ULUNDI LOCAL MUNICIPALITY

DEVELOPMENT OF CLIMATE CHANGE STRATEGY

" The City of Heritage "

ULUNDI
MUNICIPALITY

CLIMATE CHANGE STRATEGY PLAN

FEBRUARY 2025

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Executive Summary

The Ulundi Local Municipality (ULM) recognises climate change as a critical challenge that jeopardizes socio-economic development, environmental sustainability, and public health. This report outlines a comprehensive Climate Change Strategy aimed at equipping ULM to navigate the complexities brought about by climate impacts while progressing toward its vision of becoming "A developmental city of heritage focusing on good governance, socio-economic development, and upholding tradition to promote sustainable service delivery."

At the core of this strategy is the Theory of Change, which aligns each aspect of the plan with the municipality's long-term aspirations and its capacity for adaptation. The strategy begins by clearly defining the challenges posed by climate-related events, such as droughts and floods, that disrupt the livelihoods of rural communities. The recommended interventions seek to transform existing vulnerabilities into a state of enhanced resilience.

The strategy emphasizes the municipality's commitment to proactive pollution mitigation and resilience-building measures. It articulates a vision where climate change adaptation is embedded in all levels of governance and decision-making, ensuring policies promote sustainability and social equity. The strategy also incorporates international, national, and provincial climate policies, framing ULM's interventions within broader legal obligations. By aligning local actions with these frameworks, ULM ensures compliance and enhances the effectiveness of its climate response.

An assessment of the socio-economic context and environmental status of ULM provides a foundation for strategic interventions. Understanding current infrastructural limitations and resource challenges enables targeted responses prioritizing community needs and sustainable practices. The strategy includes a gap analysis to identify areas for policy enhancement, infrastructure improvements, and capacity-building efforts, establishing a framework for impactful action.

The proposed programs cover critical areas such as water security, low-carbon development, biodiversity management, and food security, each with defined

outcomes to facilitate ongoing monitoring and evaluation. By fostering collaboration and involving the community, this strategy encourages an inclusive approach that empowers local stakeholders.

In summary, the Climate Change Strategy for Ulundi Local Municipality serves as a proactive blueprint for navigating the complexities of climate change. It outlines a clear pathway from vulnerability to resilience through the application of the Theory of Change, positioning ULM to adapt effectively to future challenges while remaining aligned with its developmental objectives.

1. Introduction

1.1. Background

Climate change is increasingly recognized as a principal obstacle to achieving sustainable socio-economic development. Its effects ripple through various sectors, impacting livelihoods, natural resources, and public health systems. As global temperatures rise and weather patterns become more erratic, local authorities must take decisive action to mitigate these impacts and ensure the well-being of their communities. The Ulundi Local Municipality (ULM), located in a climate-vulnerable region, faces challenges such as declining agricultural productivity and heightened health risks. In response, ULM is developing a comprehensive Climate Change Strategy aimed at addressing these issues while promoting resilience and sustainability across its operations.

This strategy is essential for acknowledging and addressing the pressing impacts of climate change. By implementing it, Ulundi can enhance its resilience and adaptability in a world prioritizing carbon neutrality, ultimately positioning itself for success amid a changing global landscape.

This strategy will serve as a roadmap for integrating climate considerations into municipal planning and decision-making processes. The objective is to establish a framework that supports proactive measures, empowers local communities, and aligns with broader legislative commitments at international, national, and provincial levels. By doing so, ULM aspires to create a sustainable future, ensuring that both the environment and the socio-economic fabric of the community can thrive in the face of climate change.

This report is organised into eight main chapters. The first chapter offers an introduction and background on the development of a comprehensive Climate Change Strategy for ULM, outlining the problem statement and the purpose of the strategy. The second chapter explores climate change and its impacts on both global and local scales. In the third chapter, we examine the legislative framework surrounding climate change. The fourth chapter provides an assessment of the current status of ULM. Following that, the fifth chapter presents a Climate Risk Profile, addressing the

vulnerability and resilience of Ulundi. The sixth chapter details the Climate Change Response Strategy. The seventh chapter discusses various intervention programs and chapter eight unpacks intervention actions/strategies designed to enhance Ulundi's resilience to climate change impacts. Lastly, the report provides a conclusion which summarises the strategy.

1.2. Problem Statement

The ULM has a long history of experiencing profound impacts from climate-related events, including devastating droughts and destructive floods. These events have inflicted severe hardships on its predominantly rural communities, leading to extensive damage to crops, depletion of water resources, and disruptions to daily life. Without a robust and comprehensive climate change strategy in place, the municipality remains ill-equipped to effectively prevent and respond to these disasters. Additionally, the absence of spatial resilience, which results in inadequate protection of communities from climate impacts, poses a significant long-term threat to the municipality's sustainability. The municipality already faces significant infrastructure challenges, particularly in rural areas where limited capacity and backlogs in essential services such as water and roads discourage investment and hinder economic growth. Substandard access roads, coupled with the increasing costs of inputs like electricity and transport, further strain the local economy. Climate change, with its associated risks of droughts, floods, and extreme weather events, has contributed to severely damaged existing infrastructure, resulting in the need for more frequent and costly repairs. These disruptions escalate the financial burden on the municipality and deter potential investors, exacerbating economic stagnation.

Ulundi is confronted with inefficient spatial planning, characterised by low-density rural settlements, settlement sprawl, and illegal land occupation. These factors increase service delivery costs and hamper effective land use management. Climate change further intensifies these spatial inefficiencies by making certain areas more vulnerable to environmental risks, such as flooding in low-lying areas or drought in sparsely populated rural regions. Without a climate change strategy, the municipality risks further spatial disjunction between settlements and economic opportunities, increasing the difficulty and cost of delivering services efficiently and equitably. Moreover, climate

change threatens to accelerate urban decay in Ulundi municipality. Resultantly, this could affect the municipality's aesthetic and cultural heritage but also undermine efforts to attract new businesses and residents. A proactive climate strategy would ensure these areas facing decay are revitalised and resilient to future climate impacts.

Given the municipality's background and the challenges outlined, the implications of not addressing climate change are severe. The municipality would face escalating costs related to disaster recovery, infrastructure repair, and service delivery, coupled with declining economic opportunities and worsening social and spatial inequalities. However, a robust climate change strategy can counter these threats.

1.3. Purpose of the Strategy

The purpose of implementing a climate change strategy is to provide the municipality with high-level strategic guidance for decision-making, planning, and the development and execution of programs and projects related to climate change. Having a clear climate change strategy will enable the municipality to not only respond effectively to climate change but also leverage the opportunity to transition toward a more sustainable, resilient, and prosperous future. By outlining clear objectives and action plans, the strategy will enable the municipality to effectively address climate change challenges, protect the well-being of its residents, and ensure the long-term health and sustainability of the environment. This strategy should be read in conjunction with the municipality IDP and the Spatial development framework which provides a higher level of detail in terms of specific actions that will be implemented to achieve the vision, desired outcomes and goals of this strategy. By implementing a robust climate change strategy, ULM can realize the following goals:

Building Climate Change Adaptation:

A clear climate change strategy allows the municipality to proactively reduce and prepare for the impacts of climate change. This is crucial, especially for rural communities that depend on subsistence farming, which is highly vulnerable to changes in weather patterns, droughts, and floods.

Climate Change Mitigation:

The strategy enables the municipality to pursue ambitious goals in reducing greenhouse gas emissions, with the long-term objective of achieving carbon neutrality by 2050. This contributes to global efforts to limit climate change and protect local environments.

Maximising Co-Benefits:

Implementing the strategy will address climate risks and have broader positive impacts. It generates co-benefits such as job creation, improved public health, enhanced energy and water security, and reduced disaster risks. These benefits are particularly important for rural communities, where economic opportunities and access to services are often limited. However, for the strategy to work, **key enabling factors** such as taking a holistic approach, innovative financing, stakeholder engagement, monitoring and evaluation, and many others are highlighted in this report.

2. Unpacking climate change and its impacts: A global and local perspective

2.1. Exploring Climate Change: meaning, implications and Effects

Climate change, as defined by the United Nations Framework Convention on Climate Change (UNFCCC), is a change of climate which is attributed directly or indirectly to human activity that alters the composition of the global atmosphere and is in addition to natural climate variability observed over comparable periods. It has been identified as a significant threat to human livelihoods and sustainable development in many parts of the world (IPCC, 2001). Global climate change is arguably the most important environmental challenge of the 21st century. It is primarily driven by human activities, notably burning fossil fuels such as coal, oil, and gas. These activities release greenhouse gases into the atmosphere, which function like a blanket around the Earth, trapping heat from the sun and causing global temperatures to rise.

According to the latest Intergovernmental Panel on Climate Change (IPCC) Report (2021) scientists are observing changes in the Earth's climate in every region and across the whole climate system. Over the past several decades, unprecedented changes to global climate systems have been observed. The report indicates that human activities have caused around 1.1°C of warming since 1850-1900 due to greenhouse gas emissions. It also predicts that over the next 20 years, the global temperature is likely to reach or surpass 1.5°C of warming on average. This assessment is based on improved observational datasets to assess historical warming, as well as progress in scientific understanding of the response of the climate system to human-caused greenhouse gas emissions (IPCC, 2021).

The impact of climate change is becoming increasingly evident. The warming of the atmosphere and oceans, diminishing snow and ice, rising sea levels, and increasing ocean acidity due to excess carbon dioxide absorption are clear signs of the changing climate. Greenhouse gas emissions, including carbon dioxide, methane, and nitrous oxide, have reached their highest levels in the past 800,000 years and continue to rise. The rate and extent of climatic changes are surpassing previous projections, highlighting the urgency of reducing emissions and responding to climate impacts . It is crucial for society to act swiftly to mitigate these effects and avert catastrophic global warming. Climate change will increase the frequency and impact of natural disasters such as hurricanes and floods and increase the likelihood of unbearable heat and droughts.

2.1.1. A Global picture of climate change impacts

Hotter temperatures

Since the 1980s, each decade has been warmer than the previous one. Nearly all land areas are seeing more hot days and heat waves. Higher temperatures increase heat-related illnesses and make working outdoors more difficult. Wildfires start more easily and spread more rapidly when conditions are hotter. Temperatures in the Arctic have warmed at least twice as fast as the global average.

More severe storms

Destructive storms have become more intense and more frequent in many regions. As temperatures rise, more moisture evaporates, which exacerbates extreme rainfall and flooding, causing more destructive storms. The frequency and extent of tropical storms is also affected by the warming ocean. Cyclones, hurricanes, and typhoons feed on warm waters at the ocean surface. Such storms often destroy homes and communities, causing deaths and huge economic losses.

Increased drought

Climate change is changing water availability, making it scarcer in more regions. Global warming exacerbates water shortages in already water-stressed regions and is leading to an increased risk of agricultural droughts affecting crops, and ecological droughts increasing the vulnerability of ecosystems. Droughts can also stir destructive

sand and dust storms that can move billions of tons of sand across continents. Deserts are expanding, reducing land for growing food. Many people now face the threat of not having enough water on a regular basis.

A warming, rising ocean

The ocean soaks up most of the heat from global warming. The rate at which the ocean is warming strongly increased over the past two decades, across all depths of the ocean. As the ocean warms, its volume increases since water expands as it gets warmer. Melting ice sheets also cause sea levels to rise, threatening coastal and island communities. In addition, the ocean absorbs carbon dioxide, keeping it from the atmosphere. But more carbon dioxide makes the ocean more acidic, which endangers marine life and coral reefs.

Loss of species

Climate change poses risks to the survival of species on land and in the ocean. These risks increase as temperatures climb. Exacerbated by climate change, the world is losing species at a rate 1,000 times greater than at any other time in recorded human history. One million species are at risk of becoming extinct within the next few decades. Forest fires, extreme weather, and invasive pests and diseases are among many threats related to climate change. Some species will be able to relocate and survive, but others will not.

Not enough food

Changes in the climate and increases in extreme weather events are among the reasons behind a global rise in hunger and poor nutrition. Fisheries, crops, and livestock may be destroyed or become less productive. With the ocean becoming more acidic, marine resources that feed billions of people are at risk. Changes in snow and ice cover in many Arctic regions have disrupted food supplies from herding, hunting, and fishing. Heat stress can diminish water and grasslands for grazing, causing declining crop yields and affecting livestock.

More health risks

Climate change is the single biggest health threat facing humanity. Climate impacts are already harming health, through air pollution, disease, extreme weather events,

forced displacement, pressures on mental health, and increased hunger and poor nutrition in places where people cannot grow or find sufficient food. Every year, environmental factors take the lives of around 13 million people. Changing weather patterns are expanding diseases, and extreme weather events increase deaths and make it difficult for health care systems to keep up.

Poverty and displacement

Climate change increases the factors that put and keep people in poverty. Floods may sweep away urban slums, destroying homes and livelihoods. Heat can make it difficult to work in outdoor jobs. Water scarcity may affect crops. Over the past decade (2010–2019), weather-related events displaced an estimated 23.1 million people on average each year, leaving many more vulnerable to poverty. Most refugees come from countries that are most vulnerable and least ready to adapt to the impacts of climate change.

Ulundi is not spared from the above the consequences of failing to adapt to and mitigate climate change will be significant and potentially severe

2.2. Projected Climate Change Hazards for the province

The key climate change hazards that have been identified for KZN are:

- Increasing temperatures
- Increasing rainfall variability
- Increasing periods of drought
- Increasing storms and flooding events
- Sea level rise

These are discussed in more detail below. The Intergovernmental Panel on Climate Change (IPCC) has developed four Representative Concentration Pathways (RCPs). These are scenarios that project the effects of climate change from the present day to the year 2100 based on different levels of global greenhouse gas (GHG) emissions and atmospheric concentrations of GHGs (Van Vuuren et al. 2011; IPCC 2014). To understand the extent to which climate change may affect KZN, the highest GHG emissions scenario (RCP 8.5) is used throughout this section.

2.2.1. Increasing Temperatures

By 2050, KZN is projected to be affected by higher annual average temperatures (CSIR 2019; KZNEDTEA 2017a; KZNPPC 2016b; Ugu DM 2016). Average annual temperatures in KZN are shown in Figure 2 using a baseline period of 1961–1990 (CSIR 2019).

Figure 3 is the projected change in annual average temperature over the period 2021 to 2050 under the RCP 8.5 scenario relative to the baseline period (CSIR 2019). It shows that by 2050, under the RCP 8.5 scenario, most of KZN is projected to experience an increase in annual average temperatures of between 1.5°C and 2°C compared to the baseline annual average temperatures in Figure 1. These higher average temperatures will likely increase evaporation rates and may reduce agricultural outputs in KZN, and harm water and food security in KZN (KZNEDTEA 2017a; KZNPPC 2016b; Ugu DM 2016).

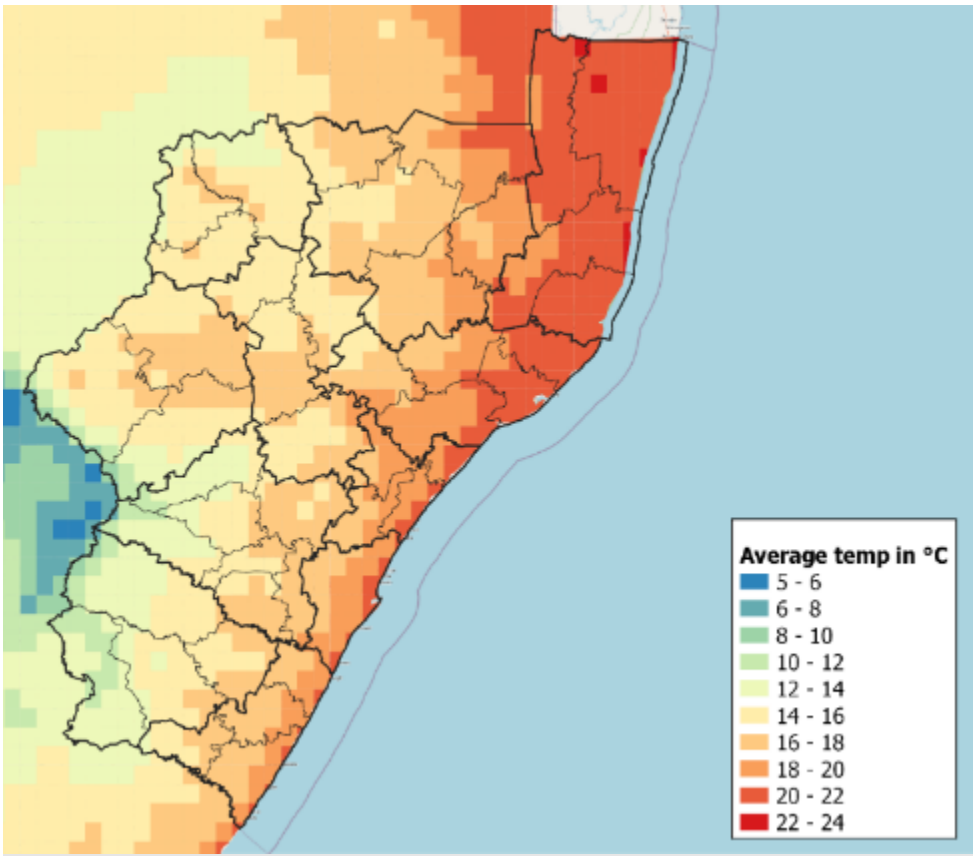

Figure 1: Annual average temperatures in KZN using the baseline period 1961–1990 (CSIR 2019)

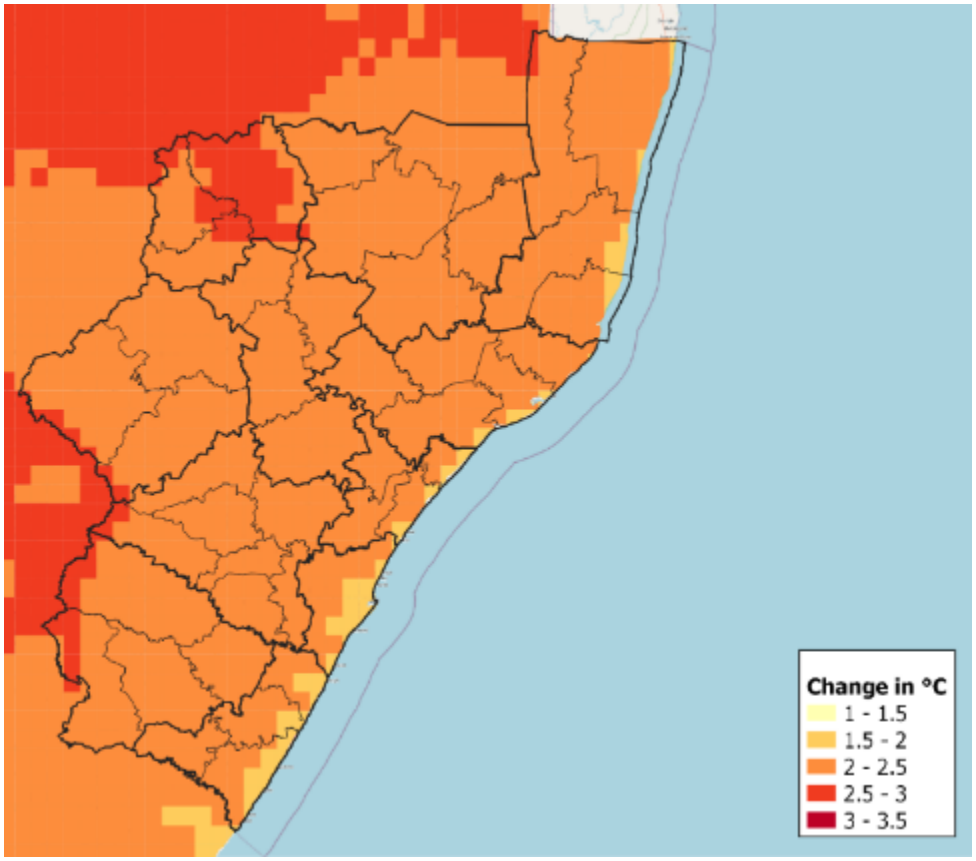

Figure 2 : Projected changes in annual average temperatures throughout KZN over the period 2021-2050 under the RCP 8.5 scenario (CSIR 2019)

2.2.2. Increasing Rainfall Variability

The annual average rainfall for KZN for the baseline period 1961–1990 is shown in Figure 2 (CSIR 2019). The annual average rainfall for South Africa is about 450 millimetres per year.

Figure 3 shows that, currently, annual average rainfall amounts across almost all of KZN are higher than the national average (DWA 2013; CSIR 2019). Figure 3 shows the projected change in annual average rainfall over the period 2021 to 2050 under the RCP 8.5 scenario relative to the baseline period (CSIR 2019). It shows that there is uncertainty regarding projected future rainfall in KZN and that rainfall variability is likely to increase in the province as some parts are predicted to receive more rainfall, while others are predicted to receive less (CSIR 2019; KZNEDTEA 2017a; KZNPPC 2016b; Ugu DM 2016).

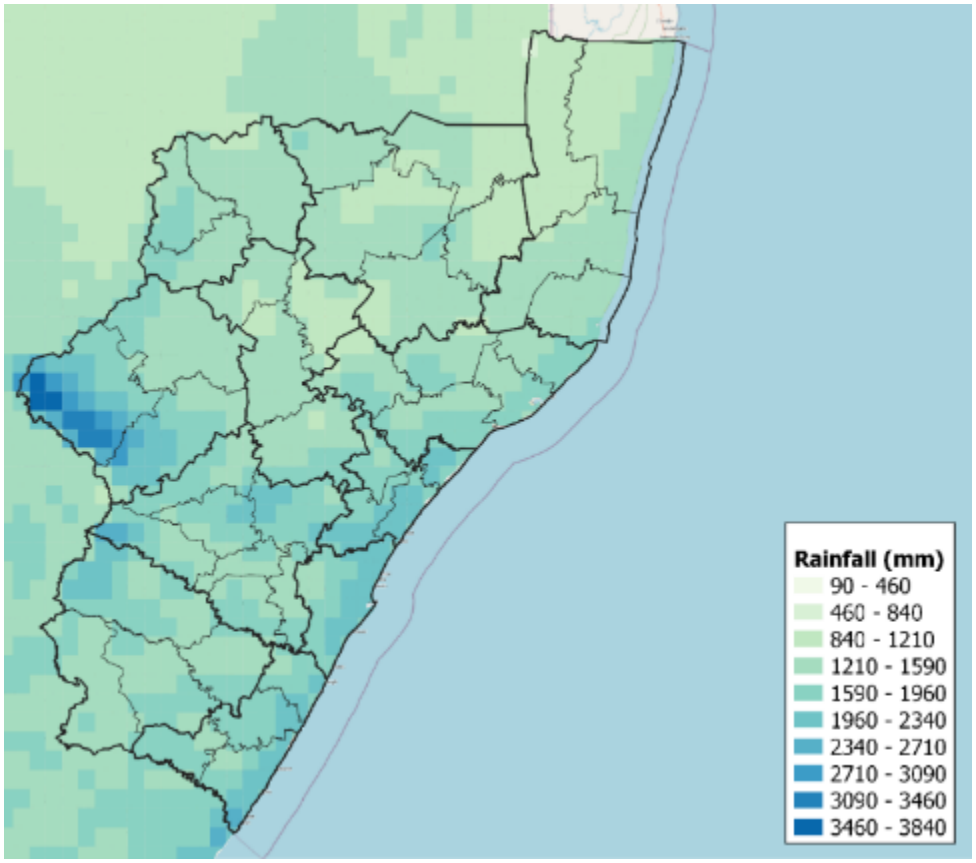

Figure 3: Annual average rainfall throughout KZN using a baseline period of 1961–1990 (CSIR 2019)

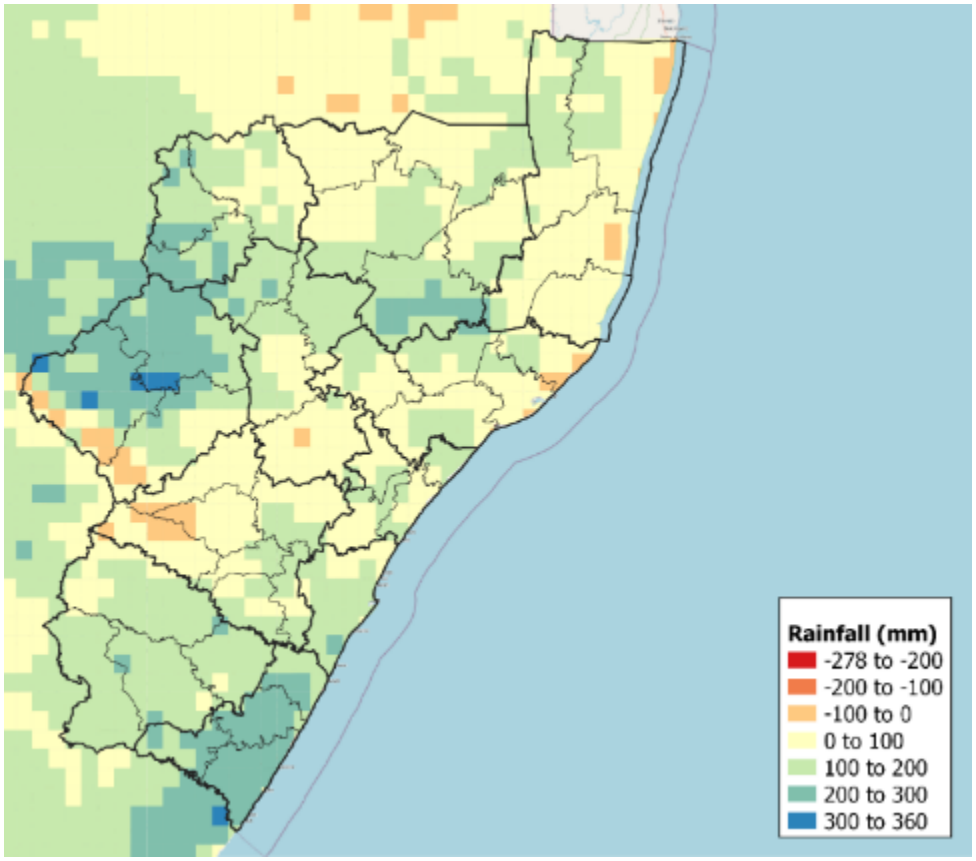

Figure 4:: Projected changes in annual average rainfall throughout KZN over the period 2021-2050 under the RCP 8.5 scenario (CSIR 2019)

2.2.3. Increasing Periods of Drought

Projected increases in rainfall variability and increasing average temperatures in KZN will increase evaporation rates in the province and are likely to increase the potential for droughts in the province. However, there is uncertainty around future changes in rainfall in KZN (KZNEDTEA 2017a; KZNPPC 2016b; Ugu DM 2016). Increases in the frequency and severity of droughts will negatively affect water security, human health, food security and biodiversity in KZN (KZNEDTEA 2017a; KZNPPC 2016b; Ugu DM 2016). These impacts will be worsened by existing water quality issues that are likely to be exacerbated by climate change (KZNEDTEA 2017a; KZNPPC 2016b; Ugu DM 2016).

2.2.4. Increasing Storms and Flooding Events

KZN has the highest flooding event risk of any province in South Africa (KZNPPC 2016b; KZNEDTEA 2017a). While there is uncertainty around future changes in annual average rainfall in KZN, increases in rainfall intensity and variability are projected and these hydrological factors are likely to increase the frequency and

severity of flooding events in KZN (KZNEDTEA 2017a; KZNPPC 2016b; Ugu DM 2016).

An extreme rainfall event is defined as 20 millimetres of rain occurring within 24 hours over an 8 km x 8 km grid-point (CSIR 2019). Extreme rainfall events include severe thunderstorms and lightning (CSIR 2019). The annual average number of extreme rainfall days has been calculated for southern Africa using an 8 km x 8 km grid for a baseline period (1961–1990). The map of KZN for the baseline period is in Figure 6 (CSIR 2019). Figure 7 sets out the projected change in the annual average number of extreme rainfall days over the period 2021 to 2050 under the RCP 8.5 scenario relative to the baseline period (CSIR 2019).

Figure 5 indicates that some parts of KZN are likely to experience storm and flood events more frequently and that such events may be more severe than previously (CSIR 2019). Figure 5 also indicates that there will be increased rainfall variability in KZN and increased uncertainty regarding projected future rainfall in KZN (CSIR 2019).

In the Durban Climate Action Plan (EThekwini Municipality 2019) it is asserted that, under a high emissions scenario (RCP 8.5), average precipitation during one-in-ten-year rainfall events (downpours) affecting Durban will increase by 22 mm per event compared to the current average of 78 mm per event. It is further asserted that these downpours will increase in frequency from once per decade to three times per decade under a high emissions scenario (RCP 8.5) (EThekwini Municipality 2019). The most recent floods occurred in April 2022 and left a trail of destruction especially in coastal districts and Ethekwini Metro.

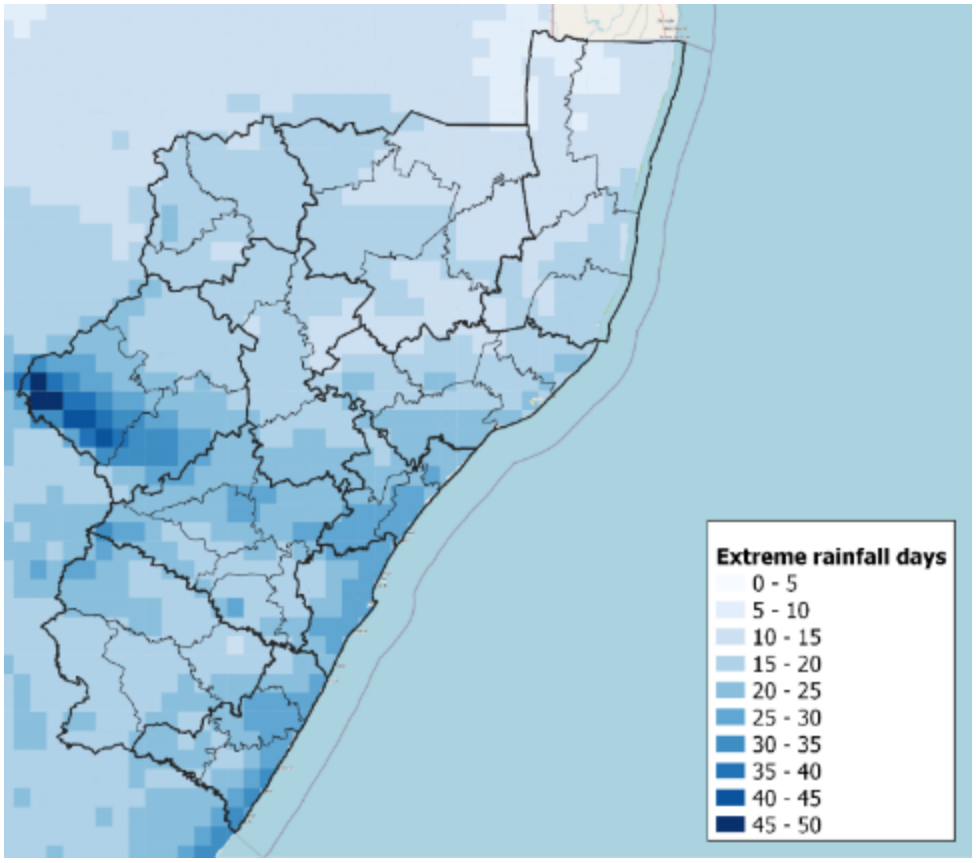

Figure 5: Annual average number of extreme rainfall days throughout KZN using the baseline period 1961–1990 (CSIR 2019)

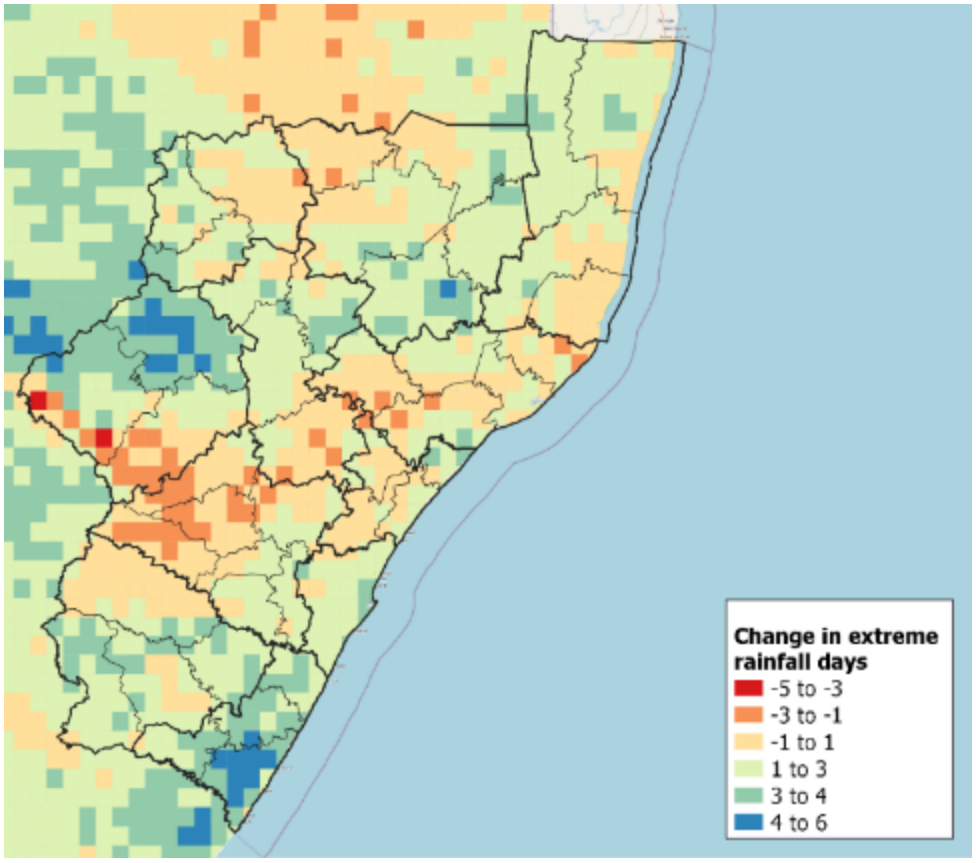

Figure 6 : Projected changes in the annual average number of extreme rainfall days throughout KZN over the period 2021-2050 under the RCP 8.5 scenario (CSIR 2019)

2.2.5. Sea Level Rise

Sea level rise is already occurring along the KZN coastline, and sea level could rise by up to one metre by the year 2100 (KZNPPC 2016b; CSIR 2019). How much sea-level rise will occur along South Africa's coastline is uncertain as the sea-level rise is complex and not well enough understood (CSIR 2019). In addition to sea-level rise, coastal storms are projected to increase in frequency and intensity and coastal flooding from storm events is also predicted to increase (KZNPPC 2016b; CSIR 2019). The CSIR's Green Book, notes that there is a gap relating to coastal flooding risk in that estuaries are treated like the rest of the coastline, even though estuaries are complex areas also at risk from inland flood events (CSIR 2019). This implies a possible underestimation of flooding risk for estuarine areas (CSIR 2019).

As coastal flooding risks only apply to areas near the coastline.

3. Provincial Greenhouse Gas Emissions

3.1. Inventory Parameters

The KwaZulu-Natal Greenhouse Gas Emissions Inventory for 2020 uses the *Greenhouse Gas Protocol - Global Protocol for Community-Scale Greenhouse Gas Emission Inventories: An Accounting and Reporting Standard for Cities* which was developed by the World Resources Institute (WRI 2014).

The KwaZulu-Natal Greenhouse Gas Emissions Inventory is for the calendar year of 2020. In some instances, data for 2020 was not available. This inventory is for the geographic area of KwaZulu-Natal Province. For the purposes of this inventory, the following Scope 1 and Scope 2 GHG emissions were considered (Table 1).

Table 1: Emissions sources by scope included in the inventory

Scope 1	Scope 2	Scope 3
Solid Fuel Combustion	Electricity Sales	None
Liquid Fuel Combustion		
Wastewater Treatment		
Solid Waste Disposal		
Enteric Fermentation (Livestock)		

To standardise reporting, source data (such as fuel sales) was multiplied by an emissions factor to convert all data to Gigagrams[1] of carbon dioxide equivalent (Gg CO_2e). GHG Emission factors were sourced primarily from the IPCC emission factor database (IPCC 2021).

[1] 1 Gigagram = 1 million kilograms

A detailed explanation of the parameters of the KwaZulu-Natal Greenhouse Gas Emissions Inventory for 2020 is available in the *2020 KwaZulu-Natal Greenhouse Gas Emissions Inventory* Report.

3.2. Inventory Results

3.2.1. Summary Results

In line with the *National GHG Inventory Report South Africa 2017* (DFFE 2021), summary results for the KwaZulu-Natal Greenhouse Gas (GHG) Emissions Inventory are presented below (without Forestry and Other Land Use (FOLU)). Figure 13 and Table 2 summarise the total GHG emissions excluding FOLU for KZN for 2020. It is evident from this data that the energy category is by far the largest contributor to the GHG emissions profile of KZN. The data also shows that the total GHG emissions for the province (excluding FOLU) for 2020 were estimated to be 73,159.69 Gigagrams of carbon dioxide equivalent (Gg CO_2e). By comparison, the total emissions for South Africa (excluding FOLU) in the most recent *National GHG Inventory Report South Africa 2017* were 512,660.6 Gg CO_2e (DFFE 2021).

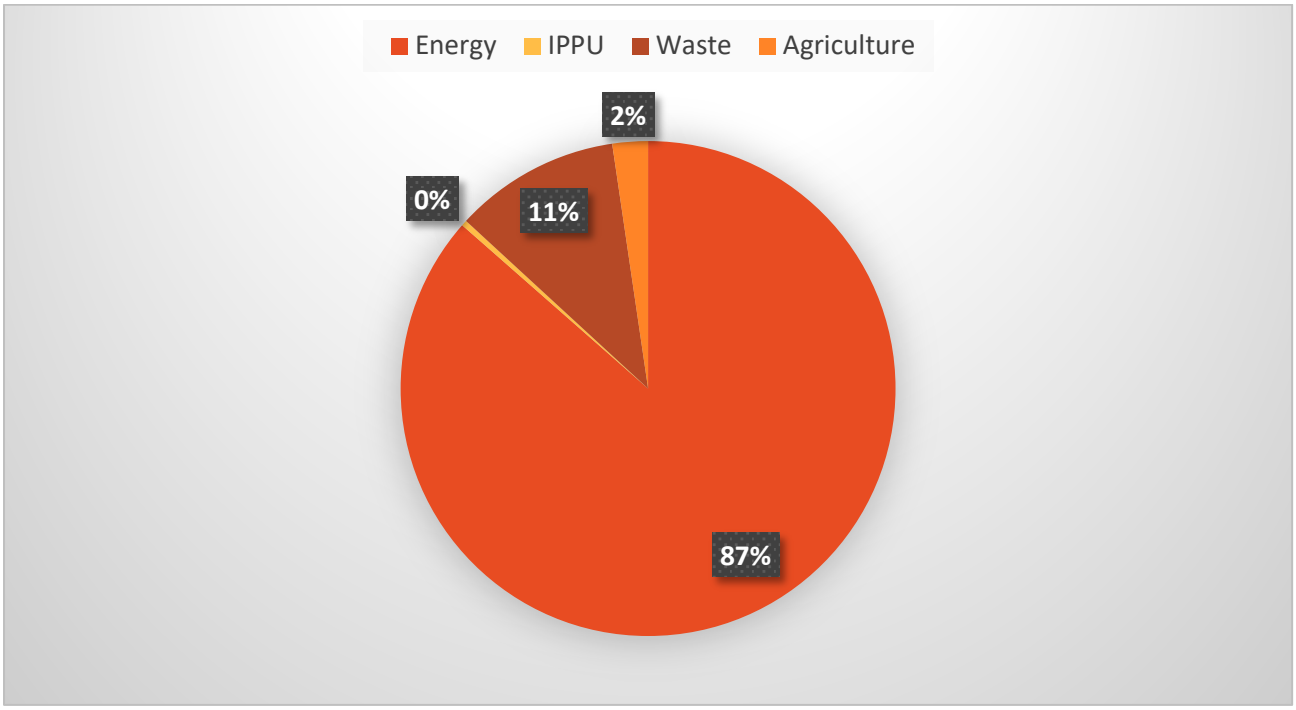

Figure 7 : KZN Greenhouse Gas Emissions Inventory - 2020 by IPCC Category (excluding FOLU)

Table 2 :KZN Greenhouse Gas Emissions Inventory 2020 by IPCC Category (excluding FOLU)

Source	GHG Emissions in Gg CO_2e
Energy	63,260.71
IPPU	273.96
Waste	7,927.10
Agriculture	1,697.92
Grand Total	**73,159.69**

It is also possible to summarise KZN's GHG emissions (excluding FOLU) for 2020 at a sector level where energy is separated into its different source categories. Figure 8 and Table 2 show this sub-categorisation in the energy sector and highlight the dominance of electricity sales in the overall GHG emissions profile for the province.

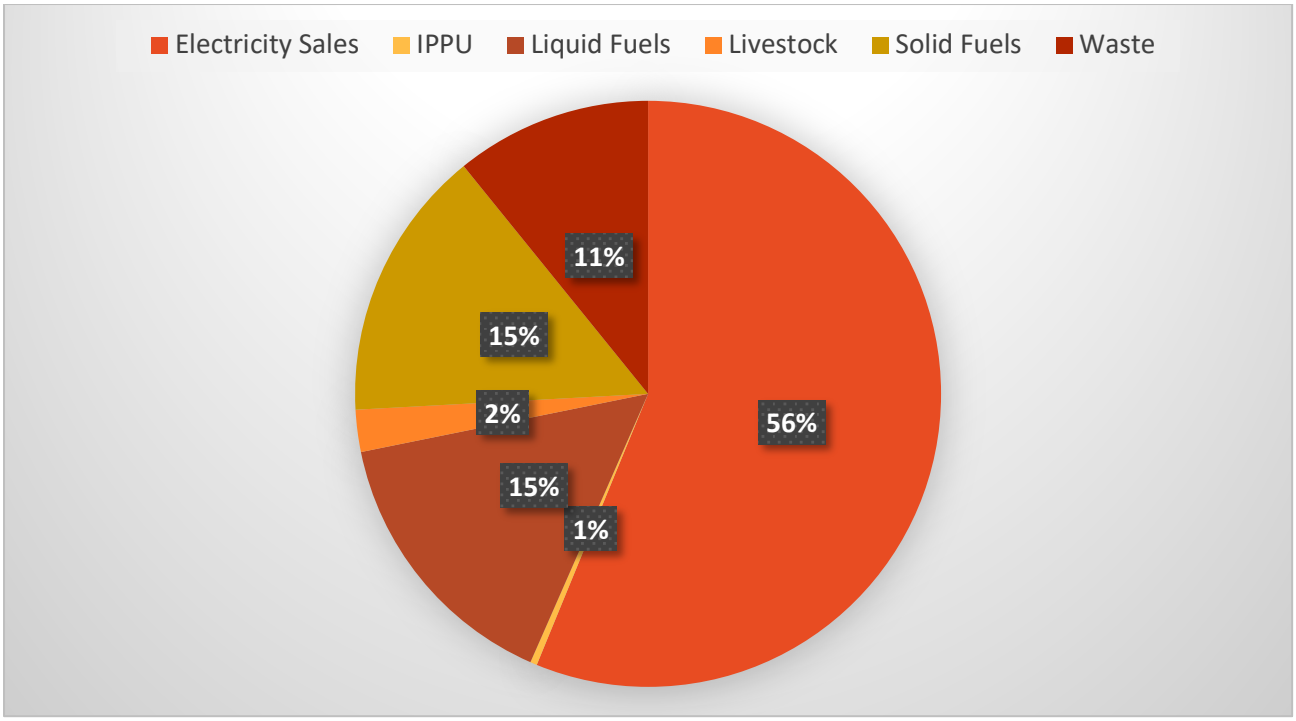

Figure 8 : KZN Greenhouse Gas Emissions Inventory -2020 by Sub-Sector (excluding FOLU)

Table 3 : KZN Greenhouse Gas Emissions Inventory - 2020 by Sub-Sector (excluding FOLU)

Source	GHG Emissions in Gg CO_2e
Electricity Sales	41,118.48
IPPU	273.96
Liquid Fuels	11,147.39
Livestock	1,697.92
Solid Fuels	10,994.85
Waste	7,927.10
Grand Total	**73,159.69**

3.2.2. Solid Fuels

Solid fuel data was collected from the South African Greenhouse Gas Emissions Reporting System (SAGERS) (DFFE 2019). These data therefore only include solid fuels from industrial and commercial processes that need to report through the SAGERS (DFFE 2019). The data does not include residential or small-scale commercial solid fuels such as coal used at a household level. The available solid fuel data is summarised in Figure 9 and Table 4 by type of use (excluding energy generation). This data shows that the biggest Solid Fuels emitters of GHG emissions in KZN are “Food Processing, Beverages and Tobacco” and “Pulp, Paper and Print”.

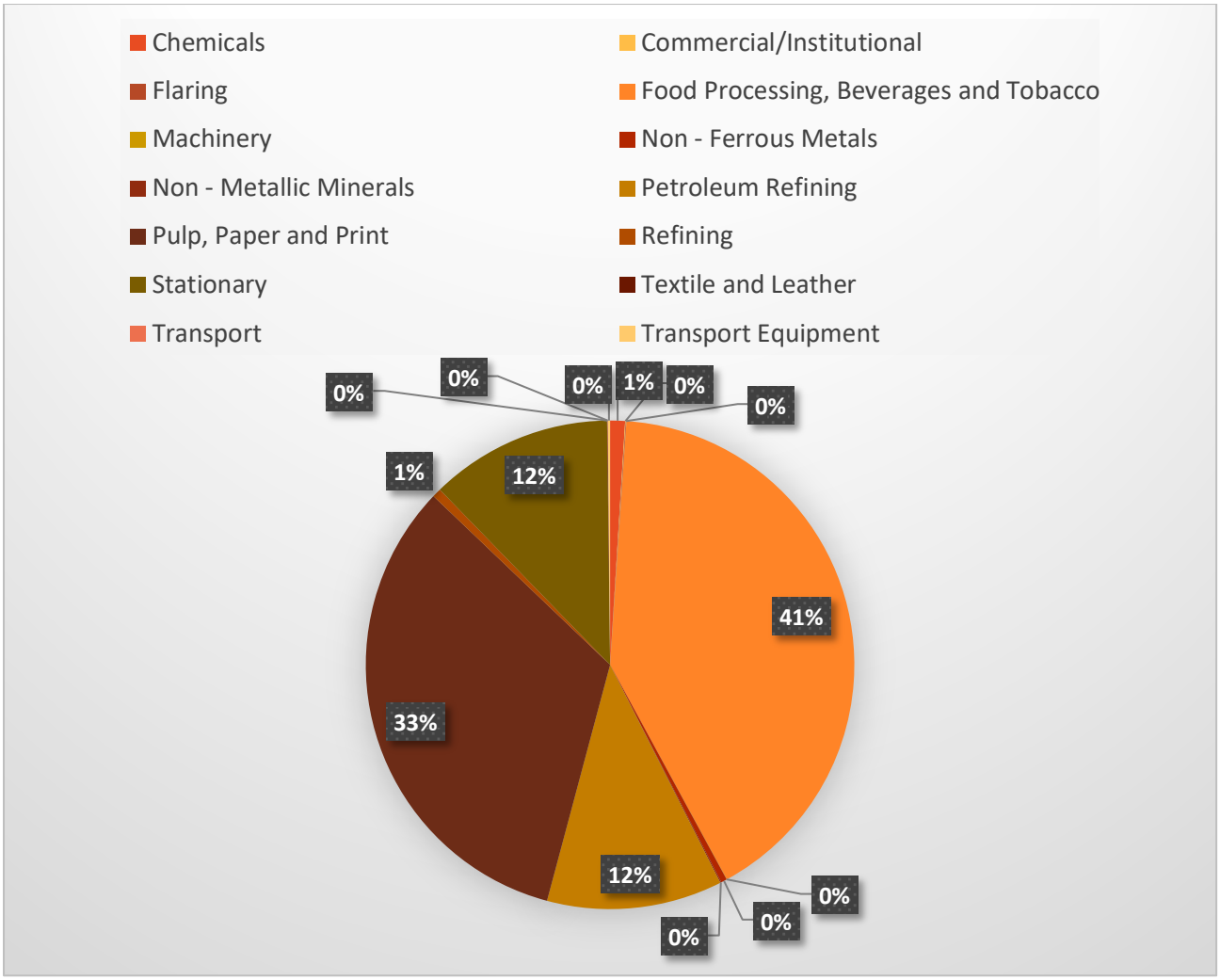

Figure 9: KZN Greenhouse Gas Emissions Inventory - 2020 - Solid Fuels (Excluding Electricity Generation)

Table 4 : KZN Greenhouse Gas Emissions Inventory - 2020 -Solid Fuels (Excluding Electricity Generation)

Source	GHG Emissions in Gg CO_2e
Chemicals	108.22
Commercial/Institutional	4.62
Flaring	4.68
Food Processing, Beverages and Tobacco	4,507.04
Machinery	2.00

Source	GHG Emissions in Gg CO_2e
Non - Ferrous Metals	43.15
Non - Metallic Minerals	8.15
Petroleum Refining	1,276.81
Pulp, Paper and Print	3,625.18
Refining	65.32
Stationary	1,327.83
Textile and Leather	4.15
Transport	1.59
Transport Equipment	16.11
Grand Total	**10,994.85**

3.2.3. Liquid Fuels

A summary of GHG emissions from fuel sale data for KZN is provided in Figure 10 and Table 5. This data shows that diesel and petrol are by far the dominant sources of GHG emissions from liquid fuels in the province.

It is important to note that the data from liquid fuels was provided at a magisterial district level (DMRE 2021). These magisterial district boundaries were aligned with the current district municipal boundaries using a proportional spatial allocation between the two datasets.

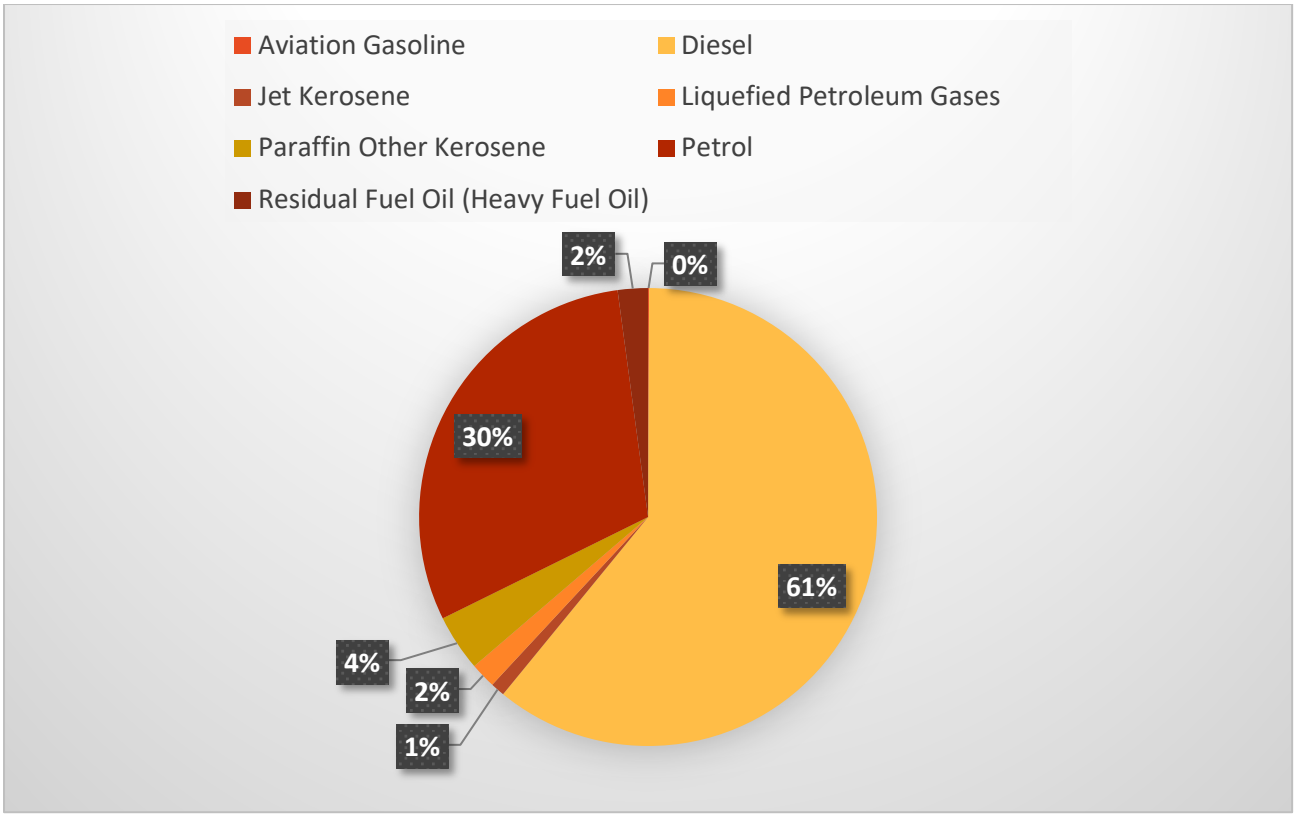

Figure 10: KZN Greenhouse Gas Emissions Inventory - 2020 - Liquid Fuels

Table 5 : KZN Greenhouse Gas Emissions Inventory - 2020 - Liquid Fuels

Source	GHG Emissions in Gg CO_2e
Aviation Gasoline	7.83
Diesel	6,782.85
Jet Kerosene	111.43
Liquefied Petroleum Gases	200.79
Paraffin Other Kerosene	444.44
Petrol	3,362.50
Residual Fuel Oil (Heavy Fuel Oil)	237.55
Grand Total	**11,147.39**

3.2.4. Waste

A summary of the GHG emissions from solid waste and wastewater is provided in Figure 17 and Table 6 below.

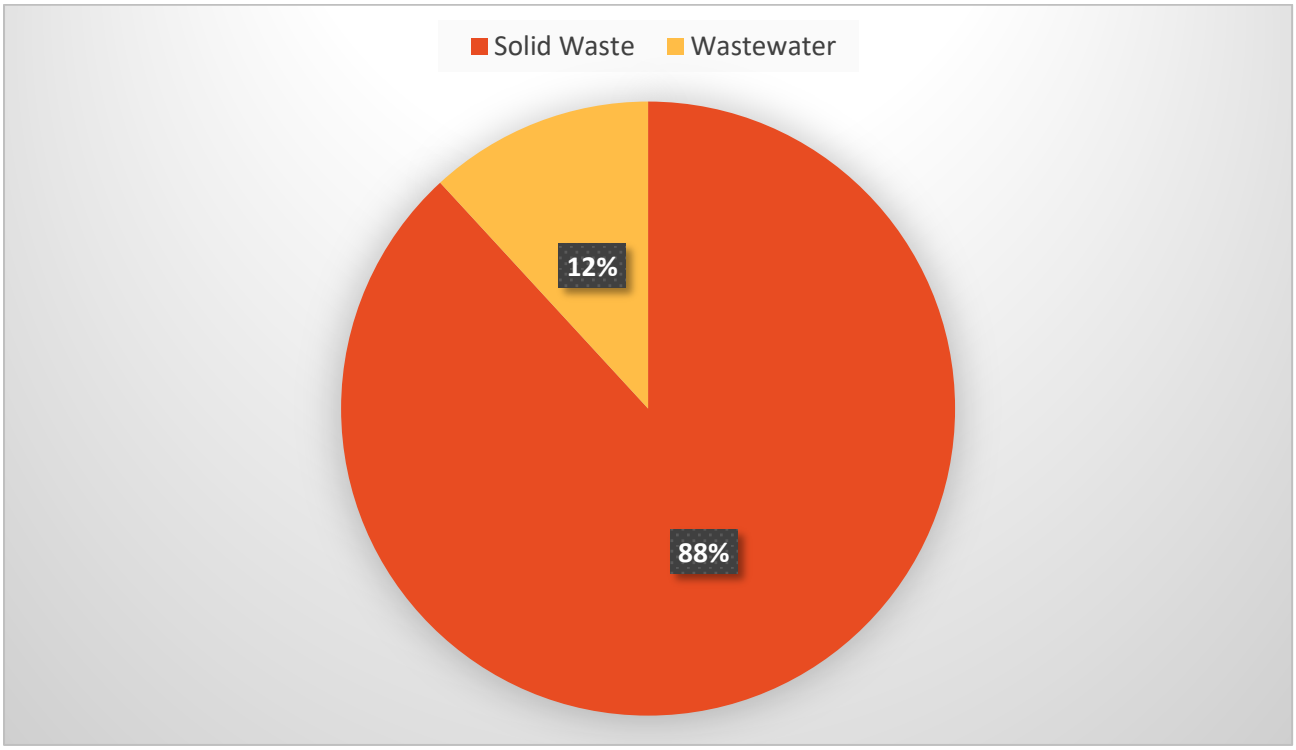

Figure 11Figure 17: KZN Province Greenhouse Gas Emissions Inventory - 2020 – Waste

Table 6: KZN Greenhouse Gas Emissions Inventory - 2020 – Waste

Source	GHG Emissions in Gg CO_2e
Solid Waste	6,988.45
Waste Water	938.65
Grand Total	**7,927.10**

3.2.5. IPPU

Industrial Processes and Product Use (IPPU) data was collected from the South African Greenhouse Gas Emissions Reporting System (SAGERS) (DFFE 2019). These data were summarised by IPCC emission code categories. The IPPU data are

presented in Figure 18 and Table 7. The production of ferroalloys is the biggest source of IPPU GHG emissions in KZN.

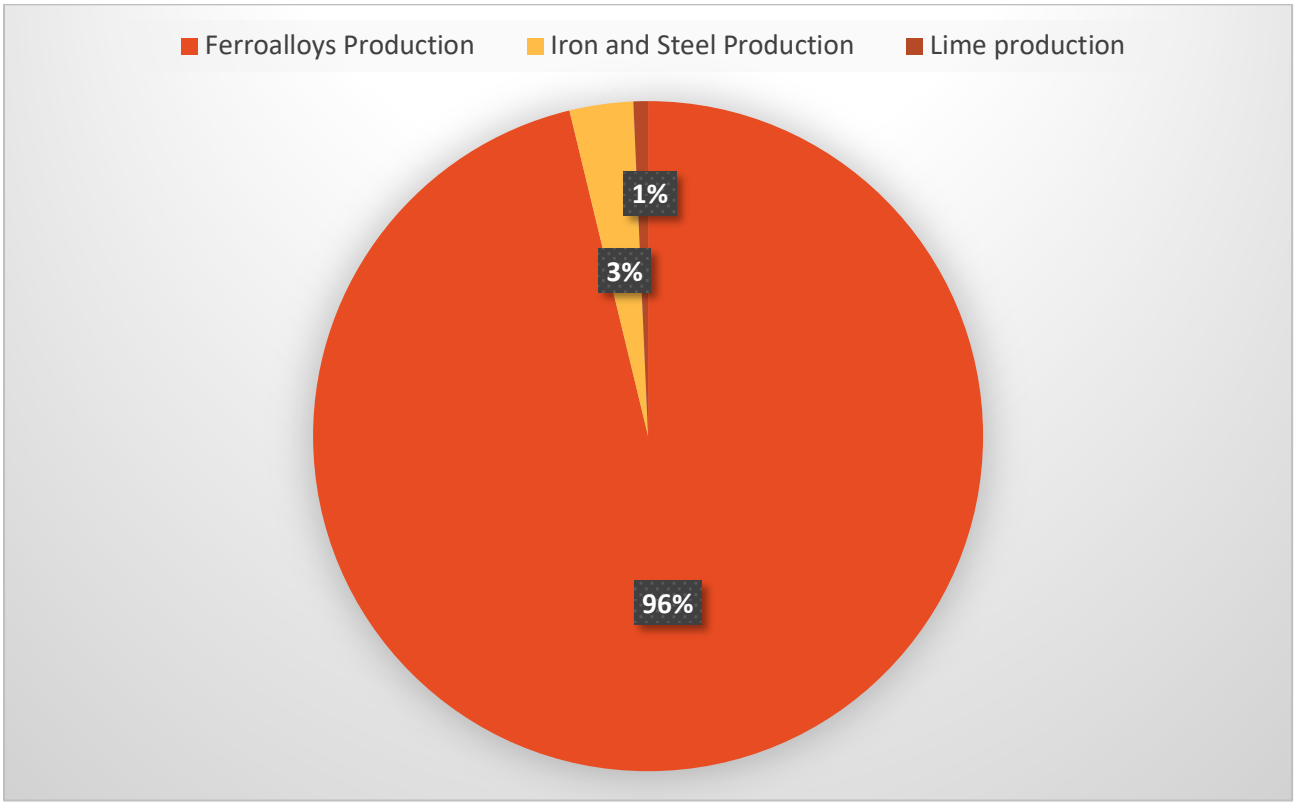

Figure 12Figure 18: KZN Greenhouse Gas Emissions Inventory - 2020 – IPPU

Table 7: KZN Greenhouse Gas Emissions Inventory - 2020 – IPPU

Source	GHG Emissions in Gg CO_2e
Ferroalloys Production	263.62
Iron and Steel Production	8.41
Lime Production	1.93
Grand Total	**273.96**

3.2.6. Agriculture

Under Agriculture, only enteric fermentation was included in the inventory and for enteric fermentation only commercial livestock data was available.

Livestock data for KZN was provided through the Census of commercial agriculture, 2017 (Statistics SA 2020a). No assumptions were made regarding the change in livestock numbers from 2017 to 2020. The GHG emissions from these livestock data are summarised in Figure 19 and Table 8. As to be expected, the bulk of the GHG emissions from commercial livestock in KZN come from cattle.

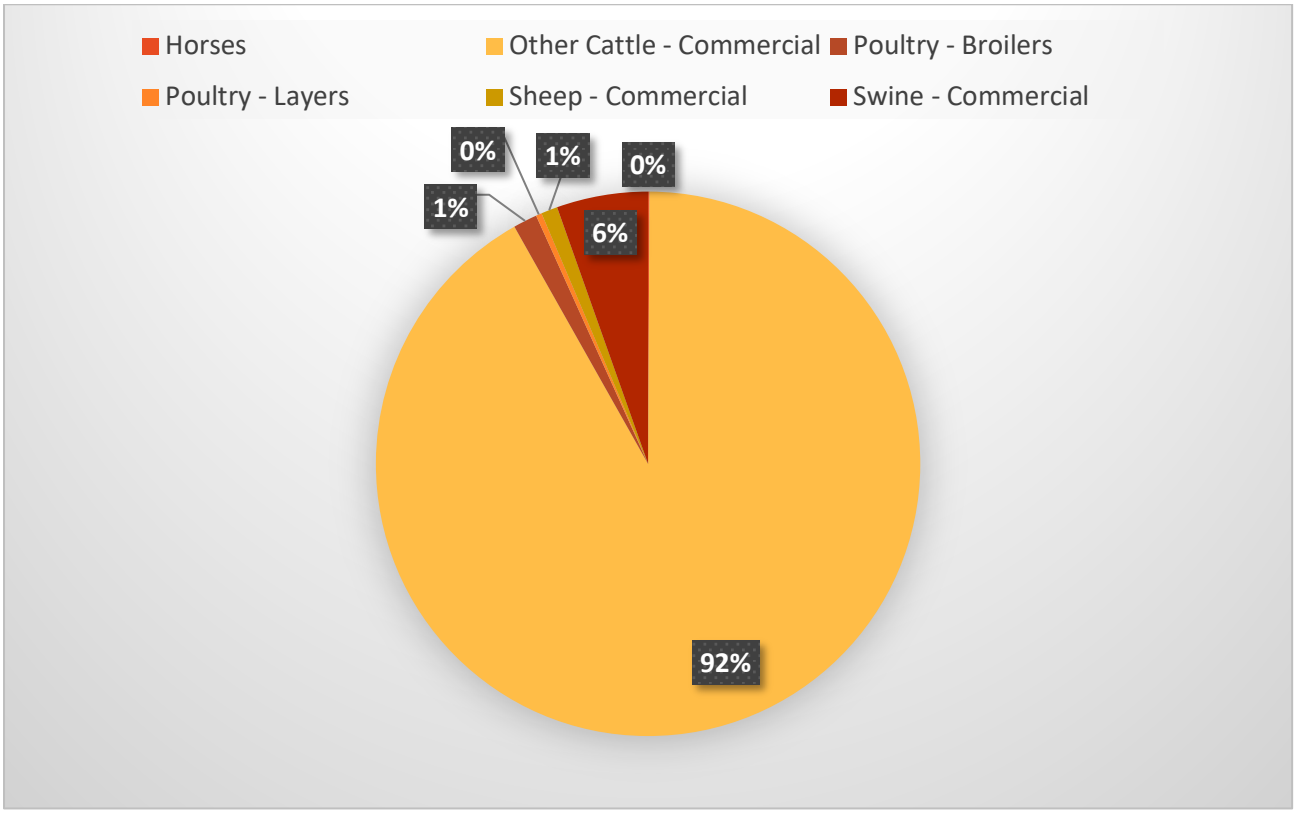

Figure 13Figure 19: KZN Greenhouse Gas Emissions Inventory - 2020 – Livestock

Table 8: KZN Greenhouse Gas Emissions Inventory - 2020 – Livestock

Source	GHG Emissions in Gg CO_2e
Horses	1.44
Other Cattle - Commercial	1,557.73
Poultry - Broilers	24.19
Poultry - Layers	5.83

Sheep - Commercial	16.61
Swine - Commercial	92.12
Grand Total	**1,697.92**

3.2.7. District Municipality Summary

It is also possible to present the above data at a district level to highlight the spatial allocation of GHG emissions in KZN. Figure 20 and Table 9 show that in 2020 the Ethekwini Metropolitan Area Municipality had the highest estimated GHG emissions, while the Umzinyathi, Harry Gwala and Amajua District Municipalities had the lowest estimated GHG emissions.

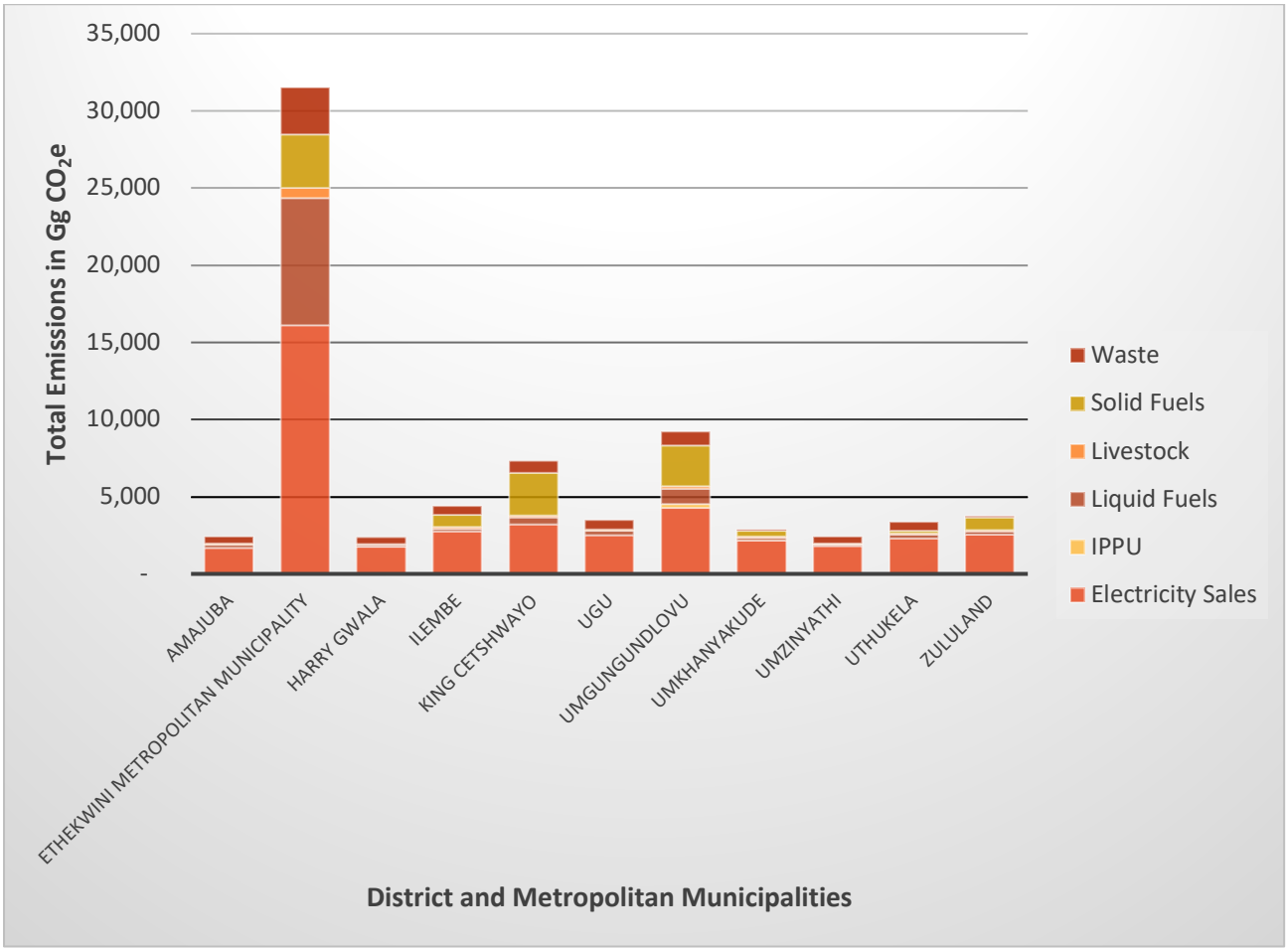

Figure 14: KZN Greenhouse Gas Emissions Inventory - 2020 - District Municipality Summary (excluding FOLU)

Table 9: KZN Greenhouse Gas Emissions Inventory - 2020 - District Municipality Summary (excluding FOLU) in Gg CO_2e

Source	Electricity Sales	IPPU	Liquid Fuels	Livestock	Solid Fuels	Waste	Grand Total
Amajuba	1,676	-	226	69	-	437	2,408
EThekwini Metropolitan	16,096	-	8,264	665	3,444	3,044	31,512
Harry Gwala	1,769	8	100	73	-	420	2,370
ILembe	2,736	-	198	113	795	541	4,383
King Cetshwayo	3,228	-	436	133	2,730	798	7,326
Ugu	2,504	-	284	103	-	619	3,511
UMgungundlovu	4,267	264	969	176	2,639	901	9,216
UMkhanyakude	2,162	2	182	89	372	57	2,865
UMzinyathi	1,813	-	85	75	13	456	2,441
Uthukela	2,313	-	217	96	186	581	3,393
Zululand	2,552	-	186	105	817	73	3,734
Grand Total	**41,118**	**274**	**11,147**	**1,698**	**10,995**	**7,927**	**73,160**

3.2.8.

4. The climate change legislative framework

Several relevant strategies, plans and frameworks from the international arena down to local government have been considered in the development of the ULM Climate Change Strategy. The most relevant of are presented in a tiered list below. The scope

of this report does not allow each of these documents to be unpacked in detail, however they are in the public domain and easily accessible.

4.1. International Policies

Although not having any direct implications for local level climate change response, South Africa's approach is influenced and shaped by the prevailing international policy context. Some of the key international measures and policies includes:

- The United Nations Framework Convention on Climate Change (UNFCCC).
- Kyoto Protocol – ratified emission targets for developed countries.
- International Carbon Action Partnership.
- United Nations Sustainable Development Goals.
- Sendai Framework for Disaster Risk Reduction (2015).
- The Cancún Agreements (2010) - finance, technology and capacity-building support package to help developing nations adapt to climate change and adopt sustainable paths to low-emission economies.
- Durban Platform for Enhanced Action (2011) –provided a roadmap towards a new legal framework by 2015 and agreement on the design and governance arrangements for the new Green Climate Fund; and
- The Paris Agreement (2016).

4.2. South African context

The legislative provision for promoting adaptive sustainable climate change strategies is encapsulated enshrined in the **Constitution of the Republic of South Africa (1996)** from which all other legislation in the country is derived. Section 24 (a) guarantees **everyone an environment that is not harmful to his or her health or well-being**. The subsequent clause advocates for sustainable development in which social and economic development is pursued for the present generation without compromising opportunities for future generation. Furthermore, Section 152 (1) (d) implores local government authorities to promote a safe and healthy environment (Constitution of the Republic of South Africa 1996).

South Africa's climate change policy framework has recently changed as the 23 July 2024**, Climate Change Act 22 of 2024** was endorsed. The Climate Change Act 22 of

2024 is a landmark piece of legislation in South Africa, designed to tackle the challenges posed by climate change. It establishes a comprehensive framework for the country to reduce greenhouse gas emissions, adapt to the impacts of climate change, and fulfil its international climate obligations. This Act outlines a national climate change response strategy that includes both mitigation and adaptation actions, ensuring that South Africa meets its emissions reduction targets under the Paris Agreement. The Act takes precedence over other climate-related legislation, requiring all government policies and actions to align with its objectives. It mandates that all levels of government proactively map, plan for, and address the nation's climate adaptation needs, acknowledging the urgency of the climate crisis.

By aligning policies that influence South Africa's climate change response, the Climate Change Act ensures a smooth transition to a low-carbon and climate-resilient economy and society, free from policy contradictions. Additionally, the Act sets out measures to enhance South Africa's capacity to reduce greenhouse gas emissions and build climate resilience over time, while mitigating the risk of job losses and promoting new employment opportunities in the growing green economy.

National Climate Change Response Policy (NCCRP) (2011) was the primary policy document guiding climate change response in South Africa. The NCCRP imposes the mainstreaming of climate change and alignment of policies, strategies, legislation, regulations and plans to the NCCRP. The Policy declares two primary objectives:

1. Effectively manage inevitable climate change impacts through interventions that build and sustain South Africa's social, economic and environmental resilience and emergency response capacity.
2. Make a fair contribution to the global efforts to stabilise GHG concentrations in the atmosphere at a level that avoids dangerous anthropogenic interferences with the climate system within a timeframe that enables economic, social and environmental development to proceed in a sustainable manner.

Accordingly, there is a direct link with development planning which is reiterated in the **National Development Plan's** endorsement of climate change response as imperative to strengthening the nations' resilience and requires local, provincial and

national governments to embrace climate adaptation by identifying and putting into effect appropriate policies and measures (NDP 2011: 180).

The Disaster Management Amendment Act No. 16 of 2015 as one of the first pieces of legislation to explicitly address climate change response, mandates all levels of government prepare a disaster management plan which among other requirements stipulates the assessment of expected climate changes, impacts and risks.

National Government's approach to climate change response has almost exclusively been dealt with through policies, strategies and regulations. Although quite limited in implementation, other legislative measures that are found in South Africa include the Carbon Emissions Motor Vehicles Tax and Disaster Management Amendment Act. In addition to the above mentioned acts, there are several other policy documents that on climate change in SA that span across wide sectors such as development planning, environment, agriculture, energy, water, disaster management and transport.[2] At a provincial scale, KZN is also guided by several climate change policies and the same applies at the district municipality level, however at the local scale, there is currently no specific policy guiding climate change action.

4.3. KwaZulu Natal Provincial Policies

- Provincial Climate Change Vulnerability Assessment
- KZN Provincial Growth and Development Strategy
- KZN Green Economy Strategy.
- Durban Adaptation Charter.
- Department of Agriculture and Rural Development,
- Strategic Plan 2015-2022.

4.4. Zululand District Municipality

- Integrated Development Plan.
- District Growth and Development Strategy.
- Air Quality Management Plan.
- Environmental Management Framework and Plan.

[2] See Table 1 in Annextures

- Coastal Management Programme.
- Disaster Management Plan.
- Spatial Development Framework.

4.5. Ulundi Local Municipality

- Integrated Development Plan.
- Environmental Management Framework and Plan.
- Spatial Development Framework.

5. Ulundi local municipality: The status quo

5.1. Socio Economic Context

ULM is situated in the northern part of KwaZulu-Natal, South Africa. It is one of five local municipalities that constitute the Zululand District Municipality.

Surface Area	3,250 km2
Population	205 762
Population Density	58/km^2
Population Growth	3,9%
Main Income Areas	**Agriculture**: A significant portion of Ulundi's economy is driven by agriculture, including livestock farming and crop production. The region's rural setting supports these activities, which contribute to both local consumption and trade. **Manufacturing**: There is some industrial activity in Ulundi, with manufacturing contributing to the local economy. This includes small-scale production of goods, often linked to agricultural products. **Trade and Retail**: Ulundi serves as a commercial hub for surrounding rural areas. The trade and retail sector is vital, providing goods and services to the local population and surrounding communities.

	Public and Social Services: As the administrative centre for the Zululand District, Ulundi has a significant public sector presence. Employment in government services, healthcare, and education plays a crucial role in the local economy. **Tourism**: Ulundi has historical and cultural significance, particularly related to the Zulu Kingdom. Tourism, though not the largest sector, contributes to the local economy through cultural tourism, historical sites, and related services.

5.2. Weather and Climatic conditions in Ulundi

5.2.1. Climate

The region generally has hot, wet summers and mild, dry winters. The overall climate is favourable for agriculture, which is a significant part of the local economy. However, the summer rains can sometimes lead to flooding, affecting infrastructure and local communities.

5.2.2. Rainfall patterns in Ulundi

The municipality has a mixture of two “precipitation sectors” which is linked to the varying topography within the municipal area. On average the two sectors average between 722 to 826 mm per annum and 827 to 912 mm per annum. Selected pockets have a higher average precipitation of 1,012 to 1,251mm per annum. Average evaporation is linked to height above sea level, which also affects other meteorological conditions such as wind occurrences. The low-lying areas of the Municipality has an average of 1801 to 2000mm per annum evaporation rate, whilst the higher lying areas averages 1601 to 1800 mm per annum; the northern and central west areas of the Municipality such as Mphepho,Nhlazatshe, Sterkstroom,Lottery,Bloubank,Dlebe and Babanango have a higher mean annual rainfall between 763-880 mm. areas along the south west boundary (south of Babanango) and north eastern boundary of the municipal area experienced the highest mean annual rainfall between 881 and 1045 mm, the spatial illustration of the annual rainfall is depicted on the map on overleaf.

5.2.3. Temperature patterns in Ulundi

The KwaZulu-Natal province has experienced warming at a rate that is more than twice the global rate. The average temperature in Ulundi ranges between 15,3 and 22,2 degrees Celsius. The eastern parts of the Municipality, such as Xolo, Ntshemanzi, Ngulwane and Mphepho are the warmest, with temperatures between 19,5 and 22,2 degrees Celsius. Average temperature drops to between 17,6 and 19,7 degrees Celsius in the central parts of the municipality such as Ulundi Town,Mpungamhlophe, Dlebe, Lottery,Makhosini. Average temperatures are the lowest (between 15,3 and 17,5 degrees Celsius) in the western parts of the municipality including Ngungwe and Babanango. The spatial illustration of the average temperature is depicted on the map on overleaf.

5.2.4. Evaporation

Average evaporation is linked to height above sea level which also affects other metrological conditions such as wind occurrences. The low-lying areas of the Municipality has an average of 1801 to 2000mm per annum evaporation rate, in higher lying areas averages 1601 to 1800mm per annum. An area south of Xolo has an evaporation rate of 2001 to 2200mm per annum. A limited number of smaller areas near Babanango and Nlazatshe have an evaporation rate of 0 to 1400mm per annum.

5.2.5. Topography and Landscape

Ulundi's topography is characterized by a mix of rolling hills, valleys, and plains. The landscape is predominantly rural, with agricultural activities taking place on the fertile plains and valleys. Key Topographical Features:

- **Hilly Terrain:** The area around Ulundi is relatively hilly, with several small hills and ridges. These are low but contribute to the region's varied landscape.
- **Valleys:** Ulundi is in a valley that is part of the larger Umfolozi River basin, which plays a significant role in the region's agriculture and ecology.
- **River Systems:** The White Umfolozi River is a critical geographical feature, flowing near Ulundi and contributing to the area's agricultural suitability.
- **Elevation:** Ulundi's elevation is generally moderate, with most areas lying between 500 and 800 meters above sea level. This elevation contributes to the area's climate and vegetation.

These topographical features make Ulundi a region with rich natural resources, supporting agriculture and wildlife conservation efforts.

5.2.6. Hydrology

Ulundi's hydrology is primarily defined by the White Umfolozi River, which is a significant watercourse in the region. The river and its tributaries play a crucial role in the area's ecology, agriculture, and community water supply.

Key Hydrological Features:

White Umfolozi River: This river flows near Ulundi and is one of the primary water sources for the area. It is a tributary of the larger Umfolozi River system, which eventually drains into the Indian Ocean. The river supports both agricultural activities and wildlife in the region.

Drainage Basin: Ulundi is part of the Umfolozi River basin, which influences the region's water flow patterns and soil moisture levels. The basin's topography contributes to seasonal flooding during heavy rainfall periods, particularly in summer.

Groundwater: In addition to surface water, groundwater resources are vital for local communities, especially in rural areas. The geology of the region supports aquifers that provide water for domestic and agricultural use.

Wetlands: The region also contains smaller wetlands and marshy areas that help to regulate water flow, reduce the impact of floods, and support biodiversity.

These hydrological features are essential for sustaining the local population, agriculture, and the natural environment of Ulundi. However, like many areas in South Africa, Ulundi may face challenges related to water management, including the risk of both droughts and floods, depending on seasonal and climatic conditions.

5.3. Biodiversity

Ulundi, located in the Zululand region of KwaZulu-Natal, South Africa, is home to rich biodiversity, largely due to its varied ecosystems that include savannahs, wetlands, and riverine environments. The area's biodiversity is integral to its cultural heritage, ecological balance, and economy.

5.3.1. Key Aspects of Ulundi's Biodiversity:

Critical Biodiversity Areas (CBAs) and Ecosystems Ulundi LM has several environmental sensitive areas, of which some areas are already formally protected. The Emakhosini Ophathe Heritage Park & Game reserve is located on the southern boundary of the municipality directly south of the White Mfolozi River. The Game reserve is directly east of the R66, whilst the heritage park stretches west from the R66 to Babanango in the west. Accordingly, to the prioritization of biodiversity categories Ulundi has biodiversity priority areas one (1) and three (3):

Biodiversity Priority 1: Areas are mainly concentrated in the east, where Ulundi borders on the Hluhluwe Mfolozi Game Reserve. A limited number of small Priority 1 Biodiversity Area pockets are scattered throughout the Municipal area and are situated near the areas of Nhlazatshe, Kwambambo, Babanango, Mahlabathini on the Nquthu LM border and on the Baqulusi border east of Mphepho.

Biodiversity Priority Area 3: is concentrated mainly in the western parts of the Municipality surrounding the areas of Bloubank, and Babanango. Further to the above, KZN Ezemvelo Wildlife developed a composite set of data with the highly sensitive areas are situated on the southwestern parts of the Municipal Area. These areas are the least densely populated areas and it's proposed that development be not encouraged in these areas. Several areas with medium to high vulnerability status are situated near Kwambambo, Mabedlana, Nhlazatshe and the eastern boundary of the municipal area near Hlabisa Local Municipality. The remainder of the Municipality is classified as medium to low vulnerability subsistence farming activities around Dlebe.

6. Climate Risk Profile, Vulnerability and Resilience of Ulundi

As emphasised in earlier sections, climate change's impacts are diverse and far-reaching. Similarly, in ULM, these can affect the individual, the household, the community, and the town and spill over to a wider regional and national scale. They also affect the economy and jobs, municipal service delivery, quality of life and health of people, and the ability of the natural environment to support life. Failure to address climate change will prove catastrophic. The economic and social costs are enormous.

Therefore, it is in the ULM's best interest to take bold action now to prevent the worst climate change impacts, through both adaptation and mitigation. While the timing and magnitude of impacts will always remain somewhat uncertain due to limitations in climate modelling at the scale of a municipality, there is a high degree of certainty about the types of impacts that ULM is currently experiencing and will continue to face. This emphasises the need for investment in systems that are flexible and adaptive, and able to respond to a range of possible climate futures. Various studies have also shown that the costs of early and proactive action will be far less than delayed action or inaction. Therefore, proactive planning and implementation to address anticipated impacts and put in place flexible and adaptive systems will be more cost-effective and practical in the long term than an approach that focuses on reactive response. In addition, actions taken to reduce emissions have numerous co-benefits. They will increase social and economic resilience and productivity, ensure better access to public transport, promote a healthier urban environment, and ensure a more economically viable and cleaner energy system. If steps are not taken to adapt to the predicted impacts of climate change and contribute to global efforts to mitigate it, Ulundi will face increasingly intense, severe, and frequent climate-related challenges, along with missed opportunities for sustainable development. The risks illustrated in Table 2 include:

Table 1: Summary of likely climate change risks and impacts ULM

Climate Risk	Likely Climate Change Impacts
Higher mean annual temperatures	• Increased evaporation and decreased water balance; • Reduced crop quality and food security.
Higher maximum temperatures, more hot days and more heat waves	• Increased heat stress on humans and livestock; • Increased incidence of heat-related illnesses; • Increased mortality and serious illness, particularly in older age groups; • Increased heat stress in livestock and wildlife; • Decreased crop yields and rangeland productivity; • Extended range and activity of some pests and disease vectors, specifically malaria; • Increased threat to infrastructure exceeding design specifications relating to temperature (e.g. road surfaces, electrical equipment, etc.); • Increased electric cooling demand increasing pressure on already stretched energy supply reliability; and • Exacerbation of urban heat island effect.
Higher minimum temperatures, fewer cold days and frost days	• Decreased risk of damage to some crops and increased risk to others such as deciduous fruits that rely on cooling periods; • Reduced heating energy demand; • Extended range and activity of some pests and disease vectors; and
Increased rainfall variability and subsequent drought potential	• Decreased average runoff, stream flow, groundwater recharge; • Decreased water security and potential increases in cost of water resources; • Decreased water quality; • Decrease in shoulder season length threatening sensitive crops; • Increased fire danger (drying factor); and • Impacts on rivers and wetland ecosystems.
Intensification of rainfall events	• Increased flooding; • Increased challenge to storm water systems in settlements; • Increased soil erosion; • Increased river bank erosion and demands for protective structures; • Increased pressure on disaster management systems and response; • Increased risk to human lives and health; and • Negative impact on agriculture such as lower productivity levels and loss of harvest which could lead to food insecurity.
Increased mean sea level and associated storm surges	• Salt water intrusion into groundwater and coastal wetlands; • Increased storm surges leading to coastal flooding, coastal erosion and damage to coastal infrastructure; and • Increased impact on estuaries and associated impacts on fish and other marine species.
The consequences of the projected climate change impacts will not be limited to their physical impacts. Climate change patterns and projected impacts will also have a significant impact on government's ability to perform their mandated roles and responsibilities. The interactions between climate change and government functions will be complex and more comprehensive risk assessments may be required to further assist decision making processes and prioritizing adaptation activities.	

6.1. Climate risk measure in ULM

Climate change risks for ULM was measured from the likelihood of the climate change, the fore castability/predictability and the severity of the changed hazard. Furthermore, the exposure to populations, agricultural and plantation areas, environmental resilience; the manageability in the form of measurable adaptation, policy capacity, and personal and institutional capacity are considered. The measures of statistical hazard index, measurable adaptation and policy capacity was done on a local municipal level, while the remainder at the mesozone scale for analysis [3]. The risks are classified from least to most important as Insignificant, Minimal, Moderate, Major and Catastrophic Risks. The status of each variable will meet one of the following scenario types:

Table 2 : Risk Matrix

	Scenario	Risk Profile	Priority Response
	Severely Negative	Catastrophic Risk	Immediate priority, adaptation urgently needed
	Negative	Major Risk	High priority, adaptation needed before conditions deteriorate further
	Medium	Moderate Risk	Medium priority, adaptation should follow higher priority actions
	Positive	Minimal Risk	Medium to low priority, should be closely monitored, may become significant
	Very Positive	Insignificant Risk	Low priority, no immediate action needed but should be monitored

These relative climate risk priorities are used to highlight the municipality's exposure to each of the main projected climate changes. This is done in table below, further expansion of the impacts associated with the climate change risks is presented in following sections of the report.

[3] CSIR mesoframe– a demarcated grid of 25000 mesozones ~50km² each (www.gap.csir.co.za/techical-overview)

Table 3 : Municipality's exposure to each of the main projected climate changes

Ulundi LM		**Relative Risk Priority**		**Hazard Indices**			**Vulnerability Rating**			
Climate change impacts	Range of time variability	Rural Areas	Urban Areas	Likelihood	Predictability	Hazard severity	Population clusters	Agricultural vulnerability	Environmental resilience	Cumulative Climatic hazards
		Commercial Farming	Subsistence Farming							
Increase annual rainfall	> 10 years	Moderate Risk	Minimal Risk	Likely	Forecastable	Medium impact	This LM has the medium to low population density focused in the urban areas. Climate impacts impact will likely affect a large number of people in a smaller area.	There are large areas of commercial agriculture and there is sensitivity to rainfall variability. Vulnerability is medium to high.	This LM has large areas under commercial crops but also large grassland/vegetation areas. This LM has a medium resilience	Combined climate changes are considered high in this LM compared to the remaining district
Increased rainfall intensity in summer	> 10 years	Major Risk	Major Risk	Likely	Highly variable	Medium impact				
Seasonal rainfall shifts	> 10 years	Moderate Risk	Moderate Risk	Likely	Highly variable	Medium impact				
Drought potential	> 10 years	Major Risk	Major Risk	Likely	Mildly predictable	Significant impact	**Manageability / Capacity to Cope indices**			
Increased temperatures	> 10 years	Major Risk	Major Risk	Almost certain	Forecastable	Medium Moderate impact	Measurable adaptation	Policy capacity	Personal Capacity	Institutional Capacity

Increased extreme temperature days	> 10 years	Major Risk	Major Risk	Almost certain	Mildly predictable	Medium Moderate impact	There are very low adaptation rates and little implementation of technology. There is no (or very slow) delivery of training or support for locals and they lack knowledge regarding sustainability and have no adaptation strategy.	The LM focuses on climate change and sees it as a challenge to sustainable growth. This is a good start, but needs follow through	The population of this LM have a combined low capacity. This is derived from their level of education and personal income	The institutional capacity is low as there as areas are predominantly classified as rural and lacking infrastructure.
Increased heat wave incidence	> 10 years	Major Risk	Major Risk	Almost certain	Mildly predictable	Medium Moderate impact				
Decreased number of cold nights	> 10 years	Insignificant Risk	Insignificant Risk	Almost certain	Forecastable	Medium Moderate impact				

6.2. Priority Sectors

Climate change impacts will affect almost all sectors to varying extents and these are:

- Education
- Energy
- Fisheries
- Food and Agriculture
- Forestry
- Disaster risk reduction
- Water
- Waste
- Transport
- Tourism
- Spatial Planning
- Nature and Ecosystem
- Infrastructure
- Health

The municipality will have to pay attention to time horizons and the evolution of risks associated with projected climate changes and reassess the suitability of response options and projects over time. Climate change related insecurity in one sector may also be diffused to other sector through complex their complex interrelationships. A balanced approach with short-, medium- and long-term adaptation interventions will be critical for reducing vulnerability to climate change impacts and achieving sustainable growth and development.

6.2.1. Energy

Climate change impacts on the energy sector include direct effects, such as changes in resource availability, power production, transmission, and distribution, and indirect effects like competition for resources and shifts in supply and demand trends, with indirect costs often surpassing direct ones. Despite policies favouring energy efficiency and renewable energy, rising energy demands and prices are anticipated, particularly in the Municipality, as climate change drives higher heating and cooling needs. Renewable energy is key to increasing sector resilience, though extreme weather and rising temperatures could disrupt both traditional and renewable energy infrastructure. The sector's vulnerability will depend on infrastructure resilience and resource availability, but opportunities exist for interventions through renewable energy and green building design.

Focus Area	Potential Risks
Energy	• Increased energy demand related to heating and cooling; • Damage to distribution infrastructure due to extreme weather events and veldfires; and • Potential impacts of climate variations on renewable energy production.

6.2.2. Municipal Infrastructure

Focus Area	Potential Risks
Infrastructure Projects including transport, buildings, water management, waste water treatment and waste management	• Changes in rates of deterioration due to changes in precipitation and temperature; • Inundation of roads resulting in deterioration or destruction; • Interruption of road traffic and disruption of emergency transport routes due to extreme climatic events; • Disruption of emergency routes; • Increased intensity of precipitation may cause intrusion into waste water networks; • Capacity of existing flood defences and drainage systems may be exceeded; • Reduction of drainage capacity due to sea level rise or storm surges; • Changes in mean and peak flow rates or rivers; • Reduced precipitation may impact on functioning of storm water systems; • Altered heating and cooling cost; • Increased risk of damage from fires or extreme hydro-meteorological events; • Higher rates of deterioration and increased maintenance costs; • Increased erosion and periods inundation; • Increased or permanent inundation of infrastructure and utilities; • Loss of public property due to inundation; • Impacts on tourism due to changes in biodiversity, water availability; • Increased operating cost and maintenance of public property due to extreme weather events; • Reduced water quality and quantity for irrigation; and • Potential for beach closures due to extreme weather and/or pollution levels

Changing climate variables has the potential to significantly impact municipal infrastructure, and ULM will be required to consider climate change implications when planning future infrastructure projects. A detailed analysis of municipal asset registers highlighting maintenance and condition of all assets will provide an indication of asset specific risk. An overview of the local municipal infrastructure at risk of climate change are presented in the table below.

Category	Infrastructure Elements
Transportation	Roads (Tarred and Gravel); Culverts; and Bridges.
Buildings	Residential and Commercial/Industrial

Critical Infrastructure	Fire Stations; Hospitals; Educational facilities; Police stations; Facilities for children and the elderly; Emergency medical services; and Water treatment facilities.
Storm & Wastewater Systems	Pipes; Manholes; Storm water Management Facilities; Lift/Pumping Stations; and Outlets.
Water Distribution Network	Water mains under bridges.
Flood Protection Structures	Dams; Flood walls; Bridges and culverts; and Canals.
Human Settlements	Buildings and structures

6.2.3. Water Resources

Focus Area	Focus Area Potential Risks
Water resource quality and Conservation	• Inundation of storm water and sewage systems; • Increased peak flow rates; • Changes in groundwater levels; • Shifting flood plains; • Reduced dry weather flow rates; • Increased intensity of precipitation causing intrusion into waste water networks; • Potential for blockages and overflows; • Changes in the mean and peak flow rates of rivers and streams; • Unreliable/insufficient water supply; • Increased risk of contamination; • Salination of water sources; and • Changes/shifting of groundwater used for irrigation.

Projected variations in rainfall patterns and the dependency of local economies on water availability make water resource management a critical focus of the Municipality's climate change strategy. The region, which relies heavily on groundwater and river resources, may experience reduced groundwater recharge due to drier, warmer conditions and more intense, but less frequent, rainfall. This could lead to long-term declines in groundwater storage, increased droughts and floods, and the mobilization of pollutants. Additionally, climate change may exacerbate the cost of water provision due to declining groundwater quality. Water availability is particularly crucial for agriculture, with irrigation needs expected to rise as water resources dwindle. Moreover, reduced flows may degrade water quality, while intensified rainfall

could further contaminate water sources through flooding and runoff, emphasizing the need for comprehensive catchment management and water quality strategies.

6.2.4. Terrestrial Biodiversity

Focus Area	Focus Area Potential Risks
Terrestrial Biodiversity	• Increased erosion and inundation; • Loss of private property and community assets; • Changes to river ecosystems due to erosion and flow rates; • Changes in the distribution of invasive species and associated loss of biodiversity and altered veldfire intensity; • Changes in the geographical distribution of indigenous fauna and flora; • Increased risk of species extinction; • Reduced ecosystem resilience; • Increased stress on ecosystems and ecosystem services

Natural ecosystems in the ULM have historically adapted to environmental changes, but the rapid pace of climate change may exceed their adaptive capacity. Human activities further strain these ecosystems, reducing their resilience to climate shocks. The vulnerability of ULM biodiversity is heightened by limited resources, technology, and capital needed for protective strategies. Projected climate change impacts include altered ecosystems due to variable rainfall and erosion, shifts in invasive species and biodiversity loss, changes in the distribution of indigenous species, increased extinction risks, and reduced ecosystem resilience. These changes, coupled with increased stress on ecosystems, will significantly affect agriculture and ecosystem services, necessitating further research and adaptive measure.

6.2.5. Disaster Management

Focus Area	**Potential Risks**
Disaster Management/Health	• Changes in geographical range and seasonality of vector-borne diseases - Malaria; • Increased incidence of food and water-borne diseases due to increased temperatures; • Health impacts related to extreme events; • Intrusion of contaminants and pollutants into water sources due to excessive rainfall; • Increased demands on emergency response and recovery operations; and • Adverse impacts on public safety and tourism, impacting regional economic performance.

An effective disaster risk management function within the district municipality will be a fundamental component in improving resilience to climate change. Climate change is

directly associated with the potential increase of the following hazards Storms; Flooding; Drought; Epidemics Veldfires. However, in the presence of increased temperatures and more variable and shifting rainfall patterns, many disaster events may shift in impact potential and locations, either as a direct result of climate changes or as an indirect result of a system's integrity being compromised though climate changes. Often these changes will compromise communities that are ill-equipped and unprepared to the timing and extent of these impacts.

6.2.6. Agriculture

Focus Area	Potential Risks
Agriculture	• Projected climate change may lead to inferior crop yields and poor veld conditions; • Reduction in and degradation of animal habitats; • Lack of livestock feed and drinking water; • Increase in disease outbreak and increased vulnerability to predation; • Increased risk of soil erosion; • Annual and perennial crop losses; • Damage to crop quality; and • Disruption of animal breeding and/or crop cycles. • Reduce employment opportunities in commercial sector; and • Increased livelihood and food insecurity among subsistence farmers.

In ULM, key agricultural activities include the production of sugar cane, bananas, macadamias, vegetables, maize, amadumbe, beans, timber, and livestock such as eggs, broilers, and cattle. The agriculture faces significant climatic vulnerabilities, with projected climate changes—such as increased temperatures and decreased precipitation—expected to exacerbate existing environmental challenges. These changes are likely to reduce crop yields, particularly affecting rain-fed crops and pastures. Livestock production will also be impacted by heat stress and reduced feed production. Sugarcane may benefit from yield increases in certain areas but faces reduced harvest cycles. Commercial forestry, particularly pine plantations, may be less sensitive to temperature increases but face threats from pests, diseases, and fire risks due to climate change. Smallholder subsistence farmers, especially maize producers, are particularly vulnerable due to limited resources, raising concerns for food security in the region. Adaptation strategies, such as diversification and sustainable management plans, are critical to mitigating these impacts.

6.2.7. Tourism

Focus Area	Potential Risks
Tourism	• Water supply security compromised dissuades tourism • Changes to ecosystem may impact wildlife and natural beauty. • Potentially more drowning incidents • Outdoor activities will be limited to the warmer seasons. • Extreme weather events can damage tourism infrastructure and have a negative impact on the nature reserves.

Future Climate changes may however have some positive benefits to the tourism industry, particularly making warm summer peak periods longer and more conducive to outdoor activity. However, the more extreme and variable weather conditions may also give the area a negative perception among tourists. Diversifying potential tourist activities and investing in more resilient infrastructure may serve to negate this changed perception and allow for year-round tourist influx.

6.3. Commitment to addressing climate change

Ulundi Municipality is proactively addressing climate change through initiatives like *greening projects, alternative energy sources, recycling programs, and invasive species clearance*. Ulundi Municipality is enhancing its environmental management strategies by refining its strategic goals and incorporating climate change considerations into its sector plans. The municipality is committed to ensuring that *all new and existing sector plans address climate change impacts*, particularly in disaster management. Some of its key focus areas include promoting integrated spatial development, adapting to climate change, managing biodiversity pressures, and exploring renewable energy alternatives. The municipality is also *dedicated to protecting environmentally sensitive areas* within its development projects.

Furthermore, the municipality has also partnered with Reutlingen, Germany, to improve waste management and is working with the Department of Environmental Affairs to eliminate illegal dumpsites, reinforcing its commitment to environmental sustainability. The community is encouraged to adopt sustainable practices such as using energy-saving light bulbs, turning off appliances when not in use, utilizing alternative heating sources, and harnessing solar energy for household needs, reflecting a commitment to sustainable living.

The following projects have been prioritised to address climate change within the city.

6.3.1. Development of Climate Change Adaptation Strategy

The Municipality has outsourced the Environmental Consultant for the establishment of climate change strategy. This strategy recognises that responding to climate change and dealing with its impacts are urgent and essential for building both resilience and a municipality that can prosper in an increasingly carbon-neutral-focused world.

6.3.2. Reviewal and Implementation of IWMP

The Municipality has outsourced the Environmental Consultant for the 5-year reviewal of IWMP. The main objective for the development and reviewal of the Integrated Waste Management Plan (IWMP) is to optimise waste management through the waste cycle by maximising efficiency and minimising associated environmental impacts and financial costs and to improve the quality of life of all South Africans.

The process the to review IWMP has commenced.

1. Waste Clean-Up And Illegal Dumping Removal Campaign

The municipality conducts at least 4 major clean-up campaigns per year which involves relevant stakeholders and affected communities.

2. Recycling (running of Buy Back centre)

The Municipality outsourced a Service provider to run the Buy Back Centre. The Ulundi Municipality Buy-Back Centre (BBC Contributes to increasing the recycling of waste and thereby reducing the strain on landfill sites. The BBC plays a significant role in diverting recyclable materials away from waste disposal and towards recycling.

3. Environmental management Framework (EMF)

EMF that serves as a decision-support tool that will guide the sustainable, effective, and efficient management of the environment and spatial development within the municipality. It explores the social, economic, and environmental aspects of the LM. The EMF aims at Promoting sustainability, Securing Environmental protection; and promoting cooperative environmental governance.

6.3.3. Strategic Environmental Assessment (SEA)

SEA aims to ensure that environmental issues are addressed from an early stage in formulating plans and programmes and incorporated throughout this process. The

approach of assessing the effect of the environment on development is an important benefit of SEA. This is one of the differences between SEA and Environmental Impact Assessment (EIA), as EIAs focus on the effect of development on

Adopted by Council in June 2022.

6.3.4. Poetry Competition 2024 In Commemoration Of Literacy And Arbor Month Celebration

The Department of Community Services is embarking on a program to integrate a culture of learning while maintaining a healthy living environment in society.

Objectives of the program

- Cultivate and promote a culture of writing.
- Developing and showcasing talent
- Raise awareness against the effects of climate change.

Promoting the culture of protecting our natural environment

6.3.5. Alien invasive plants eradication

The Municipality has the policy for Alien Invasive Plants Eradication Plan which is reviewed annually. The primary goal is to address undesirable environmental conditions by removing alien invasive plants and implementing other environmental practices that support our natural biodiversity. The aim is to significantly improve the management and control of invasive species within the town's jurisdiction in a sustainable manner that maximizes benefits to the communities involved. This program is implemented on a monthly basis by the Municipality's Tree Trimming team.

6.3.6. Alien Invasive Drive Campaign

Awareness campaigns through social media platforms, (creation of an attractive poster which states the effects of alien invasive plants and highlight 2 species on each month). Alien Invasive Drive Campaign poster is shared on Facebook and other social media platforms monthly.

6.3.7. Environmental programs at ward level

This program is conducted yearly by planting mainly Indigenous trees and fruit trees in all 24 wards of Ulundi. The trees are planted in different areas such as community

halls, schools, creches, churches, war rooms, and any priority site identified by the ward councillor of the affected ward.

6.3.8. Cleaning and greening project

Intervention from the Department of Forestry, Fisheries and Environment. There are currently two groups falling under this program, First group is in the duration of 12 months ending October 2024, Second group is in a duration of 3 months ending September 2024.

There are more than 100 beneficiaries from each program, responsibly for the following duties:

- Waste pickers
- Waste Loaders
- Awareness Campaigns
- Development and maintenance of Gardens
- Eliminating the spread of alien invasive plants
- Grass Cutting
- Any other environmental related duties

7. Climate Change Response Strategy

This section outlines strategies to mitigate and adapt to the impacts of climate change. This includes measures to reduce greenhouse gas emissions, promote renewable energy, enhance resilience in communities, and protect ecosystems.

7.1. Strategy Implementation Enabling and Disabling Factors

Requirements for Effective Strategy Implementation

- **Holistic Approach:** The strategy emphasizes the need for an integrated approach that addresses climate change as a key risk to the economy, society, and the environment. This approach recognizes the interconnectedness of these sectors and aims to create a resilient and efficient green economy.
- **Clear Vision and Objectives:** The strategy outlines a vision for climate resilience with specific, measurable objectives to guide municipal actions. Achieving this vision requires a long-term commitment and provides a framework for sustained efforts to ensure the municipality remains resilient to climate impacts.
- **Stakeholder Engagement:** Successful implementation requires the active involvement of all stakeholders, including local communities, businesses, governmental agencies, and NGOs.
- **Capacity Building:** Investing in the training and development of municipal staff and local communities is essential for building the capacity to implement and sustain climate actions.
- **Innovative Financing:** Securing funding through innovative financing mechanisms, such as public-private partnerships, grants, and climate funds, will be crucial for supporting the necessary investments.
- **Monitoring and Evaluation:** Establishing a robust system for monitoring progress and evaluating the effectiveness of climate actions will help the municipality adapt its strategy as needed and ensure accountability.
-

- **Partnerships and Leadership:** The complexity and scope of climate change require the municipality to adopt innovative approaches and foster partnerships with various stakeholders, including local communities, other municipalities, and higher levels of government. Collaborative efforts will be essential for effective climate action.
- **Regional Collaboration:** The municipality is not isolated but is connected to the surrounding region through shared resources like water, food, and energy, as well as economic activities like tourism. Engaging with partners beyond municipal borders is critical for a coordinated and effective climate response. Building strong partnerships with neighbouring municipalities, provincial and national governments, and international organizations will enhance resource sharing and coordinated responses to climate challenges.
- **Public Awareness and Education:** Raising awareness and educating the public about the impacts of climate change and the importance of the strategy will encourage community participation and support for climate initiatives

6.2 Response Options

The response options are targeted at three different levels to ensure that action can be undertaken by all applicable stakeholders.

- Strategic level: Strategic response presenting sectoral risks and high level actions and direction to be undertaken by decision makers.
- Action plan: Action planning is the bridge between the strategic level directional guide and the local level decision support matrix. It comprises project level actions, integrating climate resilience into existing and future developments and larger scale planning campaign objectives.
- Decision making support matrix: Presentation of climate risks per local municipality, impacts and consequences, targeted adaptation, and mitigation options for the four variable area/land use types of Urban and Rural areas, Commercial and subsistence agriculture. The implementation options account for both community based and governmental stakeholders.

7.2. Vision, principles and desired outcomes

7.2.1. Vision

Establishing a shared and common vision for climate change response is a way for the municipality to integrate response objectives and required principles into the broader vision of the ULM. The climate change vision is a credible statement of where the municipality would like to be and represents a call to action for its stakeholders. It outlines the municipal response to the challenges presented by climate change, emphasising managing climate change rather than simply responding passively. It reads as follows:

To create a resilient, sustainable, and climate-conscious Ulundi by fostering environmentally responsible growth, empowering communities, and adopting innovative solutions that mitigate the impacts of climate change.

Achieving this vision will demand a shared effort by the ULM and relevant stakeholders. To catalyse transformative change toward a more resilient municipality, the municipality will promote a set of cross-cutting guiding principles to achieve its vision. The key principles presented below are recognised to support effective climate change response.

- Increase awareness of climate change and its projected impacts;
- Build institutional capacity required to address climate change;
- Integrate relevant climate change information into planning, policies and decision-making processes;
- Improve the adaptive capacity of human, natural and built systems and
- Establish or strengthen partnerships that enhance climate change response capacity.

7.3. Key Strategic Objectives

The climate change response objectives have been developed as statement of what the municipality would like to achieve in the medium- to long-term to deal with the climate change risk outlined in previous sections. The Climate Change Response

Strategy is strongly aligned with the municipality development priorities and strategic objectives as outlined in the IDP.

7.3.1. IDP Goals

- To develop the institution and to facilitate institutional transformation .
- To provide infrastructure and services to all, with emphasis on rural communities, in a sustainable manner.
- To develop and support sustainable local economic development, through focusing on tourism development, and incorporating the youth.
- To develop and support social development initiatives, particularly those focused on the youth and the vulnerable.
- To ensure good governance through leadership excellence and community participation.
- To ensure continued sound financial management.
- To ensure effective and efficient Land Use Management, taking cognizance of sound environmental practices

7.3.2. Climate Change strategy Goals

1. **Water Security and Efficiency**
- Ensure sustainable water management practices that safeguard water resources for future generations.
2. **Climate-Resilient and Low-Carbon Development**
- Promote development strategies that reduce carbon emissions and enhance resilience to climate change impacts.
3. **Energy Efficiency and Demand-Side Management**
- Optimize energy use through efficient systems and promote the responsible consumption of energy.
4. **Biodiversity and Ecosystem Management**
- Protect and restore ecosystems to maintain biodiversity and support the balance of natural environments.
5. **Food Security (Agriculture)**
- Strengthen agricultural systems to enhance food security while adapting to climate change and reducing its environmental footprint.
6. **Human Security: Public Health and Disaster Management**
- Safeguard public health by addressing climate-related risks and improving disaster preparedness and response.
7. **Capacity Building Through Coordination and Awareness**
- Enhance institutional coordination and raise public awareness to improve

overall response capacity to climate challenges.

The sections below discuss the main proposals and options for achieving the goals of the strategy in order to develop a set of programmes and projects.

7.3.3. Sectorial Climate Change Response: Recommendations and Strategic response options

7.3.3.1. Energy

The energy sector is primarily guided by national policies, but on a local level the municipality should consider the following:

- Promoting energy efficiency or managing demand for increased energy;
- Promoting adoption of renewable energy sources;
- Introduce of cleaner fuels such as natural gas into the current fossil fuel mix where feasible;
- Increased use of renewable energy.
- Integrate efficient resource use into a requirement/component of economic development;
- Aim for all households to have access to safe, affordable and reliable energy sources.

Response options

Energy Supply and Electricity Service delivery

- Pursue 100% electrification, including in informal areas;
- Explore renewable energy development and procurement through PPAs;
- Explore free basic alternative energy sources for poor non-electrified households;
- Work to ensure low income housing is thermally efficient (put in ceilings);
- Solar water heater roll-out programmes;
- Implement efficient appliance programmes (e.g. fridges, kettles, lights)
- Smart metering of top electricity consumers for better electricity management
- Green procurement to ensure all municipal pumps, motors, lighting is efficient
- Retrofit of municipal/public lighting and buildings
- Greenhouse gas emissions data capture and reporting
- Monitor and record local air quality on a continuous basis

Regulations / Incentives

- Solar water heater by-law for all new buildings requiring minimum thresholds for water heating requirements from a renewable energy sources;

- Implement thermally efficient housing delivery, e.g. legislate the provision of ceilings in government-delivered housing (ceilings a warmer house in winter; cooler in summer);
- Building regulation to ensure efficiency in all new buildings, e.g. require energy efficiency plans for building/development plan approval;
- Provide incentives for energy efficiency when supplying new connections;
- Use air management approval processes to leverage efficiencies;

Awareness

- Focused awareness campaigns on energy use;

Commercial and/or industrial energy forums that provide information and learning exchange on energy efficiency within the sectors.

7.3.3.2. Municipal Infrastructure

The municipal SDF's provide key entry points for addressing pressing climate change related issues and climate change responsive spatial development planning critical to the long terms sustainability of the ULM. The municipal SDF considers climate change impacts on the following areas:

- Sensitive, vulnerable, highly dynamic and stressed ecosystems in the municipal area
- Vulnerable neighbourhoods;
- Desertification;
- Soil loss;
- Ecologically sensitive areas;
- Drought vulnerable areas;
- Flood risk areas or low-lying areas;
- Impact of deforestation and the land use changes that may result from climate change and migration;

Response Options

- Map vulnerable areas (flood lines, etc.) and implement development bans in highly vulnerable zones;
- Relocate existing development from areas of high risk;

- Strengthen building code requirements according to increased risks of flooding, heat waves, intense storms on building and infrastructure development projects;
- Maintain and update drainage systems;
- Consider permeable pavements, green roofs and rain tanks to increase on-site retention of storm water;
- Road maintenance and storm water drainage maintenance and upgrade plans to cope with increased volumes and storm damage and deterioration of road surfaces;

7.3.3.3. Transport

Response Options

- Road maintenance and storm water drainage maintenance and upgrade plans to cope with increased volumes and storm damage and deterioration of road surfaces;
- Effective transport planning and management:
    - Roll out of bus rapid transport and school bus systems
    - Allocate road space to public transport vehicles
    - Support walking and cycling modes, e.g. cycle lanes, etc.
- Increase government vehicle fleet efficiency.

7.3.3.4. Water Resources

- Improve monitoring and forecasting systems for floods and droughts – develop links with water research institutes to ensure early preparation for drought or flood years;

- Preservation of wetlands for current and future flood risk;
- Water flow monitoring towards improved infrastructure planning and development;
- Water tariff structures;
- Water restrictions: prepare plans to balance the needs of competing users when water availability is reduced (drought years, peak seasons)
- Pressure management;
- Awareness and Education campaigns for water conservation;
- Encourage use of water conservation
- Technologies such as low flush toilets and low flow showerheads;

- Changes in agricultural management practices in line with water scarcity (e.g. changes in crop types, dry land farming);
- Planning approval to consider current and future water availability;
- Improve sanitation to curb disease spread;
- Rainwater harvesting for uses such as toilet flushing, car washing, irrigation
- Re-use of grey water or water from sewage treatment
- Control of invasive alien vegetation
- Reduction of leaks
- Response options for peak supply in drought years need further investigation (from cost Benefit perspective and development approach): increased storage capacity/widening of dams,

7.3.3.5. Terrestrial Biodiversity

Municipal environmental programmes within the ULM should addressed the following:

- Fire risk reduction;
- Identification and conservation of critical biodiversity areas;
- Eradication of alien plants and pests;
- Protect and conserve watersheds;
- Rehabilitate river banks.

Response Options

- Vulnerability mapping and related management plans,
- Protect and increase existing ecosystems services buffering against climate change impacts;
    - wetlands
    - river courses
    - land care/erosion prevention
    - water sheds
- Monitor and control alien plants and pests;
- Monitor sustainability biomass used for energy;
- Improve buffers (ground coverage) to protect against increased runoff from more intense storms.

7.3.3.6. Disaster Management

With climate change contributing to an increase in disaster risk, disaster management becomes a vital and urgent component of any climate change adaptation program. As part of climate change adaptation measures, the ULM needs to focus on risk reduction measures to mitigate natural hazards exacerbated by climate change. The reduction of current and future vulnerabilities to climate change risk should build on and expand existing disaster management efforts.

- Install Early Warning Systems and develop links with key scientific and sector institutions to improve predictive ability
- Increase institutional capacity (predictive skills, plans, training and equipment)
- Develop drought response plans and capacities;
- Have robust disaster management plans in place, particularly for vulnerable areas;
- Encourage local voluntary action for disaster management;
- Changes zoning and building standards to reduce disaster risk;
- Increasing rates of rural-urban migration which may result in the expansion of unregulated settlements in hazard-prone areas and municipalities must be responsive to these new risk areas; and
- Explore strategic partnerships with insurance industry.

7.3.3.7. Agriculture

Agricultural Development planning addressing the resilience of commercial and subsistence farming activities should have the following considerations:

- More frequent crop failure from more droughts;
- Decreased chill unit accumulation from fewer cold days;
- Less soil moisture due to declining precipitation and greater evaporation rates;
- Increased incidence of pests due to higher mean temperature or reduced production of key crops from pests and disease;
- Reduced water security; and Adaptive and maladaptive agricultural practices;
- Exploitation and overexploitation of groundwater resources;
- Changes in crop types or switching to dry land farming

7.3.3.8. Tourism

- Build climate resilience and adaptive capacity of tourist attractions/destinations and encourage green tourism infrastructure investment.
- Encourage tourists to participate in the protection and conservation of natural environment, i.e. “Eco-tourism”.
- Promote research, capacity building and awareness in the tourism sector.
- Coordinate an outreach program of workshops for tourism business across the municipality to accelerate the communication of climate change issues to industry.
- Support the establishment of energy efficiency programmes and the introduction of renewable energy into the tourism sector.
- Establish programmes that will allow tourists to offset the emissions generated through their travel to and in South Africa

7.3.3.9. Waste Management

- Reduction, re-use and recycling of waste;
- Demand Side Management (DSM) activities and waste recycling to reduce landfill related methane emissions;
- Correct disposal waste to improve emissions

7.3.3.10. Local Economic Development

Agriculture is arguably the economic sector most vulnerable to the impacts of climate change, while the tourism and health sector will also be affected by projected temperature increases, altered rainfall patterns and more frequent extreme events. Poverty is an important determinant of vulnerability to climate change. Lower-income groups are hit hardest by the combination of greater exposure to climate hazards (e.g. those living in makeshift housing on unsafe and/or remote sites), less capacity to cope and adapt (e.g. lack of assets and insurance), less state provision to help them cope and less legal protection. There are strong complementarities between reducing poverty and reducing vulnerability – in part because poverty reduction involves better provision of infrastructure and services, and because higher incomes increase the adaptive capacity of households From a Local Economic Development perspective the municipality will need to consider the following climate change related issues:

- The sensitivity of economic development plans to climate change.
- Income flows for rural farmers may be unpredictable, leaving them less able to prepare and cope with climate-related disasters.
- Agricultural processing, retail trade, local transport, domestic services, tourism, and equipment repairs are all examples of non-farm livelihood activities that can diversify income, allowing people to protect themselves against adverse shocks and trends;
- Industrial and commercial energy efficiency or demand side management mechanisms;
- Relocation of buildings located in hazard-prone areas ;
- Day-to-day operations that rely on steady water supplies may need to be redesigned as climate change constrains water availability;
- Supply chains reliant on climate-sensitive geographic areas may have to be diversified; and
- Climate risks may translate into less disposable incomes, while associated health risks may affect the productivity of the workforce.

Response Options

- Assessment of vulnerable livelihoods and sectors dependent on natural resources or carbon intensive sectors;
- Ongoing research and monitoring of climate change impact on vulnerable livelihoods, especially agriculture and tourism;
- Diversification of livelihood strategies (notably non-farm activities to cushion farming based livelihoods);
- Reduce dependence on increasingly costly energy sources – improve efficiency across all sectors;
- Changes in crop types, dry land farming to diversify agricultural activities;
- Attract low carbon or 'green' economic activities, including renewable energy opportunities;
- Show visible commitment to sustainable tourism;
- Consider tourism alternatives where impacts interfere with existing tourism bases; Implement recycling to increase landfill life-span and provide jobs;

- Invest in public transport to increase mobility and improve access to livelihoods; and
- Work with the community on community-based adaptation projects.

7.3.3.11. Health

Response Options

- Improved sanitation to curb disease;
- Increased awareness on/preparedness for climate related health threats (vector-borne diseases, heat, air pollution, floods);
- Monitoring of malaria distribution;
- Interventions to reduce air pollution Increase staffing and supplies (capacity support) for health facilities
- Nutrition programmes where climate impacts affect livelihoods and food security.

8. Intervention Programmes

This chapter presents intervention/Actions/Activities plans designed to enhance Ulundi's resilience to climate change impacts. By identifying key areas for action, the plans aim to address vulnerabilities while promoting sustainable development.

Vision **To create a resilient, sustainable, and climate-conscious Ulundi by fostering environmentally responsible growth, empowering communities, and adopting innovative**	
Resources	ULM will use existing government budgets and new sources of financing by aligning programs along the national framework strategies and actions for climate change
Strategic Objectives	**Water Security and Efficiency** ● Ensure sustainable water management practices that safeguard water resources for future generations. **Climate-Resilient and Low-Carbon Development** ● Promote development strategies that reduce carbon emissions and enhance resilience to climate change impacts. **Energy Efficiency and Demand-Side Management** ● Optimize energy use through efficient systems and promote the responsible consumption of energy. **Biodiversity and Ecosystem Management** ● Protect and restore ecosystems to maintain biodiversity and support the balance of natural environments. **Food Security (Agriculture)** ● Strengthen agricultural systems to enhance food security while adapting to climate change and reducing its environmental footprint. **Human Security: Public Health and Disaster Management** ● Safeguard public health by addressing climate-related risks and improving disaster preparedness and response. **Capacity Building Through Coordination and Awareness** ● Enhance institutional coordination and raise public awareness to improve overall response capacity to climate challenges.

8.1. Water Security and Efficiency

Goal 1: Water Security and Efficiency					
Main Activity	Lead/Partners	Budget	Budget Source	Time Frame	Indicator of Success
1.1 Enabling policy framework for the integration of climate change adaptation strategies and water resource management.					
Review existing water resource management structures, institutional capacity and policies for improved alignment and coordination. Develop policy guidelines for water conservation, allocation, and reuse. Develop and implement municipal guidelines for the rainwater harvesting, for communities and industry.	**Leaders**: Zululand District Municipality (ZDM) **Partners**:KZNEDTEA	R1 000 000.00	District Budget	2025-2026	1. Percentage of proposed policy guidelines that have been formally adopted and implemented by local governments and relevant authorities. 2. Number of training sessions conducted and participants trained in water resource management and climate adaptation strategies. 3. Number of community and industry stakeholders actively participating in rainwater harvesting initiatives and policy discussions. 4. Measurable reduction in water usage per capita in the targeted areas following the introduction of new policies and guidelines. 5. Percentage increase in households and industries implementing rainwater harvesting systems after establishing municipal guidelines. 6. Evidence of increased collaboration and communication among water resource management institutions, assessed through surveys or reports. 7. Frequency and thoroughness of assessments conducted to evaluate the effectiveness of the new policies and frameworks.
Review/compile bylaws Endorse enforcement	**Leaders**:ZDM **Partners**:KZNEDTEA, ULM	R500 000.00	Internal Budget	2026-2027	Number of bylaws updated and enforced within the specified timeframe.
Develop a database and information management systems for municipal water resources and users	**Leaders**:ZDM **Partners**:KZNEDTEA, ULM		Internal Budget	2026-2027	Completion and functionality of the database, along with the number of users accessing the system.

Goal 1: Water Security and Efficiency					
Main Activity	Lead/Partners	Budget	Budget Source	Time Frame	Indicator of Success
Establish partnership with University of KwaZulu Natal for targeted research and dissemination of results	**Leaders**:ZDM **Partners**:UKZN,ULM		Internal Budget	2026-2027	Number of collaborative research projects initiated and the volume of research findings disseminated to stakeholders.
Build municipal capacity through targeted training of key municipal officials and staff.	**Leaders**:ZDM **Partners**:UKZN, KZNEDTEA, ULM			2025-2026	Percentage of staff trained, along with pre-and post-training assessments demonstrating improved competencies.
1.2 Implementation and enforcement of regulatory framework.					
Review the capacity of relevant statutory bodies to implement and enforce regulations relating to water quality and effluent discharge within the municipality	**Leaders**:ZDM **Partners**:KZNEDTEA, ULM			2026-2027	Number of regulatory bodies assessed and their capacity improvement score (measured through a standardised capacity assessment framework).
Supply of low cost field testing kits in rural areas to monitor water quality and improve early warning	**Leaders**:ZDM **Partners**:KZNEDTEA, ULM	R200 000	Internal Budget	2026-2027	Percentage of rural households receiving testing kits and frequency of water quality tests conducted per household.
Public awareness campaigns on sanitation, water-borne diseases and climate related health risks	**Leaders**:ZDM **Partners**:KZNEDTEA,ULM	R200 000	Internal Budget	2025-2028	Increase in public knowledge, measured by the percentage of the population able to identify at least three water-borne diseases and their prevention methods post-campaign, assessed through surveys.
1.3 Improved water resource management.					

Goal 1: Water Security and Efficiency					
Main Activity	Lead/Partners	Budget	Budget Source	Time Frame	Indicator of Success
Conduct vulnerability assessments for water resources (ground and surface) and recharge areas in hotspot areas.	**Leaders**:ZDM **Partners**:KZNEDTEA, ULM	R500 000	Internal Budget	2025-2026	Number of vulnerability assessments completed and the identification of key risk factors within hotspot areas.
Comprehensive flood and drought risk assessment and management plan	**Leaders**:ULM **Partners**:KZNEDTEA, ZDM	R100 000	Internal Budget	2026-2027	Development and adoption of a risk management plan, with specific mitigation strategies outlined for floods and droughts.
Develop an Alien Invasive Management Plan	**Leaders**:ULM **Partners**:KZNEDTEA, ZDM			2025-2026	Completion and publication of the management plan, with measurable objectives for reducing invasive species presence.
Alien Invasive management project	**Leaders**:ULM **Partners**:KZNEDTEA, ZDM			2026-2027	Reduction in the population of targeted invasive species in project areas, measured by pre-and post-intervention surveys.
Address water leaks and rehabilitate or decommission aging infrastructure.	**Leaders**:ZDM **Partners**:KZNEDTEA, ZDM	R1 000 000	Internal Budget	2026-2027	Percentage reduction in water loss from leaks and the number of ageing infrastructures rehabilitated or decommissioned.
Establish community/village based water resource management structures	**Leaders**:ZDM **Partners**:KZNEDTEA, :ULM			2025-2026	Number of community management structures established and the active participation rate of community members.
School water supply programmes in rural areas.	**Leaders**:ZDM			2025-2026	Number of schools receiving reliable water supply, and an improvement in student attendance and health indicators.

Goal 1: Water Security and Efficiency					
Main Activity	Lead/Partners	Budget	Budget Source	Time Frame	Indicator of Success
	Partners:KZNEDTEA, ULM				
Household level rain water harvesting systems	**Leaders**:ZDM **Partners**:KZNEDTEA, ULM			2025-2028	Number of households implementing rainwater harvesting systems and the volume of water collected annually from these systems.

8.2. Climate-Resilient and Low-Carbon Development

Goal 2 :Climate-Resilient and Low-Carbon Development					
Main Activity	Lead/Partners	Budget	Budget Source	Time Frame	Indicator of Success
2.1Increased livelihood opportunities in the green economy.					
Support business and job opportunities in emerging green sectors	**Leaders**:ULM **Partners**:KZNEDTEA, ZDM			2025-2028	Number of new businesses established in green sectors per year, along with the total number of jobs created in these businesses.
Analyse long and short term jobs trends to identify which sectors/occupations will be positively/negatively impacted, with an emphasis on job creation opportunities	**Leaders**:ULM **Partners**:KZNEDTEA, ZDM			2025-2028	Annual report detailing job growth or decline in specific sectors, including the percentage change in employment figures for both positively and negatively impacted occupations.

Goal 2 :Climate-Resilient and Low-Carbon Development					
Main Activity	Lead/Partners	Budget	Budget Source	Time Frame	Indicator of Success
Develop Growth and Development Strategy to align it with Climate Change Response Strategy and KwaZulu Natal Green Economy Plan	**Leaders**:ULM & ZDM **Partners**:KZNEDTEA, ZDM			2025-2028	Completion of the integrated Growth and Development Strategy document, with a measurable implementation rate (e.g., percentage of identified initiatives that are actively being pursued within the first 2 years).
2.2 Climate resilient municipality					
Integrate climate change resilience into Terms of Reference for development new infrastructure.	**Leaders**:ULM **Partners**:KZNEDTEA, ZDM			2025-2028	Percentage of new infrastructure projects that include climate change resilience clauses in their Terms of Reference.
Review existing physical frameworks and planned infrastructure development based on risk identified in the Climate Change Response Strategy	**Leaders**:ULM **Partners**:KZNEDTEA, (ZDM)			2025-2028	Number of existing physical frameworks and planned infrastructure projects reviewed and updated to reflect identified climate risks within a year (or any specified timeframe).
Evaluate and improve capacity of storm water systems for high intensity rainfall events	**Leaders**:ULM **Partners**:KZNEDTEA, (ZDM)			2025-2028	Reduction in flooding incidents and the number of properties affected during high-intensity rainfall events, measured annually.
Maintenance of gutters drainage ditches and culverts	**Leaders**:ULM **Partners**:KZNEDTEA, (ZDM)	R1000 000	Internal	2025-2028	Percentage of maintenance tasks (cleaning, repairs) completed on schedule for gutters, drainage ditches, and culverts, tracked quarterly.
2.3 Climate resilient land use planning and housing.					

Goal 2 :Climate-Resilient and Low-Carbon Development					
Main Activity	Lead/Partners	Budget	Budget Source	Time Frame	Indicator of Success
Review municipal development plans based on climate risks	**Leaders**:ULM **Partners**:KZNEDTEA, (ZDM)			2025-2028	Percentage of municipal development plans that include climate risk assessments and adaptation strategies, with a target of 100% compliance within two years.
Implement an integrated land use transport plans to reduce average travel distance and time between work and residence, and promote energy Conservation.	**Leaders**:ULM **Partners**:KZNEDTEA, (ZDM)			2025-2028	Average reduction in travel distance (in kilometers) and travel time (in minutes) by 15% reduction over five years
2.4 Climate responsive sold waste management.					
Conduct waste reduction through segregation and composting at municipal landfills	**Leaders**:ULM **Partners**:KZNEDTEA, (ZDM)			2025-2028	Amount of organic waste diverted from landfills (in tons) due to composting initiatives, with an annual target (e.g., 1,000 tons per year).
Promote expansion of in-store recycling programs especially for electronic waste and low value recyclables.	**Leaders**:ULM **Partners**:KZNEDTEA, (ZDM)			2025-2028	Number of participating stores and amount of electronic waste collected (in kilograms) through in-store recycling programs, with a target of reaching a specific number of stores and a certain volume of waste collected (e.g., 50 stores and 500,000 kg collected within two years).

8.3. Energy Efficiency and Demand-Side Management

Goal 3 :Energy Efficiency and Demand side Management					
Main Activity	Lead/Partners	Budget	Budget Source	Time Frame	Indicator of Success
3.1 Develop and implement an energy management programme.					
Develop energy management guidelines for all municipal facilities.	**Leaders**:ZDM & ULM **Partners**:KZNEDTEA,			2025-2028	Percentage of municipal facilities that have adopted and implemented the energy management guidelines within a specified timeframe (e.g., 12 months).
Establish feasibility of alternative energy sources for public lighting	**Leaders**:ULM & ZDM **Partners**:KZNEDTEA			2025-2028	Number of feasibility studies completed and reports generated on alternative energy sources for public lighting within a specified period.
Awareness Campaigns of electricity management and conservation.	**Leaders**:ULM **Partners**:KZNEDTEA, ZDM			2025-2028	Increase in public awareness percentage measured through surveys before and after the campaigns, targeting at least a 20% improvement in knowledge about energy conservation.
3.2 Green transport strategies and fuel conservation integrated into development plans.					
Develop and Implement a green fleet management programmes for municipal departments	**Leaders**:ULM **Partners**:KZNEDTEA, ZDM			2025-2028	Reduction in fuel consumption and greenhouse gas emissions from the municipal fleet, measured as a percentage decrease from baseline data over a year.
Implement national policy guidelines on integrating land-use and transport planning.	**Leaders**:ULM, KZNEDTEA & ZDM			2025-2028	Number of new development projects that comply with national policy guidelines and include integrated land-use and transport plans, aiming for at least 80% compliance in new projects.

8.4. Biodiversity and Ecosystems Management

Goal 4: Protection and rehabilitation of ecosystems and ecosystem services					
Main Activity	Lead/Partners	Budget	Budget Source	Time Frame	Indicator of Success
4.1 Implementation of climate change response strategies for key ecosystems					
Conduct a comprehensive biodiversity risk and vulnerability assessment	**Leaders**:ULM, EDTEA, DFFE,EZEMVELO			2025-2026	Percentage of key ecosystems assessed for biodiversity risk and vulnerability annually (or bi-annually).
Review zoning guidelines for different ecosystems	**Leaders**:ULM & KZNEDTEA **Partners**, ZDM			2025-2026	Number of zoning guidelines reviewed and updated in alignment with current ecological data and climate change impacts.
Identify and demarcate vulnerable ecological management zones requiring	**Leaders**:ULM & KZNEDTEA **Partners**: ZDM			2025-2027	Number of vulnerable ecological management zones identified and accurately mapped, along with the percentage of these zones actively monitored for changes.

8.5. Food Security and Agriculture

Goal 5 :Food Security and Agriculture					
Main Activity	Lead/Partners	Budget	Budget Source	Time Frame	Indicator of Success
5.1 Enhanced knowledge on the vulnerability of agriculture to the impacts of climate change.					
Advocate the development and adoption of climate resilient crop and livestock production systems and technologies in the commercial sector	COGTA			2025-2028	Number of commercial farms that have adopted climate-resilient technologies or practices, with a target of at least 20% adoption increase annually.
Public awareness campaigns on climate change projections and risks	**Leaders**:ULM **Partners**:KZNEDTEA, (ZDM)			2025-2029	Number of participants attending public awareness campaigns or workshops and a follow-up survey indicating knowledge retention (aiming for at least 80% of participants reporting increased awareness and understanding post-campaign). Reach of social media campaigns (e.g., number of impressions, shares, and engagements). Percentage change in public knowledge regarding climate change risks (measured via pre- and post-campaign surveys).
5.2 Climate-sensitive agriculture policies and plans					
Conduct annual CC adaptation planning and budgeting.	ULM, KZN AGRIC			2025-2026	Percentage of budget allocated to climate change adaptation initiatives compared to total municipal budget
Rehabilitation of land owned by municipality to address the	**Leaders**:ULM, KZNAGRIC	R 1000 000	Internal Budget	2025-2029	Area (in hectares) of rehabilitated land restored to agricultural productivity.

Goal 5 :Food Security and Agriculture					
Main Activity	Lead/Partners	Budget	Budget Source	Time Frame	Indicator of Success
concern regarding the loss of agriculturally productive land and natural resources	**Partners**:KZNEDTEA,				
Build institutional capacity by training relevant municipal staff on climate change and response	EDTEA	R50 000	Internal Budget	2025	Number of training sessions conducted and percentage of staff trained in climate change and response strategies.
Develop a subsistence farming irrigation policy to facilitate the responsible use of water for irrigation.	**Leaders**:ZDM & KZN AGRIC **Partners**:KZNEDTEA, ULM			2025-2029	Completion status of the irrigation policy and number of stakeholders involved in its development and review.
Monitor, repair and rehabilitate irrigation infrastructure to reduce water losses and improve irrigation efficiency	**Leaders**:ZDM & KZN AGRIC **Partners**:KZNEDTEA, ZDM,ULM			2025-2029	Percentage reduction in water loss from improved irrigation infrastructure and increase in irrigation efficiency measured through crop yield per unit of water used.
5.3 Enhanced capacity for Climate Change Adaptation in farming communities and industry.					
Develop education, training and extension services and establish farmer support programmes in vulnerable communities.	**Leaders**:ZDM & KZN AGRIC **Partners**:KZNEDTEA,ZDM & KZN AGRIC,ULM			2025-2029	Number of educational workshops and training sessions held per year, along with the percentage of participants who report an increase in knowledge and skills related to climate resilience.
Implementation and utilization of community gardens for agriculture and food production	**Leaders**:ZDM & KZN AGRIC			2025-2029	Number of community gardens established and the average yield of produce harvested per garden per season, along with community participation rates.

Goal 5 :Food Security and Agriculture					
Main Activity	Lead/Partners	Budget	Budget Source	Time Frame	Indicator of Success
	Partners:KZNEDTEA, ULM				
Identify and implement climate change risk transfer and social protection mechanisms for agriculture.	**Leaders**:ZDM & KZN AGRIC **Partners**:KZNEDTEA, ULM			2025-2029	Number of farmers enrolled in risk transfer programs and the percentage of losses covered by these mechanisms during climate-related events.
Organise and train farmers and farmer organisations in accessing financing and insurance	**Leaders**:ZDM & KZN AGRIC **Partners**:KZNEDTEA, ULM			2025-2026	Percentage increase in the number of farmers and organisations successfully accessing financing and insurance options, along with the amount of funding secured compared to previous years.

Specific activities for inclusion in the projects put forward in the action plan outlined above Included but are not limited to: (please note the suitability of the following activities will be context specific and may not be suitable for universal implementation) Practices to reduce soil loss (erosion) and increase soil water retention such as no-till or conservation tillage, no-burn policy; Conserve and improve soil health and water retention through biological farming systems, increase carbon content and microbial activity e.g. crop rotation, inter-cropping, mulching, cover crops, working in weeds; Improve irrigation efficiency (demand), change to drip irrigation Secure reliable supply of fresh water for irrigation (supply management); Preserve groundwater (this must be unpacked by the water sector); Remove and control alien invasive species to restore stream flow; Introduce stricter measures and increase monitoring capacity to reduce pollution and salinizatione appropriate/conducive areas; Change from livestock to crops where appropriate of fresh water resources; Change crops to varieties more suited to the new conditions, this may require developing new infrastructure, and developing markets; Identify, monitor and control pests and diseases (both existing and new) using IPM (Integrated Pest Management); Extension of weather station network co-ordinated and managed by a central agency, with regular accurate information and forecasts to farmers, early-warning systems; Move agricultural activities to mor; Provide rural farmers with

agrometeorological advice; Investment in more efficient irrigation technology; Insurance and risk sharing mechanisms; Education on water-saving practices and changes in crop choices; Document and assess indigenous knowledge and coping strategies; Seed banks; Develop scientifically-based but suitably packaged information systems to help farmers with decision-making, collate various sources of expert knowledge; Develop efficient extension service for better technology transfer and adoption of sustainable/climate resilient farming practices Better integrated land use planning and economic development using CC scenarios, climate topologies, resource base, and GIS based crop census; Maintain and develop research capacity locally, incl. Indigenous knowledge base; Improve trade equity, market access, benefit from new opportunities in global context; Plant indigenous forests to prevent soil erosion, fires, floods for whole region Implement different planting dates; Increased use irrigation; Adjustments to livestock management; Soil conservation techniques/erosion control; Implement crop diversification; Change quantity of land under cultivation; Change from crops to livestock where appropriate; Change from farming to non-farming activity, i.e. diversify livelihoods; Change use/application of fertilisers and chemicals; Increased use water conservation techniques; Adjust growing season; Agroforestry; Food storage; Recycling of grey water. Integrated and use planning including climate change scenarios Increased research; Employment of additional extension officers; Sustainable land reform; Shift to less water intensive crops.

8.6. Human Security: Public Health and Disaster Management

Goal 6 :Human Security: Public Health and Disaster Management					
Main Activity	Lead/Partners	Budget	Budget Source	Time Frame	Indicator of Success
6.1 Mainstreaming of Climate Change Response and Disaster Risk Reduction					
Identify municipal climate risks and vulnerable sectors	**Leaders**:ULM **Partners**:KZNEDTEA, ZDM,COGCTA			2026-2027	
6.2 Enhanced institutional capacity for disaster risk reduction and climate change response.					
Organise and mobilise local networks of climate change practitioners and resources that can provide assistance to the	**Leaders**:ULM **Partners**:KZNEDTEA, ZDM			2026-2027	Implementation of at least two community-based climate change response projects annually, with demonstrable community

Goal 6 :Human Security: Public Health and Disaster Management					
Main Activity	Lead/Partners	Budget	Budget Source	Time Frame	Indicator of Success
municipality and communities in terms of climate change response					participation and feedback collected through surveys showing 75% satisfaction.
Develop and implement clear public awareness programmes	**Leaders**:ULM **Partners**:KZNEDTEA, ZDM			2025-2026	Launch of at least four public awareness campaigns per year, with metrics indicating at least a 25% increase in community knowledge and understanding of climate change impacts, measured through pre- and post-campaign surveys.
Increase the municipality capacity to disseminate early warnings and weather forecasting information to vulnerable sectors and communities	**Leaders**:ULM **Partners**:KZNEDTEA, ZDM,COGCTA,DFFE			2025-2026	Capability to successfully disseminate early warnings to 90% of vulnerable communities, evidenced by timely feedback from the communities during testing of the early warning systems, and an increase in the uptake of warning messages by at least 50%.
6.3 Improved response capacity of public health.					
Liaise with national and provincial Dept. of health on the development of health surveillance systems	**Leaders**:ULM **Partners**:ZDM,COGTA,KZN, HEALTH			2025-2026	Establish a documented agreement or memorandum of understanding (MOU) with the national and provincial Departments of Health, and ensure that at least 75% of stakeholders report improved communication and coordination in health surveillance efforts within six months.
Assess capacity of local health facilities and personnel for emergency preparedness and response.	**Leaders**:HEALTH **Partners**:ZDM,COGTA,KZN, ULM			2025-2026	Conduct capacity assessments in 100% of local health facilities and develop training plans for personnel, with at least 75% of facilities implementing at least one

Goal 6 :Human Security: Public Health and Disaster Management					
Main Activity	Lead/Partners	Budget	Budget Source	Time Frame	Indicator of Success
					improvement based on assessment findings within one year.

9. Monitoring and Evaluation

	Action	**Description**	**Indicator of success**
1	Monitor the implementation of projects in this strategy against their indicators of success	Track the various actions identified in the strategy every quarter to identify indicators of success that have been achieved	A tracking sheet is completed for each quarter
2	Provide a quarterly presentation to the Provincial Climate Change Technical Committee on progress made	This will involve giving a presentation every quarter to the KwaZulu-Natal Provincial Climate Change Technical Committee on progress with the implementation of the	A presentation is completed for each quarter

		Climate Change Strategy. The presentation will be based on the information captured in the tracking sheet	A presentation is given to the Provincial Climate Change Technical Committee every quarter
3	Draft an annual monitoring and evaluation report on the implementation of this Climate Change Strategy	This will involve drafting an annual report that documents which actions in this Climate Change Strategy have been successfully implemented over the past year. The report will also identify actions that are not being implemented and recommend approaches to enable the implementation of these actions such as amendments to the action or changes in the lead organisation.	An annual monitoring and evaluation report is completed and approved for each year All approved annual monitoring and evaluation reports are available

10. Conclusion

While this Strategy attempts to develop a process that is applicable to the municipality municipal planning remains a complex process involving difficult decisions. The lengthy timeframes associated with climate change will also complicate matters, since they contradict the time frames attached to development planning, budgetary cycles and political office. Local government is often caught in a continuous struggle to cope with day to day service delivery problems. Limited institutional capacity and financial resources will require municipality to align their climate change objectives with their everyday commitments rather than developing a separate approach. The climate change impacts experienced across the ULM will vary and will be influenced by various factors. The lack of uniformity regarding the experience of climate change impacts emphasises the need for the inclusion of multiple perspectives into the municipal planning process. Climate change poses a real threat to the municipality and needs to be addressed through effective and strategic climate change response measures. The project has set out to establish a baseline of information on climate change risk within the district and the institutional capacity to deal with such risk in terms of mitigation and adaptation, and then to develop strategy guide the municipality journey towards climate resilience. The ULM should actively utilise this strategic framework and endeavour to implement the recommendations contained herein using the implementation guideline provided as an addendum. The successful implementation of the Strategy will reinforce sustainable development goals and make a real contribution to the resilience of the district and its people in general and against climate change.

This Strategy aims to create a framework that is tailored to the municipality's needs, recognizing that municipal planning is inherently complex and often involves challenging decisions. The prolonged timeframes associated with climate change pose additional challenges, as they clash with the timelines of development planning, budget cycles, and political tenures. Local governments frequently find themselves grappling with immediate service delivery issues, which can distract from long-term planning initiatives.

Given the constraints of limited institutional capacity and financial resources, it is crucial for the municipality to integrate climate change objectives into its everyday operations, rather than treating them as separate initiatives. The impacts of climate change experienced throughout the ULM are not uniform and are influenced by a variety of factors. This lack of uniformity underscores the importance of incorporating diverse perspectives into the municipal planning process.

Climate change presents a significant threat to the municipality and necessitates the implementation of effective and strategic response measures. This project aims to establish a comprehensive baseline of information regarding climate change risks in the district, as well as assess the institutional capacity to address these risks in terms of both mitigation and adaptation. From this foundation, a strategic guide will be developed to steer the municipality on its path towards achieving climate resilience.

To achieve meaningful outcomes, it is imperative that the ULM actively engages with this strategic framework and diligently implements the recommendations outlined herein, following the provided implementation guidelines. The successful execution of this Strategy will not only advance sustainable development goals but also significantly enhance the resilience of the district and its communities in facing the challenges posed by climate chang