstream biodiversity into key aspects of land use planning, government and private sector policies, development programs and production standards
11. Promote and facilitate the implementation of low carbon micro-scale organic food businesses to provide economic opportunities to communities and reinforce food security

4.4. HUMAN HEALTH

Objectives:

a) To ensure that communities are made aware of possible diseases and are aware of the methods of treatment
b) Ensure that Municipal health services are able to respond to high percentages of those infected (i.e. adequate provision of resources, adequately trained staff etc.)
c) Ensure adequate provision of medical facilities
d) Ensure that Occupational Health Staff are equipped, trained and prepared to deal with an increase in those suffering from climate change related health impacts
e) Ensure that Environmental Health Unit is equipped to deal with an increase in diseases

To address the concerns mentioned above, the City will aim to:

1. Communities benefit from a linked public open space network providing for a range of sporting, cultural and recreational uses.
2. Programs and plans should be implemented, which seek to educate Municipal staff and the public on how to respond to various climate change related health impacts.
3. Developing and communicating heat emergency plans when temperature levels are excessively high (e.g. Msunduzi Heat Stress Policy)

4. Encouraging and motivating for increased street trees along all major roads and intersections (relates to Msunduzi Municipality tree planting policy) in order to reduce heat / temperature levels.
5. Disaster Management teams have plans / strategies in place which deal with responding to major outbreaks of severe diseases, conditions pertaining to malnutrition, heat stroke, dehydration etc., and are adequately trained and provided with equipment to deal with these impacts in an effective and efficient manner.
6. Ensure that clinics / hospitals are provided with information pertaining to impacts of climate change related incidents (i.e. heat stroke / dehydration / increased diseases etc.).
7. Concepts / strategies regarding carbon emission reduction and the improvement of air quality within the Msunduzi area must be investigated.
8. Strategies aimed at improving air quality and reducing risks to human health (i.e. hazardous emissions) must be investigated
9. Air Quality Management Plans to be developed which would identify areas / sectors, which produce high emissions, as well as identifying emission reduction plans, dispersion modelling and mechanisms of reporting high emissions
10. Ensure that Carbon Emissions and GHG's are monitored and calculated, with the provision of strategies aimed at reducing carbon emissions and GHG's.
11. Carbon Emissions Inventory and Offset Programs to be investigated in order to identify the need for the implementation of green technologies, strategies and building design in order to create developments, which are more sustainable and environmentally friendly.
12. Undertake a Climate Change Risk and Vulnerability Assessment for the City : Climate Change Risk Assessment must be developed which would assess and address risks of climate change and the potential impacts on the City
13. Ensure that water quality testing is conducted regularly – results should be made available to the public. Measures to be identified and implemented should water quality be of poor conditions.
14. Ensure that infrastructure and facilities are well maintained to meet the needs of residents and business in ways that reduce environmental impacts and ensure that air emissions are reduced.
15. Green design principles are used to ensure environmental efficiency and minimise use of resources in order to decrease carbon emissions and heat island effects.

4.5. STORM WATER MANAGEMENT

Objectives:

a) To safeguard water sources from contamination
b) To ensure that sanitation services and infrastructure are up to standard.
c) To ensure that future planning takes the lack of service delivery in outer lying areas into account and strategies for improving conditions are identified and implemented.
d) To improve and enhance storm water infiltration systems and storm water management / drainage systems.
e) To enhance and improve storage and utilization of storm water
f) Monitoring and reduction of storm water inflows to Msunduzi sewer network

To address the concerns mentioned above, the City will aim to:

1. Ensure improved storm water drainage and management
2. Develop and implement a Storm Water Management Policy for the City
3. Develop and implement Storm Water Management Bylaws and Regulations.
4. Implement improved storm water capture / retention and improved Storm Water Management Plans throughout the Msunduzi Municipal area
5. Ensure that domestic waste does not enter storm water drains and, as a result, cause blockages. Litter should be cleared from streets on a regular basis and should be recycled.
6. Re-evaluate the design of storm water infrastructure in order to cope with flood levels.
7. Public Awareness Campaign to raise awareness of the benefits of retrofitting storm water runoff reduction techniques i.e. green roofs, retention / wet basins, detention / dry basins, infiltration basins, rain water harvesting etc. to reduce runoff from existing and future developments.
8. Protect and restore riparian vegetation and wetland / floodplain areas in order to protect the integrity of riverbanks and retain ecological buffers against flooding
9. Identify pump stations and pipeline routes, which are in need of servicing / upgrading.

10. Retrofit and modify existing infrastructure and public spaces using adaptive engineering approaches to provide protection against future water related climate impacts.
11. Ensure that the potential impacts of climate change are taken into account when considering large-scale infrastructure projects.

4.6. WASTE MANAGEMENT

Objectives:

a) Ensure the implementation of improved service delivery, in terms of collecting, cleaning, clearing and waste removal to landfill sites.
b) To shift thinking to focus on the waste hierarchy principles such as avoidance, prevention, reduce, re-use, and recycle.
c) Investigate opportunities for implementing large scale recycling initiatives.
d) Educate communities and the general public on the harmful effects of inadequate (or lack of) waste disposal.
e) Implementation of annual upgrade of waste disposal infrastructure, vehicles and equipment.
f) Implement the Msunduzi Municipalities Integrated Waste Management Plan.
g) Implementation of advanced Waste Management Systems that reflect community values around waste minimization.
h) Removal of illegal landfill sites – greater emphasis should be placed on recycling initiatives.

To address the concerns mentioned above, the City will aim to:

12. Increased implementation of recycling initiatives i.e. expansion of the Mondi kerb-side recycling project to involve all users and producers of waste coupled with a sustained municipal wide education and awareness campaign.
13. Implement and increase capacity of the Materials Recovery Facility [2](MRF).
14. Increased implementation of composting facilities varying in degree from small-scale household facilities to large industrial scale regional facilities.
15. Improved waste collection efficiency by and between the various role players municipal wide, including the private sector.
16. Enforce the Polluter Pays Principle (NEMA, 2010).
17. Enforce All Municipal Bylaws and Regulations.
18. Address illegal roadside / community dumping of waste via sustained public awareness campaigning and sustained law enforcement.
19. Creating a Public Awareness Unit within the Waste Management Business Unit
    a) This unit should be focus on addressing issues such as illegal dumping and littering.
    b) How waste and litter can affect ecosystems and biodiversity should be highlighted, with information on how to reduce waste and promote recycling.
20. Implementation of the Msunduzi Integrated Waste Management Plan which deals with waste reduction and recycling strategies
21. Prepare and implement strategies regarding the impacts of industrial effluent, land degradation, poor sewage infrastructure, solid waste and storm water management on the quality of water and aquatic ecosystems.
22. Improve basic service delivery such as; effective waste removal and the provision of appropriate sanitation and water services.
23. In areas where shop owners are problematic i.e. litter outside of buildings, fines / penalties should be issued until areas are cleared up and litter is removed, as litter blocks up storm water drains, and causes far reaching negative environmental impacts.
24. Increase the provision and servicing of refuse bins / skips within the City.
25. Explore options such as:
    a) Converting waste to energy (biofuels should only be used if they can be produced / generated with very little carbon emissions and with sustainable agricultural practices).
    b) Landfill gas capture projects / initiatives
    c) Properly facilitate mining of landfill waste
    d) Reducing waste to landfill

[2] The Msunduzi Municipality has plans to establish a Materials Recovery Facility (MRF) at the New England Road Landfill. The purpose of this facility would be to sort the incoming general waste and separate the recyclable fraction from waste component in order to reduce the quantity of waste that has to be land filled whilst promoting recycling.

4.7. ENERGY UTILIZATION

Objectives:

a) To reduce the Cities overall electricity consumption (reduce energy demand in buildings).
b) To retrofit municipal owned buildings with energy saving technologies to reduce electricity consumption.
c) To move towards a more environmentally friendly source of energy (i.e. alternative energy sources such as solar, wind etc.) in order to reduce energy consumption of outdoor lighting.

Targets identified in the IDP which are required to be met by 2030, are as follows:

1. 30% of Msunduzi's electricity demand is met by renewable sources.
2. 20% of liquid energy is derived from bio-fuel.
3. 50% of new commercial or industrial development incorporates some form of renewable energy technology usage in its design and construction.
4. 80% of new human settlement development incorporates some form of renewable energy technology usage in its design and construction.
5. 100% of building plans approved have due consideration for energy efficiency.

To address the concerns mentioned above, the City will aim to:

1. Increase community[3] awareness regarding appropriate usages of energy and electricity (if not using an appliance switch it off, benefits of implementing energy saving technologies etc.).
2. Introduce rebates and incentives to encourage electricity users to implement renewable energy technologies.
3. Increased utilization of alternative energy / powered facilities i.e.:
   a) Solar powered streetlights, traffic lights.
   b) Small-scale solar energy / alternative energy projects.
   c) Solar geyser initiatives.
4. Develop and implement Green Building Guidelines for the City
5. Ensure that municipal buildings are assessed (and later retrofitted) in terms of energy efficiency.
6. Develop and implement bylaws to support and strengthen building regulations / develop and implement bylaws / regulations to support and promote carbon storage and capture
7. All new developmental projects within the City implement energy efficient, alternative technologies
8. Develop a Sustainable Energy Sector Development Plan to advance the sustainable energy sector of the green economy within the City.
9. Promote programmes to implement energy efficient technologies and design in buildings and developments beyond existing national standards in local building regulations
10. Promote the use of energy efficient technologies to reduce the heat island effect
11. Investigate and implement a range of mechanisms that reduce electricity consumption during peak hours.
12. Targets set in the Msunduzi Draft IDP 2017-2022 to be met
    a) Use of renewable sources of energy is widespread
    b) 100% of streetlights and 100% of traffic signals in the CBD are powered by renewable energy
    c) 100% of municipal households are fitted with solar water heating geysers
    d) Demand management provides a 10% reduction in peak demand.

4.8. TRANSPORTATION

Objectives:

a) To ensure that transportation routes and facilities are resilient to the impacts of climate change.
b) To ensure that sufficient budget is allocated to deal with roads and traffic management measures that require upgrades and improvements
c) To ensure that climate smart energy efficient technologies are investigated and implemented
d) Encourage sustainable strategies which aim at enhancing mobility and access to amenities

[3] Public, private and municipal

To address the concerns mentioned above, the City will aim to:

1. The implementation of improved storm water and drainage systems (to decrease degradation to road and railway networks (i.e. potholes, cracking of roads etc.)
2. Increase mobility and access to transportation networks and routes
3. Implementation of transportation systems, which will significantly contribute to the upgrading of interchanges and road networks within and around the CBD as well as contributing to traffic reduction
4. Development of infrastructure Cost Modelling aimed at improving service delivery and providing basic services.
5. Enhance transportation systems; aim at contributing to the upgrading of interchanges and road networks within and around the CBD as well and contributing to traffic reduction.
6. Implement improved and more effective public transportation systems.
7. Investigation and implementation of Non-Motorized Transportation (NMT) routes and infrastructure throughout the City
8. Develop economic nodes and mixed use zones in existing and planned neighbourhoods and communities where residents have access to shops, services and entertainment, thus reducing the need for extensive travel.
9. Improve transport linkages that enable access to goods and services between neighbourhoods, communities and economic nodes.
10. Extend the implementation of the Integrated Rapid Public Transport Network (IRPTN) to provide an affordable, high quality, clean and safe form of public transport that enables seamless movement between different precincts within the municipality.
11. Explore the adoption of a range of alternative fuels and fuel efficient technologies that are less carbon intensive.
12. Prioritize the use of and promote the purchase of low carbon and energy efficient vehicles.
13. Clean, renewable and efficient energy sources and transportation options are investigated and implemented in order to reduce fossil fuel dependence, to reduce energy costs and produce low greenhouse gas emissions and other air contaminants.

4.9. BUILDING CO-OPERATIVE GOVERNANCE & IMPROVED COMMUNICATION PROCEDURES

Objectives:

a) To ensure that all Business Units and Municipal officials are aware of environmental concerns, and mitigation and adaptation measures which should be implemented in order to circumvent / negate impacts pertaining to climate change.
b) To increase levels of awareness regarding environmental issues (i.e. this would include the sustainable use and adequate management of all resources)

To address the concerns mentioned above, the City will aim to:

1. Research projected climate change impacts on natural resources, infrastructure and human well-being and appropriate adaptation measures
2. Identify existing capacity as well as areas that require further capacity and support within the municipality.
3. Ensure that a Council on Climate Change is established in order to impart practical mitigation and adaptation measures (IDP review for 2013/14-2016-17).
    a) Re-establish the LA21 Forum - focuses on addressing issues around resources allocated for environmental functions, it also deals with increasing the use of media and public support in order to ensure participation in decision-making.
    b) Participation in LA21 is increased and the public is encouraged to participate in municipal planning initiatives.
4. Hold Sustainable Development Training / Climate Change Awareness Workshop, which aims at improving communication channels within municipal business units and ensures that all business units are aware of climate change related threats.
5. Engage in knowledge sharing exchanges with other cities and local authorities to promote collective learning, sharing lessons learnt and best practice.
6. Capital investment projects undertaken or facilitated by the Municipality adhere to legislated requirements and Integrated Environmental Management principles.
7. Msunduzi is prepared to respond rapidly and to deal effectively with known and unforeseen hazards / emerging threats, to limit the adverse impacts of events and effectively manage emergencies.
8. Access to environmental information is facilitated and encouraged.
9. Regular monitoring is undertaken to report on progress towards climate change resilience, so that the City can learn and adapt as needed.
10. Communities are informed, empowered and involved in decision-making processes to ensure climate change resilience.

11. Climate change matters and priorities are embedded in the Performance Management System and Key Performance Areas of all components of the municipality and are integrated into municipal planning processes
12. Environmental issues are prioritized and Msunduzi is committed to achieving environmental sustainability and climate change resilience.
13. Sustainability Appraisal of all Municipal Plans, Policies and Programs, this ensures that all decision making processes take into account environmental priorities and responsibilities with regard to implications of climate change impacts.

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ANNEXURE 1: POSSIBLE CLIMATE CHANGE IMPACTS ON MSUNDUZI [4]

In order to formulate mitigation and adaptation strategies, we first need to define future impacts of climate change on the City. The following table includes these possible impacts, and the departments/business units that will be impacted.

CLIMATE VARIABLES	CAUSE	DEPARTMENTS AFFECTED	IMPACTS
Increase in extreme weather events ➢ **Rain / Thunderstorms** ➢ **Wind** ➢ **Heat** ➢ **Cold** ➢ **Lightning**	Changing temperatures alter weather patterns.	Disaster Management	Flooding and other disasters
		Environmental Management	Climate change
		Roads & Drainage	Damage to infrastructure
		Housing	Damage to housing
		Water & Sanitation	Damage to infrastructure
		Environmental Health	Contamination of water sources Disease outbreaks
		Parks, Sport & Recreation	Fallen trees
Damage to infrastructure	Increase in extreme weather events.	Water & Sanitation	Damage to infrastructure
		Roads & Drainage	Damage to infrastructure
		Electricity	Damage to infrastructure
		Housing	Damage to and loss of housing
Increased temperatures	Increased Greenhouse Effect causes the atmosphere to become warmer.	Environmental Management Unit	Natural processes are affected by warmer atmospheres
		Electricity	Stresses on energy usage for cooling appliances
		Environmental Health	Disease outbreaks Heat-related emergencies
Higher incidence of flooding of the Msunduzi River	Increased precipitation and extreme weather events.	Housing	Damage to and loss of housing
		Environmental Management	

[4] Taken from Msunduzi Municipality's Climate Change Adaptation And Mitigation Strategy (2016)

		Roads & Drainage	Damage to infrastructure
		Water & Sanitation	Damage to infrastructure Contamination of water sources
		Disaster Management	Protocols
		Electricity	Damage to infrastructure
Higher energy usage for high/low temperatures	Changing temperatures cause the need for cooling/heating facilities dependent on energy.	Building Control & Signage	Green Building Design
		Electricity	Higher demand on energy supply
Reduced water quality	Flooding contributes to the contamination of water. Less water causes higher concentrations of pollutants and pathogens.	Water & Sanitation	Pollution of natural water sources
		Environmental Management	Pollution of natural water sources
		Environmental Health	Pollution of natural water sources adversely affects health of residents
Increase in disease outbreaks	Warmer temperatures enabling enteric and water-borne pathogens to survive.	Disaster Management	Protocols
		Parks, Sport & Recreation	Conservation areas affected by disease outbreaks in fauna
Increased proliferation of alien vegetation	Changing temperatures and weather conditions allow certain species to flourish where they would not normally.	Environmental Health	Certain alien plants (e.g. Famine Weed) have adverse health impacts on residents
		Water & Sanitation	Alien vegetation uses more water than indigenous vegetation therefore reducing natural water supplies
		Environmental Management	Alien plants lead to a decline in indigenous vegetation
		Parks, Sport & Recreation	Alien plant clearing programmes Alien plants invade conservation areas
Threatened biodiversity	Increased proliferation of alien invasive species.	Environmental Management	Alien plants lead to a decline in indigenous vegetation

	Land degradation.	Parks, Sport & Recreation	Alien plant clearing programmes Alien plants invade conservation areas
Increased likelihood of drought/Reduced precipitation	Changing temperatures alter weather patterns.	Department of Agriculture	Drought causes reduced crop yields and therefore decreased food security
		Water & Sanitation	Decreased water security
		Environmental Management	Less water in natural water sources
		All other business units	Ability to perform functions is reliant on adequate water supply