



# GREENBOOK

*adapting settlements for the future*



**PORT ST JOHNS**  
• MUNICIPALITY •  
OUR HERITAGE, OUR PEOPLE

## Port St. Johns Local Municipality Adaptation Action Plan

JUNE 2024

Report compiled by the CSIR  
Funded by the GIZ  
DFFE and DHS as collaborative partners



Supported by:



on the basis of a decision  
by the German Bundestag

**Title:** Port St. Johns Local Municipality: Adaptation Action Plan  
**Authors:** Sasha Naidoo, Amy Pieterse, Lethabo Chilwane & Willemien van Niekerk  
**Project lead:** Willemien van Niekerk (CSIR) & Michelle Hiestermann (GIZ)  
**Date:** June 2024  
**Citation:** CSIR, 2024. Port St. Johns Local Municipality: Adaptation Action Plan. GIZ, DFFE, DHS, the HDA & Port St. Johns Local Municipality.  
**Version:** Draft 1

# Contents

List of Acronyms and Abbreviations .....	4
Glossary of Terms .....	5
1. Introduction.....	7
2. Policy Framework.....	8
3. Adaptation Principles, Approach, Programmes & Actions .....	9
3.1. Adaptation principles .....	9
3.2. Adaptation approach.....	10
3.3. Adaptation programmes and actions .....	12
4. Summary of Climate Risk Profile .....	13
4.1. Climate projections, vulnerabilities and impacts .....	13
4.2. Priority climate-related hazards.....	14
5. Adaptation Goals, Programmes and Actions .....	14
5.1. Adaptation goals .....	15
5.2. Adaptation programme: Goal 1 .....	15
5.3. Adaptation programme: Goal 2 .....	16
5.4. Adaptation programme: Goal 3 .....	17
5.5. Adaptation programme: Goal 4 .....	18
5.6. Adaptation programme: Goal 5 .....	18
6. Implementation Framework.....	20
6.1. Implementation framework: Goal 1.....	20
6.2. Implementation framework: Goal 2 .....	21
6.3. Implementation framework: Goal 3 .....	22
6.4. Implementation framework: Goal 4 .....	23
6.5. Implementation framework: Goal 5.....	25
7. Implications for the PSHDA .....	27
8. Recommendations for Mainstreaming.....	27
9. Bibliography.....	29

## List of Acronyms and Abbreviations

CSIR	Council for Scientific and Industrial Research
CSIRO	Commonwealth Scientific and Industrial Research Organisation
DFFE	Department of Forestry, Fisheries and the Environment
DHS	Department of Human Settlements
DRR	Disaster risk reduction
HDA	Housing Development Agency
IDP	Integrated Development Plan
IPCC	Intergovernmental Panel on Climate Change
LRT	Let's Respond Toolkit
PHSHDA	Priority Human Settlement and Housing Development Area
PHS	Priority Human Settlement
PHDA	Priority Housing Development Area
PSJLM	Port St. Johns Local Municipality
SDBIP	Service Delivery and Budget Implementation Plan
SPLUMA	Spatial Planning and Land Use Management Act, 2013 (Act No.16 of 2013)

## Glossary of Terms

Adaptation actions	A range of planning and design actions that can be taken by local government to adapt to the impacts of climate change, reduce exposure to hazards, and exploit opportunities for sustainable development (CSIR, 2019).
Adaptation planning	The process of using the basis of spatial planning to shape built-up and natural areas to be resilient to the impacts of climate change, to realise co-benefits for long-term sustainable development, and to address the root causes of vulnerability and exposure to risk. Adaptation planning assumes climate change as an important factor while addressing developmental concerns, such as the complexity of rapidly growing urban areas, and considers the uncertainty associated with the impacts of climate change in such areas – thereby contributing to the transformational adaptation of urban spaces. Adaptation planning also provides opportunities to climate proof urban infrastructure, reduce vulnerability and exploit opportunities for sustainable development (National Treasury, 2018; Pieterse, 2020).
Adaptive capacity	“The ability of systems, institutions, humans and other organisms to adjust to potential damage, to take advantage of opportunities, or to respond to consequences” (IPCC, 2022, p. 2899).
Climate change adaptation	“In human systems, the process of adjustment to actual or expected climate and its effects, in order to moderate harm or exploit beneficial opportunities. In natural systems, the process of adjustment to actual climate and its effects; human intervention may facilitate adjustment to expected climate and its effects” (IPCC, 2022, p. 2898).
Climate change mitigation	“A human intervention to reduce emissions, or enhance the sinks, of greenhouse gases (GHGs)” (IPCC, 2022, p. 2915). The goal of climate change mitigation is to achieve a reduction of emissions that will limit global warming to between 1.5°C and 2°C above preindustrial levels (Behsudi, A, 2021).
Climate hazards	Climate hazards are a sub-set of natural hazards and a grouping of hydrological, climatological, and meteorological hazards. This includes the spatial extent and frequency of, among others, floods, fires, and extreme weather events such as extreme rainfall and extreme heat. Sometimes referred to as hydrometeorological hazards. The potential occurrence of a climate hazard may cause loss of life, injury, as well as damage and loss to property, infrastructure, livelihoods, service provision, ecosystems, and environmental resources (IPCC, 2022). Climate hazards can increase in intensity and frequency with climate change (Pieterse et al., 2023).
Climate risk	Risk implies the potential for adverse consequences resulting from the interaction of vulnerability, exposure, and a hazard. Relevant adverse consequences include those on “lives and livelihoods, health and well-being, economic and sociocultural assets, infrastructure and ecosystems” (IPCC, 2022, p. 144). In the IPCC’s 6th Assessment Report, it is confirmed that

risks may result from “dynamic interactions between climate-related hazards with the exposure and vulnerability of the affected human or ecological system” (IPCC, 2022, p. 132).

Coping capacity	“The ability of people, institutions, organizations and systems, using available skills, values, beliefs, resources and opportunities, to address, manage, and overcome adverse conditions in the short to medium term” (IPCC, 2022, p. 2904).
Disaster risk reduction	“Denotes both a policy goal or objective, as well as the strategic and instrumental measures employed for anticipating future disaster risk; reducing existing exposure, hazard or vulnerability; and improving resilience” (IPCC, 2022, p. 2906).
Exposure	Exposure implies the physical exposure of elements to a climate hazard. It is defined as the “presence of people; livelihoods; species or ecosystems; environmental functions, services, and resources; infrastructure; or economic, social, or cultural assets in places and settings that could be adversely affected [by climate hazards]” (IPCC, 2022, p. 2908).
Mainstreaming	The process of integrating climate change adaptation strategies and measures into existing planning instruments and processes as opposed to developing dedicated adaptation policies and plans (Pieterse et al., 2021).
Resilience	“The capacity of interconnected social, economic and ecological systems to cope with a hazardous event, trend or disturbance, responding or reorganising in ways that maintain their essential function, identity and structure. Resilience is a positive attribute when it maintains capacity for adaptation, learning and/or transformation” (IPCC, 2022, pp. 2920–2921).
Sensitivity	“The degree to which a system or species is affected, either adversely or beneficially, by climate variability or change. The effect may be direct (e.g., a change in crop yield in response to a change in the mean, range, or variability of temperature) or indirect (e.g., damages caused by an increase in the frequency of coastal flooding due to sea level rise)” (IPCC, 2022, p. 2922).
Vulnerability	Vulnerability is defined as the “propensity or predisposition to be adversely affected. Vulnerability encompasses a variety of concepts and elements including, sensitivity or susceptibility to harm and lack of capacity to cope and adapt” (IPCC, 2022, p. 2927). Vulnerability refers to the characteristics or attributes of exposed elements, i.e., elements that are exposed to potential climate-related hazards. Vulnerability is a function of sensitivity and (coping or adaptive) capacity (Pieterse et al., 2023).

# 1. Introduction

Climate change impacts vary widely from region to region in South Africa, and are reflected by floods, droughts, heatwaves, and coastal erosion, among others. These impacts directly threaten life, economic well-being, property, infrastructure, and ecosystems as well as the ability of local government to provide public services. It is local government's responsibility and duty to provide leadership in planning and preparing to manage these risks for the sake of the well-being, safety, and security of individuals within their jurisdiction (SABS, 2023). The purpose of this document is to strengthen the capability of local government to prepare for climate change threats and associated risks.

The Climate Change Adaptation Plan and its accompanying Risk Profile report have been specifically drafted for the Port St. Johns Local Municipality (PSJLM) with the aim of strengthening its strategic response to climate change. These documents derive their insights from the GreenBook ([www.greenbook.co.za](http://www.greenbook.co.za)), a freely accessible online planning support system. The GreenBook is a unique and invaluable resource, providing quantitative scientific evidence to assist local governments in comprehending their climate risks. It plays a pivotal role in guiding the adaptation of settlements to withstand the impacts of both current and future climate challenges.

Designed as an information-rich tool, the GreenBook caters to South African local governments, offering insights into risks and vulnerabilities associated with population growth, climate change, exposure to hazards, and the vulnerability of critical resources. Moreover, the GreenBook not only diagnoses these challenges but also provides practical adaptation measures. These measures are essential for cities, towns, and settlements, empowering local government to mitigate the impacts of climate hazards on communities, the environment, the economy, and municipal assets and infrastructure, while aligning with broader developmental goals (refer to [Green Book I Adapting settlements for the future](#)).

The Climate Risk Profile and the Climate Change Adaptation Plan serve distinct yet interlinked purposes and strategic objectives. They aim to:

1. Drive and advance the local climate change response agenda.
2. Provide a foundational framework for strategy and planning within the Local Municipality, with a specific focus on Priority Human Settlements or Priority Housing Development Areas (PHSDAs).
3. Systematically identify and prioritise risks and vulnerabilities.
4. Pinpoint and prioritise targeted interventions and responses.
5. Facilitate the integration of climate change response, particularly adaptation, into mainstream policies and practices.

In essence, these documents are instrumental in equipping Port St. Johns Local Municipality with a comprehensive strategy to navigate the complexities of climate change, reduce vulnerability and exposure, and champion sustainable development.

The Adaptation Action Plan briefly outlines the policies constituting the framework for adaptation in South Africa. It then goes on to describe generic adaptation principles, approaches, pathways, and various categories of actions. Subsequently, the plan suggests a specific adaptation strategy for Port St. Johns LM by aligning it with adaptation goals, programmes, and actions designed to address priority risks. Finally, the document concludes with recommendations aimed at facilitating the integration of the proposed actions into broader initiatives, ensuring their effective mainstreaming.

## 2. Policy Framework

South Africa's institutional policy and legislative framework makes provision for climate change adaptation at all levels of government, with local government increasingly identified as the primary driver of climate change adaptation. For instance, there exists various national policy and legislative mechanisms that promote, necessitate, guide and/or regulate climate change adaptation at the local level. These include the Disaster Management Amendment Act, i.e., Act No. 16 of 2015, the Spatial Planning and Land Use Management Act (SPLUMA), i.e., Act No. 16 of 2013, the Climate Change Bill (B9 of 2022), the 2011 National Climate Change Response White Paper, as well as the 2019 National Climate Change Adaptation Strategy.

While the Disaster Management Amendment Act requires each organ of state, as well as provincial and local government to identify measures for, as well as indicate plans to invest in, disaster risk reduction (DRR) and climate change adaptation; SPLUMA identifies the principles of (1) spatial resilience – which involves accommodating “flexibility in spatial plans, policies and land use management systems, to ensure sustainable livelihoods in communities most likely to suffer the impacts of economic and environmental shocks” (Republic of South Africa., 2013, p. 20) – some of which may be induced by the impacts of climate change, and (2) spatial sustainability, which sets out requirements for municipal planning functions such as spatial planning and land use management to be carried out in ways that consider protecting vital ecosystem features such as agricultural land, i.e., from both anthropogenic and natural threats, including the impacts of climate change, as well as in ways that consider current and future costs of providing infrastructure and social services in certain areas (e.g., uninformed municipal investments may lead to an increase in the exposure of people and valuable assets to extreme climate hazards) amongst the key principles intended to guide municipal planning and development. The Climate Change Bill (DEA, 2018) sets out requirements for every District Intergovernmental Forum to serve as a Municipal Forum on climate change that coordinates climate response actions and activities in its respective municipality, while also requiring every municipality to report on their climate change response needs and draft resultant climate risk assessments, as well as climate change response and -implementation plans.

Moreover, the National Climate Change Response White Paper identifies local governments as critical role players that can contribute towards effective climate change adaptation through their various functions, including human settlement planning; urban development; municipal infrastructure and services provision; water and energy demand management; and local disaster response, amongst others. The National Climate Change Adaptation Strategy (DEA, 2019) outlines several actions that are applicable at local government level, including the development and implementation of adaptation strategies and vulnerability reduction programmes for communities and individuals that are most at risk to the impacts of climate change; the development of municipal early warning systems; as well as the integration of climate change adaptation into municipal development plans and relevant sector plans.

In response to the national call to advance spatial transformation and consolidation in human settlement development, the National Department of Human Settlements (DHS) has identified and gazetted a total of 136 Priority Human Settlements and Housing Development Areas (PHSHDAs). The PHSHDAs were declared to ensure that housing delivery is used to restructure and revitalise towns and cities, strengthen the livelihood prospects of households, and overcome apartheid spatial patterns by fostering integrated urban forms (DHS, 2020). PHSHDAs were designated using national criteria which includes an area or settlement's potential to support sustainable environmental management (which plays a critical role in mitigating the negative impacts of climate change, particularly through nature-based adaptation



solutions), as well as its potential to accommodate the integration of land uses and amenities, i.e., in addition to other criteria.

The DHS has identified two key objectives for PSHDAs, including (1) targeting and prioritising areas for integrated housing and human settlements development to ensure the delivery of housing for a diverse range of income groups within an integrated mixed-use development, as well as (2) transforming spatial patterns which have historically exacerbated social inequality and economic inefficiency (PLM, 2021). As part of the second objective, this initiative aims to develop post-apartheid cities and city patterns that ensure urban access, as well as achieve a balance between spatial equity, economic competitiveness and environment sustainability (PLM, 2021). As the impacts of climate change become more severe, the latter outcome (i.e., ensuring and maintaining environmental sustainability) will become increasingly important.

Furthermore, as part of the implementation approach for housing and human settlement development in PSHDAs, the DHS has identified the provision and maintenance of ecological infrastructure to support development in priority areas as a key avenue for integrating climate considerations and mainstreaming climate responses, including climate change adaptation.

### 3. Adaptation Principles, Approach, Programmes & Actions

Climate change mitigation and adaptation refer to the two primary strategies aimed at addressing the adverse effects of climate change, i.e., by either delaying, reducing, redistributing, or avoiding the impacts. Although disaster risk reduction and climate change mitigation form part of the overall climate change response agenda, the focus of this plan is on adaptation.

Climate change adaptation aims to reduce climate-related risks by adjusting a system to the actual or anticipated climate and seeking “to moderate or avoid harm [and] exploit beneficial opportunities” (IPCC, 2022, p. 2898) that may derive from unavoidable impacts of climate change such as extreme hazards. The climate change adaptation agenda is concerned with adapting species, people, places, assets, and systems, to the impacts of actual or anticipated climate-related risks and implements various measures or actions to achieve this (Behsudi, 2021; C40, 2020).

This section of the report outlines adaptation principles, drawing from the recommendations by the South African Bureau of Standards. It also presents a structured approach to selecting adaptation options, categorises adaptation actions, and explains the concept of an adaptation pathway.

#### 3.1. Adaptation principles

The Bureau for Standards recently proposed the following principles that apply to local government when adapting to climate change (SABS, 2023):

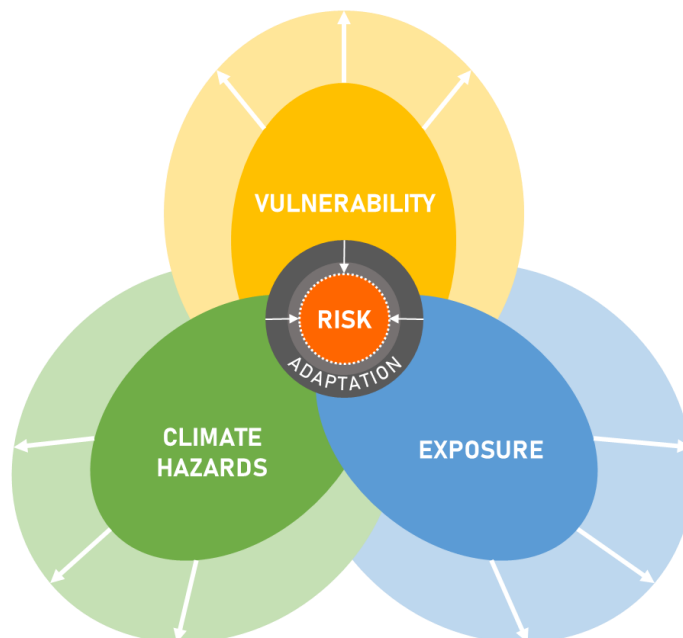
- i. **Accountability:** Local governments not only acknowledge but also assume responsibility for their climate change adaptation efforts. They willingly subject themselves to appropriate scrutiny and accept the duty to respond to this scrutiny.
- ii. **Continual learning and improvement:** Recognising the uncertainties in knowledge and the dynamic nature of drivers of change, available knowledge and evidence, and the contextual factors, continual learning and improvement are essential for effective climate change adaptation.

- iii. **Mainstreaming and embedding:** The effectiveness of climate change adaptation is maximised when integrated into local government operations, encompassing policies, plans, procedures, risk management, and implementation strategies.
- iv. **Flexibility:** Embrace a flexible approach that considers technical, social, administrative, political, legal, environmental, and economic circumstances. This allows for the accommodation of a diverse range of data availabilities and technical and institutional capacities to meet goals and objectives.
- v. **Practicality:** Set practical and achievable goals and objectives. Impractical targets may hinder the successful realisation of climate change adaptation benefits. Focus on easily measurable indicators/metrics with available underlying data and compare them across scales to avoid imposing additional burdens.
- vi. **Prioritisation:** During the identification of adaptation plans and measures, prioritise areas based on the relative characteristics of climate change impacts (magnitude, likelihood, and urgency). Consider the capacities of stakeholders and the local government and community's ability to act.
- vii. **Proportionality:** Undertake actions that are most effective under the current circumstances, including economic, social, cultural, and political contexts, capabilities, knowledge, and evidence base. Aspire for continual improvement in identifying and assessing adaptation measures.
- viii. **Relevance:** Facilitate assessments that provide decision-makers and practitioners with meaningful information for adaptation planning, considering appropriate spatial scales and relevant time durations.
- ix. **Transparency:** Ensure that reports and communications on climate change adaptation are openly, comprehensively, and understandably presented, providing accessible information for all interested parties (SABS, 2023).

These principles should be considered when formulating adaptation goals, programmes, and measures.

### 3.2. Adaptation approach

The approach that was followed to develop this adaptation plan revolves around comprehending the climate-related risks and implementing adaptive measures in response to these risks. Climate-related risk encompasses the potential for adverse consequences arising from the interplay of vulnerability, exposure, and the occurrence of climate hazards (IPCC, 2022). The components of risk are dynamic, with the occurrence of climate hazards influenced by both natural climate variability and anthropogenic climate change. The exposure of individuals, the built environment, and the natural surroundings to climate hazards is driven by both planned and unplanned development and growth. Vulnerability is the inherent characteristics that make systems sensitive to the effects and impacts of climate hazards.



*Figure 1 – The interplay between climate hazards, vulnerability and exposure that determines risk (based on IPCC, 2014 and IPCC, 2021)*

The inherent uncertainty in future climate trends underscores the necessity for a flexible response and the formulation of adaptable, medium to long-term adaptation strategies.

The approach followed in this plan involves the following steps:

- i. Gain an understanding of climate risk in a specific geographic area.
- ii. Identify priority climate hazards/zones based on the risk profile.
- iii. Establish adaptation goals to mitigate the risk associated with priority hazards/zones.
- iv. Develop adaptation programmes with measures/actions to achieve these goals.
- v. Integrate climate considerations into other sector plans/instruments/strategies.

Refer to Table 1 for a more detailed description of this approach.

*Table 1: The adaptation approach*

Understand climate risk for a specific geographic area	A climate risk profile assesses risk by determining – in a specific geographic area and at a specific scale – the likelihood of a hazard to occur, the inherent vulnerability of various systems, and exposure of these systems to specific climate hazards. To be able to develop an appropriate adaptation plan, it is important to understand what contributes to risk and vulnerability.
Identify priority climate-related risks/zones	Identify the climate hazards and impacts that pose the greatest risk at present and in the future within a geographic area. If possible, also identify climate risk zones that need to be prioritised for intervention.

Establish adaptation goals	Identify adaptation goals to address priority risks/zones that speak to policy goals.
Develop adaptation programmes and actions	<p>Develop adaptation programmes that speak to the identified adaptation goals and identify appropriate adaptation actions under each of the programmes that are mutually supportive. Adaptation actions should:</p> <ul style="list-style-type: none"> <li>• Be specific to a climate hazard/vulnerability/exposure.</li> <li>• Suggest a target or an indicator to measure progress.</li> <li>• Be assignable to a primary implementer.</li> <li>• Consider co-benefits and other possible implications.</li> <li>• Include mitigation as far as it builds resilience or reduces exposure and vulnerability.</li> </ul>
Mainstream climate considerations into planning	Integrate evidence of climate risk, adaptation goals, programmes, and actions into existing instruments and processes. The aim is to ensure that climate change considerations are an integral part of all that local government is doing.

The primary aim of an adaptation plan is to address both current and anticipated future risks and vulnerabilities while also leveraging opportunities for long-term transformation and sustainable development.

### 3.3. Adaptation programmes and actions

An adaptation programme is a structured and systematic set of actions, initiatives, and interventions that can be used to adapt to the impacts of climate change. It involves the practical implementation of specific goals identified in the plan.

Broadly, adaptation actions include anticipatory and reactive measures. Anticipatory adaptation involves proactive measures taken in preparation for anticipated climate change impacts, while reactive adaptation entails responding to climate change effects as they are experienced. Furthermore, it facilitates the integration and prioritisation of climate change adaptation and resilience measures into various planning mechanisms and processes (CSIR, 2019).

A spectrum of adaptation actions is at the disposal of local municipalities to enhance resilience and mitigate risks posed by changing climatic patterns and extreme weather events. Some of the categories of actions include:

- Infrastructure development, encompassing the construction of, for example, seawalls, levees, and storm surge barriers to protect against rising sea levels and extreme weather events. These engineered solutions provide immediate protection and buy time for longer-term adaptation efforts but are mostly very expensive to build.
- Green infrastructure initiatives offer sustainable and nature-based solutions. Municipalities can implement urban green spaces, green roofs, and permeable pavements to absorb excess water, reduce flooding, and mitigate the urban heat island effect. Such approaches not only enhance climate resilience but also contribute to improved air quality and overall urban liveability.

- Environmental protection such as restoring ecosystems like mangroves, dunes, and wetlands, not only provides natural buffers but also supports biodiversity.
- Integrated urban planning is essential to create climate-resilient municipalities. Land-use regulations should be adapted to consider climate risks, prioritising construction practices that enhance resilience. Elevating structures above projected flood- and sea levels and using climate-resilient materials in building design can minimise the impacts of flooding and storm damage.
- Early warning systems and emergency preparedness plans are critical tools to ensure swift responses to extreme weather events, minimising the impact on vulnerable communities.
- Innovative water management strategies are essential for municipalities facing changing precipitation patterns and increasing water scarcity. Diversifying water sources, implementing water efficiency measures, and investing in advanced stormwater management systems contribute to water security and sustainable resource use.
- Engagement and education are pivotal components of successful adaptation strategies. Empowering officials, and residents, to understand and respond to climate risks through awareness campaigns, education programmes, and participatory planning initiatives can enhance local adaptive capacity (CSIR, 2019).

Local governments must embrace a combination of structural, natural, and community-based approaches to build resilience and adaptive capacity, protect vulnerable communities, while ensuring long-term sustainability in the face of evolving climate challenges.

## 4. Summary of Climate Risk Profile

A Climate Risk Profile Report was prepared by the team, designed to complement this Plan. The comprehensive Climate Risk Profile serves as an essential resource for understanding the risks associated with climate change in Port St. Johns Local Municipality. Presented to representatives of the Municipality during a series of nationwide stakeholder engagements in late 2023, these workshops served as forums to not only validate the risks outlined in the report but also to confirm the adaptation goals proposed.

This section of the Plan summarises the climate risk profile for Port St. Johns, drawing from the GreenBook Risk Profile Tool at <https://riskprofiles.greenbook.co.za/>. Consult the accompanying Climate Risk Profile Report for more detailed information.

### 4.1. Climate projections, vulnerabilities and impacts

The average annual temperature under baseline conditions in Port St Johns Local Municipality (PSJLM) ranges between a low of 18°C in the interior and around 22°C on the south coast. It is expected that these temperatures may increase by between 1.82°C to 2.14°C from the interior to the coast of Port St Johns in future. Port St Johns has a south-to-north rainfall gradient, with lowest rainfall in the south coast (1600 mm) and highest rainfall in the interior (2400 mm). The highest increases in rainfall are expected towards the interior part and is expected to increase in the interior by 286.27 mm and decrease by 29.95 mm in the south coast of the municipality.

The population of Port St Johns is projected to increase by 21% between 2011 and 2030, and a further 10.98% by 2050 under a medium growth scenario. Port St. Johns is projected to experience medium population

growth pressure by 2050 and this alludes to the potential increase in the exposure of people and their assets to future climate conditions and their impacts.

The water sector and the agriculture, forestry and fisheries (AFF) sector are key economic sectors impacted by climate change in the Ports St. Johns local municipality. In terms of the water sector, it is expected that water resources and supply of the PSJLM would be impacted by climate change. The catchment serving Port St Johns LM includes the Mzimvumbu-Tsitsikamma Primary Catchment Water. The Port St. Johns area is entirely surface water dependent and the water demand in the municipality is currently higher than supply with a water supply vulnerability value of 1.84. It is expected that the LM's water supply vulnerability will further increase to just over 2.0 due to the projected increases in mean annual evaporation, and population growth.

The AFF sector in Port St Johns contributes 1.35% to the local GVA, which is a contribution of 0.02% to the national GVA for the AFF sector. More than 5% of the LM's total employment is within the AFF sector. Agriculture consists of small-scale and communal livestock framers, and livestock is a priority at subsistence and livelihood scale. Climate projections show a warmer and wetter climate with more extreme rainfall events which support increased water availability and grazing potential. However, hot, and moist conditions could cause increased spread of disease and parasites, which in turn contribute to reduced growth & reproduction performance due to heat stress.

#### 4.2. Priority climate-related hazards

One of the most significant climate risks identified for Port St Johns LM is that rainfall is likely to become more uneven and intense resulting in a higher risk for flooding and landslides. This, in turn, impacts stormwater management, water quality, public health, and transportation with a higher risk of damage to infrastructure. Under current baseline conditions, the flood hazard index for Port St Johns indicates a low risk for the entire settlement with a medium flood risk in the northern parts of the local municipality. In future there will be an increase in extreme rainfall days, of between 0.22-5.56 days, especially over the interior parts of the local municipality which is projected to undergo a higher increase in extreme rainfall events. The eastern part of Port St Johns and the northeastern part of the local municipality, however, are projected to experience slightly fewer extreme rainfall days in future.

Port St Johns will likely face a very low risk of coastal flooding and the area is not exposed to any erosion risk by 2050. The PSJLM has a very low settlement drought-level risk, and while conditions of heat extremes increase slightly in the future, settlement extreme heat risk will remain very low. Similarly, the current settlement wildfire risk in the Port St Johns area is rare, and the number of fire danger days is unlikely to increase much in future.

## 5. Adaptation Goals, Programmes and Actions

This section outlines the adaptation plan using goals and actions designed to help the Port St. Johns LM to adapt to the impacts of climate change. Based on the assessment of the potential risks and vulnerabilities posed by climate change, this plan was developed as a proactive strategy to mitigate these risks and enhance resilience.

## 5.1. Adaptation goals

Drawing upon the assessment of the current and projected climate-related risks and vulnerabilities outlined in the preceding section, the following adaptation goals for Port St. Johns LM were identified, prioritising those risks with the highest potential impact. These goals were validated by stakeholders during the nationwide engagements:

1. Goal 1: To ensure water security and good water quality, protecting water resources under a changing climate.
2. Goal 2: To protect and increase the resilience of critical municipal infrastructure.
3. Goal 3: To invest in green infrastructure, rehabilitate and protect natural resources and biodiversity to improve ecosystem services.
4. Goal 4: To build capacity of the public health sector and protect human health.
5. Goal 5: To support resilient commercial, small-scale and subsistence farming systems (these contribute to food security and employment in the area).

The adaptation programmes below identify the overarching programmes and their actions, necessary to achieve each one of the goals. Specific timeframes and responsibilities are allocated in the subsequent implementation framework.

## 5.2. Adaptation programme: Goal 1

Goal 1: To ensure water security and good water quality, protecting water resources under a changing climate

### Programme 1.1: Protect and conserve water

The purpose of this programme is to: (1) protect critical water sources and downstream water bodies from contamination, whether from stormwater or from potential pollution sources; and (2) implement water conservation measures throughout the municipality to reduce demand and water losses in the reticulation system.

#### Actions:

- i. Protect water sources by reducing pollution from stormwater runoff.
- ii. Implement water conservation measures.
- iii. Design systems to recycle water.
- iv. Prioritise maintenance and rehabilitation of existing infrastructure and development.

### Programme 1.2: Promote use of diversified water sources

Use of diversified water sources reduces demand for potable water for purposes for which it is not required, so that more potable water is available for drinking, sanitation and other purposes. The municipality can diversify its water sources by investing in solutions such as underground storage, stormwater capture, groundwater, fog water harvesting, and direct and indirect wastewater recycling.

#### Actions:

- i. Develop a Water Services Development Plan to guide the diversification of the water supply and enhance water security.
- ii. Incorporate water use and management plans into the LM's IDP and SDBIP.

- iii. Encourage the use of alternative water sources such as rainwater tanks, stormwater and recycled water by the government, developers and households.
- iv. Design stormwater and rainwater harvesting systems for new developments or employ retrofitting.

**Programme 1.3: Amend, enforce and monitor water policies and guidelines**

This programme will support sound water use regulations to enhance water security for authorised users and protects water resources and their environments from damage by promoting an enabling regulatory environment for water use management and the improvement of water efficiency.

**Actions:**

- i. Review and amend water use policies and policies related to promoting water efficiency
- ii. Enforce “green” approaches in residential areas and developments  
Enforce the implementation of regulations and legislation

### 5.3. Adaptation programme: Goal 2

**Goal 2: To protect and increase the resilience of critical municipal infrastructure**

**Programme 2.1: Protect municipal infrastructure currently located in high climate-risk areas (e.g. areas at risk of flooding and landslides)**

One of the most significant climate risks identified for Port St Johns LM is that rainfall is likely to become more uneven and intense, and as such, there is a higher risk for flooding as well as landslides. The purpose of the programme is to ensure all developments and infrastructure within climate risk zones and hotspots, and vulnerable to damage are prioritised and incorporated into an action plan to climate proof if possible.

**Actions:**

- i. Limit infrastructure development in high-risk areas/climate risk zones and hotspots.
- ii. Climate proof existing developments within climate risk zones or hotspots, where possible.

**Programme 2.2: Design and maintain stormwater infrastructure to accommodate storm surges and increase the volume of stormwater runoff to prevent damage to infrastructure and assets**

The Port St Johns IDP highlights that stormwater drainage maintenance and upgrade plans to cope with increased volumes and storm damage and deterioration of road surfaces is a key priority. The SDF also indicates the need for the adaptation of improved stormwater infrastructure to manage runoff and stormwater drainage.

**Actions:**

- i. Identify existing stormwater infrastructure that is vulnerable to the impacts of climate change.
- ii. Develop natural buffer zones around critical stormwater infrastructure.
- iii. Design stormwater and rainwater harvesting systems.
- iv. Retrofit or replace existing stormwater infrastructure to meet revised design criteria.
- v. Regularly maintain stormwater systems.



## 5.4. Adaptation programme: Goal 3

**Goal 3: To invest in green infrastructure, rehabilitate and protect natural resources and biodiversity to improve ecosystem services.**

Biodiversity and ecosystem services is a key priority sector in the PSJLM due to increased impacts on threatened ecosystems and environment due to land-use change. The District's IDP states that effective environmental planning, including urban and rural greening, can assist greatly in improving the quality of the environment and the livelihoods of the people who live in these areas. A practical and aggressive action plan is needed to enable the Municipality to assist with issues of environmental sensitivity, reducing the municipality's carbon footprint, and increasing the quality of the environment for the municipality.

**Programme 3.1: Ensure critical biodiversity and ecological support areas are integrated into city spatial plans at all scales**

This programme addresses the need to identify the geographic areas necessary for meeting biodiversity conservation targets and provide recommendations for appropriate land uses across several recognised biodiversity categories. This can be achieved through the development of Critical Biodiversity Area (CBA) maps which are a form of strategic planning for the natural environment. It is important to identify these sites and to include them in Integrated Development Plans and Spatial Development Frameworks to ensure that they are considered in development decisions and sufficiently protected from the impacts of climate change.

Actions:

- i. Develop critical biodiversity maps for the PSJHLM.

**Programme 3.2: Protect key ecosystems and protected areas**

The purpose of this programme is to protect key ecosystems and protected areas through land use management tools. These areas need to be protected from development. Development application should be considered in terms of individual applications and cumulative impacts within these areas.

Actions:

- i. Development and integration of the biodiversity sector plan into the broader spatial planning process for the PSJLM.

**Programme 3.3: Rehabilitate ecosystems and maintain ecological infrastructure**

The rehabilitation and maintenance of ecological infrastructure ensures that the ecosystems continue to deliver valuable services to people and communities (e.g. water and climate regulation, soil formation and disaster risk reduction).

Actions:

- i. Conduct a holistic assessment of the landscape to determine which components of the ecosystem need to be rehabilitated, which biological indicators to use, and identify the measures required (e.g. re-vegetation, removal of invasive alien species, and erosion protection measures).
- ii. Conduct regular maintenance of identified ecosystems to ensure the continued provision of related processes and services.

## 5.5. Adaptation programme: Goal 4

Goal 4: Build capacity of the public health sector and protect human health.

Programme 4.1: Determine and quantify the type, nature, magnitude, gender dimensions and distribution of current and potential health impacts associated with climate change

With increasing temperatures and flooding events, the potential for water- and vector-borne diseases in the municipality will increase significantly. The purpose of this programme is to reduce water- and vector-borne diseases linked to predicted climate change impacts.

### Actions:

- i. Conduct a study to determine and quantify the current and potential health impacts associated with climate change in PSJLM.

Programme 4.2: Promote knowledge/information sharing and decision making that ensures public health and safety during climate events

Communities should be aware of the factors that contribute to climate-related health risks and be able to identify at-risk people in their neighbourhood.

### Actions:

- i. Promote information sharing – put actions in place that enable communities to receive and share information on climate change issues that are relevant to their community.
- ii. Mainstream climate change into IDPs – establishing on-the-ground policies that address local opportunities and vulnerabilities arising from climate change.

Programme 4.3: Promote local health care to address the health impacts of climate change and ensure access to public health services during extreme weather events

Awareness of climate-related health risks such as heat stress and others should form part of the process to share information on climate-related challenges.

### Actions:

- i. Identify access to health services during extreme climate events (e.g. flooding, heatwaves).
- ii. An access plan should be incorporated into the Early Warning System (EWS) so health facilities in high-risk areas are alerted before an event.
- iii. Develop a Community Services Plan to comprehensively dovetail municipal health needs and their climate change risks into the PSJLM development planning.
- iv. Increase capacity and resources at health facilities for climate change related impacts.

## 5.6. Adaptation programme: Goal 5

Goal 5: To support resilient commercial, small-scale and subsistence farming systems (these contribute to food security and employment in the area)

Programme 5.1: Promote climate-resilient local food production to improve food security

This programme aims to provide small-scale and subsistence farmers with the information needed to support informed decision-making and risk management to increase their adaptive capacity.

**Actions:**

- i. Identify climate-resilient areas: conduct comprehensive climate risk assessments to identify vulnerabilities and risks posed by increased temperatures and changes in rainfall patterns to small-scale and subsistence farmers.
- ii. Identify climate-resilient crops.
- iii. Develop localised adaptation plans based on assessment findings to guide farming communities in adopting climate-resilient farming practices.

**Programme 5.2: Protect high value and urban agricultural land and promote climate smart agriculture**

This programme aims to enhance the resilience and sustainability of urban agricultural systems to ensure food security and support livelihoods. This programme will also promote sustainable local food economies that support farmers and strengthen community resilience.

**Actions:**

- i. Identify suitable land within the urban edge that can be used for urban agricultural uses based on assessments of available land, access to bulk infrastructure, production potential, complementary uses and environmental restrictions.
- ii. Determine appropriate agricultural activity for identified land and include these sites in the municipality's Spatial Development Framework.

**Programme 5.3: Capacity building to promote sustainable agricultural practices**

This programme aims to provide technical assistance and capacity building to small-scale and subsistence farmers by strengthening agricultural extension services through the implementation of capacity-building programs.

**Actions:**

- i. Implement training programs to educate farmers on sustainable agricultural practices such as use of water-efficient irrigation technologies, agroforestry, crop rotation, and integrated pest management (IPM).
- ii. Facilitate the adoption of soil conservation methods to improve soil health and resilience to climate extremes.

## 6. Implementation Framework

The implementation framework summarises the adaptation plan and indicates responsibilities, timeframes, and priorities.

### 6.1. Implementation framework: Goal 1

Goal 1: To ensure water security and good water quality, protecting water resources under a changing climate.

Adaptation programme 1.1: Protect and conserve water				
Adaptation Actions	Key risk or vulnerability addressed	Responsible department	Timeframe	Priority level
i. Protect water sources by reducing pollution from stormwater runoff.	Surface water depletion; flooding	Engineering Services – Water and Sanitation	Medium term	High
ii. Implement water conservation measures.	Surface water depletion	Engineering Services – Water and Sanitation	Medium term	High
iii. Design systems to recycle water.	Surface water depletion, flooding	Engineering Services – Water and Sanitation	Medium term	Medium
iv. Prioritise maintenance and rehabilitation of existing infrastructure and development.	Flooding	Engineering Services – Water and Sanitation	Short	High

Adaptation programme 1.2 Promote use of diversified water sources				
Adaptation Actions	Key risk or vulnerability addressed	Responsible department	Timeframe	Priority level
i. Develop a Water Services Development Plan to guide the diversification of the water supply and enhance water security.	Surface water depletion; flooding	Engineering Services – Water and Sanitation, ORT DM	Medium term	High
ii. Incorporate water use and management plans into the LM's IDP and SDBIP.	Surface water depletion, flooding	Engineering Services – Water and Sanitation	Long term	High
iii. Encourage the use of alternative water sources such as rainwater tanks, stormwater and recycled water by the government, developers and households.	Surface water depletion, flooding	Engineering Services – Water and Sanitation	Short term	High

iv. Design stormwater and rainwater harvesting systems for new developments or employ retrofitting.	Flooding	Engineering Services – Water and Sanitation	Long term	High
---	----------	---	-----------	------

Adaptation programme 1.3 Amend, enforce and monitor water policies and guidelines				
Adaptation Actions	Key risk or vulnerability addressed	Responsible department	Timeframe	Priority level
i. Review and amend water use policies and policies related to promoting water efficiency	Surface water depletion	Engineering Services – Water and Sanitation	Medium term	High
ii. Enforce “green” approaches in residential areas and developments	Surface water depletion	Engineering Services – Water and Sanitation;	Short term	High
iii. Enforce the implementation of regulations and legislation	Surface water depletion	Engineering Services – Water and Sanitation	Short term	High

## 6.2. Implementation framework: Goal 2

Goal 2: To protect and increase the resilience of critical municipal infrastructure

Adaptation programme 2.1 Protect municipal infrastructure currently located in high climate-risk areas (e.g. areas at risk of flooding and landslides)				
Adaptation Actions	Key risk or vulnerability addressed	Responsible department	Timeframe	Priority level
i. Limit infrastructure development in high-risk areas/climate risk zones and hotspots.	Flooding	Engineering Services – Water and Sanitation	Long term	High
ii. Climate proof existing developments within climate risk zones or hotspots, where possible.	Flooding	Engineering Services – Water and Sanitation	Medium term	High

Adaptation programme 2.2 Design and maintain stormwater infrastructure to accommodate storm surges and increase the volume of stormwater runoff to prevent damage to infrastructure and assets				
Adaptation Actions	Key risk or vulnerability addressed	Responsible department	Timeframe	Priority level
i. Identify existing stormwater infrastructure that is vulnerable to the impacts of climate change.	Flooding	Engineering Services – Water and Sanitation	Short term	High
ii. Develop natural buffer zones around critical stormwater infrastructure.	Flooding	Engineering Services – Water and Sanitation	Long term	Medium
iii. Design stormwater and rainwater harvesting systems.	Flooding	Engineering Services – Water and Sanitation	Medium term	Medium
iv. Retrofit or replace existing stormwater infrastructure to meet revised design criteria.	Flooding	Engineering Services – Water and Sanitation	Medium term	Medium

### 6.3. Implementation framework: Goal 3

Goal 3: To invest in green infrastructure, rehabilitate and protect natural resources and biodiversity to improve ecosystem services.

Adaptation programme 3.1 Ensure critical biodiversity and ecological support areas are integrated into city spatial plans at all scales				
Adaptation Actions	Key risk or vulnerability addressed	Responsible department	Timeframe	Priority level
i. Develop critical biodiversity maps for the PSJHLM.	Flooding, heat stress, drought, wildfires	Engineering Services; Local Economic Development	Short term	High

Adaptation programme 3.2 Protect key ecosystems and protected areas				
Adaptation Actions	Key risk or vulnerability addressed	Responsible department	Timeframe	Priority level
i. Development and integration of the biodiversity sector plan into the broader spatial planning process for the PSJLM.	Flooding, heat stress, drought, wildfires	Engineering Services; Local Economic Development	Short term	High

Adaptation programme 3.3 Rehabilitate ecosystems and maintain ecological infrastructure				
Adaptation Actions	Key risk or vulnerability addressed	Responsible department	Timeframe	Priority level
i. Conduct a holistic assessment of the landscape to determine which components of the ecosystem need to be rehabilitated, which biological indicators to use, and identify the measures required (e.g. re-vegetation, removal of invasive alien species, and erosion protection measures).	Flooding, heat stress, surface water depletion	Engineering Services, Local Economic Development	Short term	High
ii. Conduct regular maintenance of identified ecosystems to ensure the continued provision of related processes and services.	Flooding, heat stress, surface water depletion	Engineering Services, Local Economic Development	Short	High

#### 6.4. Implementation framework: Goal 4

Goal 4: Build capacity of the public health sector and protect human health.

Adaptation programme 4.1 Determine and quantify the type, nature, magnitude, gender dimensions and distribution of current and potential health impacts associated with climate change				
Adaptation Actions	Key risk or vulnerability addressed	Responsible department	Timeframe	Priority level
i. Conduct a study to determine and quantify the current and potential health impacts associated with climate change in PSJLM.	Health risk, flooding	Engineering Services, Community Services & Public Safety	Short term	High

Adaptation programme 4.2 Promote knowledge/information sharing and decision making that ensures public health and safety during climate events				
Adaptation Actions	Key risk or vulnerability addressed	Responsible department	Timeframe	Priority level
i. Promote information sharing - put actions in place that enable communities to receive and share	Flooding, heat stress, health risks	Engineering Services, Community Services & Public Safety	Medium term	Medium

information on climate change issues that are relevant to their community.				
ii. Mainstream climate change into IDPs - establishing on-the-ground policies that address local opportunities and vulnerabilities arising from climate change.	Flooding, heat stress, health risks	Engineering Services, Community Services & Public Safety	Medium term	Medium

Adaptation programme 4.3 Promote local health care to address the health impacts of climate change and ensure access to public health services during extreme weather events.				
Adaptation Actions	Key risk or vulnerability addressed	Responsible department	Timeframe	Priority level
i. Identify access to health services during extreme climate events.	Flooding, heat stress, health risks	Engineering Services, Community Services & Public Safety	Short term	High
ii. An access plan should be incorporated into the Early Warning System (EWS) so health facilities in high-risk areas are alerted before an event.	Flooding, heat stress, health risks	Engineering Services, Community Services & Public Safety	Short term	High
iii. Develop a Community Services Plan to comprehensively dovetail municipal health needs and their climate change risks into the PSJLM development planning.	Flooding, heat stress, health risks	Engineering Services, Community Services & Public Safety	Medium term	Medium
iv. Increase capacity and resources at health facilities for climate change related impacts.	Flooding, heat stress, health risks	Engineering Services, Community Services & Public Safety	Long term	Medium



## 6.5. Implementation framework: Goal 5

Goal 5: To support resilient commercial, small-scale and subsistence farming systems

Adaptation programme 5.1 Promote climate-resilient local food production to improve food security				
Adaptation Actions	Key risk or vulnerability addressed	Responsible department	Timeframe	Priority level
i. Identify climate-resilient areas - Conduct comprehensive climate risk assessments to identify vulnerabilities and risks posed by increased temperatures and changes in rainfall patterns to small-scale and subsistence farmers.	Surface water depletion, heat stress	Engineering Services, Local Economic Development	Short term	High
ii. Identify climate-resilient crops.	Surface water depletion, heat stress	Engineering Services, Local Economic Development	Short term	High
iii. Develop localized adaptation plans based on assessment findings to guide farming communities in adopting climate-resilient farming practices.	Surface water depletion, heat stress	Engineering Services, Local Economic Development	Medium term	Medium

Adaptation programme 5.2 Protect high value and urban agricultural land and promote climate smart agriculture				
Adaptation Actions	Key risk or vulnerability addressed	Responsible department	Timeframe	Priority level
i. Identify suitable land within the urban edge that can be used for urban agricultural uses based on assessments of available land, access to bulk infrastructure, production potential, complementary uses and environmental restrictions.	Surface water depletion, heat stress, flooding	Engineering Services, Local Economic Development	Medium term	High
ii. Determine appropriate agricultural activity for identified land and include these sites in the municipality's Spatial Development Framework.	Surface water depletion, heat stress, flooding	Engineering Services, Local Economic Development	Medium term	Medium

Adaptation programme 5.3 Capacity building to promote sustainable agricultural practices				
Adaptation Actions	Key risk or vulnerability addressed	Responsible department	Timeframe	Priority level
i. Implement training programs to educate farmers on sustainable agricultural practices such as use of water-efficient irrigation technologies, agroforestry, crop rotation, and integrated pest management (IPM).	Surface water depletion, heat stress	Engineering Services, Local Economic Development	Short term	High
ii. Facilitate the adoption of soil conservation methods to improve soil health and resilience to climate extremes.	Surface water depletion, heat stress	Engineering Services, Local Economic Development	Long term	Medium

## 7. Implications for the PSHDA

One of the most significant climate risks identified for Port St Johns LM is that rainfall is likely to become more uneven and intense, and as such, there is a higher risk for flooding as well as landslides. The highest increases are expected towards the interior parts of the local municipality, which included the Port St Johns Urban Centre. Changing extreme precipitation events will affect stormwater management, water quality, public health, and transportation with a higher risk of damage to infrastructure. These can be exacerbated in the absence of appropriate adaptation, protection and/or recovery procedures. The Port St Johns LM area is also predicted to experience population growth, leading to increased pressure on service delivery and competition for resources.

Under current climate conditions, water demand in the Port St Johns Urban Centre is already higher than water supply and the water supply vulnerability is expected to increase with the increasing population growth. It is important for the municipality to protect water resources under a changing climate to ensure water security and good water quality. Given the higher risk of flooding and storm surges, it is necessary to protect and increase the resilience of critical municipal infrastructure within the PSHDA that are at high risk of flooding, climate-proof existing infrastructure, and limiting the development of new infrastructure in flood-prone areas. There is a need for maintenance of existing stormwater infrastructure in the Port St Johns Urban Centre, as well as designing more climate-resilient stormwater infrastructure to accommodate potential storm surges. The inclusion of rainwater harvesting systems in the design of stormwater infrastructure can support promoting use of diversified water sources.

With increasing temperatures and flooding events, the potential for water- and vector-borne diseases in the municipality will increase significantly. Adaptation actions which help reduce water- and vector-borne diseases linked to predicted climate change impacts are essential. This includes understanding the potential health impacts linked to the impacts of climate change and increasing community awareness of climate-related health risks such as heat stress and others as part of the process to share information on climate-related challenges.

Commercial, small-scale and subsistence farming systems contribute to food security and employment in the PSJLM, as such, it is crucial to support increasing the climate resilience of these farming systems. This can be done through promoting climate-resilient local food production to improve food security, protecting high value and urban agricultural land and promoting climate smart agriculture within the Port St Johns Urban Centre, and providing capacity building to promote sustainable agricultural practices. Addressing these climate change risks, and proposed adaptation actions outlined within this plan, will require a collaborative effort from both the local and district municipality, public works programmes, coastal communities, engineers, and environmental scientists.

## 8. Recommendations for Mainstreaming

Mainstreaming is the process of integrating climate change considerations into existing sectoral plans, other instruments and decision-making processes across various sectors and levels of governance. It involves recognising that climate change impacts and risks cut across multiple sectors and require a holistic approach to address effectively.

Mainstreaming climate change involves several key elements:

- **Policy integration:** Embedding evidence of climate change, as well as climate change adaptation and mitigation considerations into sectoral policies and strategies, such as those related to disaster risk management, energy, water resources, transportation, and urban planning. This ensures that climate change is not treated as a standalone issue but is instead integrated into broader development agendas.
- **Institutional integration:** Incorporating climate change responsibilities and expertise within departments. This may involve establishing a dedicated but decentralised climate change unit, as well as fostering collaboration and coordination among departments and relevant external stakeholders. Incorporating climate response outcomes in the KPIs of all relevant departments, will ensure that progress towards climate goals can be tracked and measured.
- **Capacity building:** Enhancing the knowledge, skills, and capacities of politicians, decision-makers, and practitioners to understand and address climate change effectively. This includes providing training, technical assistance, and access to relevant information and tools, such as the GreenBook. By improving their understanding of climate change and the need for adaptation, these groups can better integrate climate considerations into their work.
- **Budgeting and financing:** Allocating resources and funding to support climate change adaptation and mitigation activities within existing budgets and financing mechanisms. This may involve reallocating funds from other priorities, leveraging external sources of finance, or integrating climate considerations into budget planning processes.
- **Establishing networks and partnerships:** Establishing networks and partnerships with civil society organisations, research councils, the private sector, different spheres of government, and other relevant entities could bolster climate adaptation efforts.
- **Monitoring and evaluation:** Establishing systems for monitoring and evaluating the effectiveness of mainstreaming efforts and tracking progress towards climate-related goals and targets is essential. This helps ensure accountability and facilitates learning and adaptation over time.

Climate change mainstreaming is essential for building resilience and promoting sustainable development in the face of climate change. By integrating climate considerations into decision-making processes and actions across sectors, mainstreaming helps minimise future risks, maximise opportunities for adaptation and mitigation, and enhance overall resilience to climate change impacts.

## 9. Bibliography

- Behsudi, A, 2021. What Is Mitigation vs Adaptation? IMF Finance Dev. Mag. 46–47.
- Council for Scientific and Industrial Research (CSIR), 2019. Green Book I Adapting settlements for the future. GreenBook. URL <https://greenbook.co.za/>
- Department of Environmental Affairs (DEA), 2018. Climate Change Bill.
- Department of Environmental Affairs (DEA), 2019. National Climate Change Adaptation Strategy.
- Department of Human Settlements (DHS), Republic of South Africa, 2020. Gazette Notice: Declaration of the Priority Human Settlements and Housing Development Areas (PHSHDAs) (No. Gazette Notice No. 526). Department of Human Settlements, Pretoria, South Africa.
- IPCC, 2014. Climate Change 2014: Synthesis Report. Contribution of Working Groups I, II and III to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change [Core Writing Team, R.K. Pachauri and L.A. Meyer (eds.)]. IPCC, Geneva, Switzerland, 151 pp.
- IPCC, 2021. Annex VII: Glossary [Matthews, J. B. R., J. S. Fuglestedt, V. Masson-Delmotte, V. Möller, C., Méndez, R. van Diemen, A. Reisinger, S. Semenov (ed.)]. In: Climate Change 2021: The Physical Science Basis. Contribution of Working Group I to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change [Masson-Delmotte, V., P. Zhai, A. Pirani, S. L. Connors, C. Péan, S. Berger, N. Caud, Y. Chen, L. Goldfarb, M. I. Gomis, M. Huang, K. Leitzell, E.
- IPCC, 2022. Climate Change 2022: Impacts, Adaptation and Vulnerability. Contribution of Working Group II to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change. Cambridge University Press., Cambridge, UK and New York, NY, USA.
- National Treasury, 2018. Supplementary Guidance Note for the Built Environment Performance Plan (BEPP) 2019/20– 2021/22: Integrating Climate Response Priorities into the BEPP.
- Pieterse, A., 2020. Mainstreaming Climate Change Adaptation into Municipal Planning: Lessons from two South African Cases (PhD Thesis). University of Pretoria.
- Pieterse, A., du Toit, J., van Niekerk, W., 2021. Climate change adaptation mainstreaming in the planning instruments of two South African local municipalities. Dev. South. Afr. 38, 493–508. <https://doi.org/10.1080/0376835X.2020.1760790>
- Pieterse, A., Ludick, C., van Niekerk, W., Arnold, K., Chilwane, L., Mateyisi, M., Nangombe, S., Steenkamp, K., John, J., Kotzee, I., Lück-Vogel, M., 2023. GreenBook MetroView: Methodology for eThekweni. Pretoria.
- Republic of South Africa (RSA), 2011. National Climate Change Response White Paper.
- Republic of South Africa (RSA), 2013. Spatial Planning and Land Use Management Act, 16 of 2013.
- Republic of South Africa (RSA), 2015. Disaster Management Amendment Act.
- South African Bureau of Standards (SABS), 2023. Technical specification: Adaptation to climate change – Requirements and guidance on adaptation planning for local governments and communities. Pretoria: SABS.