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INGQUZA HILL
LOCAL MUNICIPALITY

Ingquza Hill Local Municipality Adaptation Action Plan

JULY 2024

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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
IHLM	Ingquza Hill Local Municipality
IPCC	Intergovernmental Panel on Climate Change
LRT	Let's Respond Toolkit
PHDA	Priority Housing Development Area
PHS	Priority Human Settlement
PHSHDA	Priority Human Settlement and Housing Development Area
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 Ingquza Hill Local Municipality (IHLM) with the aim of strengthening its strategic response to climate change. These documents derive their insights from the GreenBook (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 | 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 Ingquza Hill Local Municipality (IHLM) 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 IHLM 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 PHSHDAs, 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 PHSHDAs, 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.

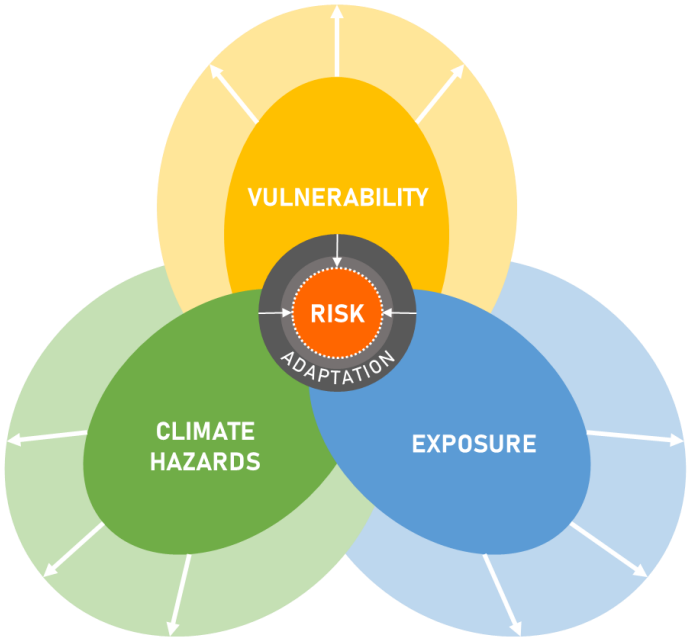

Figure 1 – The interplay between climate hazards, vulnerability and exposure that determines risk (based on IPCC, 2014 and IPCC, 2021)

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	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: • Be specific to a climate hazard/vulnerability/exposure. • Suggest a target or an indicator to measure progress. • Be assignable to a primary implementer. • Consider co-benefits and other possible implications. • Include mitigation as far as it builds resilience or reduces exposure and vulnerability.
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 Ingquza Hill 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 Ingquza Hill Local Municipality, 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 major settlements in the LM of Ingquza Hill are Lusikisiki, Mkhambathi, and Flagstaff, with the rest of the settlements classified as traditional areas. The average annual temperature under baseline conditions in the Ingquza Hill LM ranges between 15°C in the interior around areas of Flagstaff, and 19.4°C on the coast around Mkhambathi, and these temperatures are projected to increase between 1.8°C and 2.3°C respectively in future. The LM experiences summer rainfall with rainfall increasing along a northwest-to-southeast gradient from 1523mm at Flagstaff on the inland to 2323mm at Lusikisiki and Mkhambathi. Rainfall is expected to increase across the LM, with areas around Lusikisiki, Mkhambathi and Flagstaff predicted to receive increases of up to 300mm.

Ingquza Hill LM's water demand is already higher than water supply under current climate conditions, and it is expected that high population growth coupled with increasing temperatures will further increase water supply vulnerability. The quaternary catchment serving Ingquza Hill Local Municipality is Mzimvubu-Tsitsikamma Primary Catchments. The Lusikisiki Urban Development Node has both surface water and groundwater dependent settlements. The Lusikisiki Urban Development Node area has a high groundwater recharge potential, and it is projected that the groundwater recharge potential will significantly increase in the future, although the southern parts will not experience any changes in the future. In addition, the groundwater depletion risk in the area is medium.

The Lusikisiki Urban Development Node Priority Human Settlement and Housing Development Area (PHSDA) faces the highest service access vulnerability of all settlements in the LM, indicating challenges to access basic services such as electricity, water and sanitation as well as access to healthcare and education. In terms of physical vulnerability, the Ingquza Hill LM has a very high physical vulnerability score, i.e., the third highest in the province which alludes to the high structural vulnerabilities in the LM, particularly when considering the municipality's buildings and infrastructure. Ingquza Hill LM's population is projected to increase by almost 34% between 2011 and 2050, under a medium growth scenario with most of the growth expected to occur between 2011 and 2030. Lusikisiki is projected to experience high settlement-level population growth pressure, and this alludes to the potential increase in the exposure of people and their assets to future climate conditions and their impacts.

Agriculture in the Ingquza Hill LM consists primarily of maize for grain and beef cattle livestock. Livestock is a priority at a subsistence and livelihood scale. It is expected that the warmer, wetter climate with more extreme rainfall events projected for the area could be advantageous to livestock farming through increasing water availability and grazing potential. However, the spread of disease and parasites may increase due to the hot, moist conditions and this could potentially contribute to reduced growth and production performance due to heat stress.

4.2. Priority climate-related hazards

One of the most significant climate risks identified for Ingquza Hill LM and Lusikisiki Urban Development Node is that rainfall will become more extreme and intense. Under current baseline conditions the flood hazard index for Lusikisiki Urban Development Node indicates a low risk for the entire settlement with a moderate flood risk across the PHSHDA and parts of the local municipality. Lusikisiki is projected to undergo a significant increase in extreme rainfall events in the future and a moderate risk of floods in and around Lusikisiki is expected, specifically over the Lusikisiki Urban Development Node extending to the north-northwest and north-northeast of PHSHDA within the Ingquza Hill LM. The increase in extreme rainfall translates into a higher risk for flooding as well as landslides. The extreme precipitation events directly impact stormwater management, water quality, public health and transportation, as well as increases the risk of damage to infrastructure.

The future settlement drought-level risk in the Lusikisiki Urban Development Node is low. In terms of heat extremes, it is expected that while conditions of heat extremes in the Lusikisiki settlement are projected to increase in the future, settlement heat risk will remain very low. The area in and around Lusikisiki is prone to veldfires and has a possible likelihood of experiencing wildfires under current conditions. However, the risk of increases in wildfires by the year 2050 will be low.

5. Adaptation Goals, Programmes and Actions

The section outlines the adaptation plan using goals and measures designed to help Ingquza Hill 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 Ingquza Hill 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 protect 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 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 portable 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 supports 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.
iii. 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)

Lusikisiki is projected to undergo a significant increase in extreme rainfall events in the future and, and a moderate risk of floods in and around Lusikisiki is expected, specifically over the Lusikisiki Urban Development Node extending to the north-northwest and north-northeast of PHSHDA within the Ingquza Hill LM. The purpose of this 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

This programme considers actions needed to design and manage stormwater infrastructure to accommodate storm surges, given the increased risk of flooding in the IHLM. Stormwater systems need to be regularly managed to accommodate storm surges. They should be designed to mimic nature, make use of natural features in the stormwater cycle, be robust and resilient, and be able to function with relatively little maintenance. A regular maintenance plan is required for effective operation. When stormwater systems are adequately designed and maintained, they can deal with stormflows effectively thus minimising, or even eliminating, damage caused by flood waters in urban spaces.

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 is an environmental focus area within the OR Tambo DM State of Environment Report. Contaminated rivers and streams, eutrophication of the water system, and encroachment of tourism and residential sectors into key biodiversity areas may contribute to the loss of biodiversity. Effective environmental planning, including urban and rural greening, can assist greatly in improving the quality of the environment and the livelihoods of the people in areas with threatened ecosystems. 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.

Actions:

i. Develop critical biodiversity maps for the IHLM.

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 applications 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 IHLM.

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: Improvement of waste management

Proper solid waste management has important benefits to public health as it reduces vectors of disease. Landfill sites require large tracts of land and buffer areas, and they are also associated with risks such as flooding or overflowing leachate control systems at landfill sites due to extreme rainfall events, and the risk of landfills catching fire due to increased heat. Future potential sites and buffer zones need to be well-planned, identified and protected, thereby reducing the occurrence of unplanned and informal dumping sites which can negatively affect groundwater, pose a high fire-risk, and could lead to issues during flooding events. Landfills under pressure are more vulnerable to climate risks such as heat stress, wildfire, flooding and increased wind speed. Recycling reduces resource use and pressures on landfills. Urban waste needs to be reduced from the household level, and on the retail and commercial level, and to a settlement-wide level.

Actions:

i. Identify suitable landfill and recovery sites.
ii. Protect future landfill, recovery sites and buffer zones.
iii. Reduce, reuse and recycle solid waste.

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 IHLM 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 by conducting 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 programmes.

Actions:

i. Implement training programmes 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	Infrastructure and Engineering Services	Medium term	High
ii. Implement water conservation measures.	Surface water depletion	Infrastructure and Engineering Services	Medium term	High
iii. Design systems to recycle water.	Surface water depletion, flooding	Infrastructure and Engineering Services	Medium term	Medium
iv. Prioritise maintenance and rehabilitation of existing infrastructure and development.	Flooding	Infrastructure and Engineering Services	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	Infrastructure and Engineering Services, ORT DM	Medium term	High
ii. Incorporate water use and management plans into the LM's IDP and SDBIP.	Surface water depletion, flooding	Infrastructure and Engineering Services	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	Infrastructure and Engineering Services	Short term	High

iv. Design stormwater and rainwater harvesting systems for new developments or employ retrofitting.	Flooding	Infrastructure and Engineering Services	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	Infrastructure and Engineering Services	Medium term	High
ii. Enforce "green" approaches in residential areas and developments.	Surface water depletion	Infrastructure and Engineering Services	Short term	High
iii. Enforce the implementation of regulations and legislation.	Surface water depletion	Infrastructure and Engineering Services	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	Infrastructure and Engineering Services	Long term	High
ii. Climate proof existing developments within climate risk zones or hotspots, where possible.	Flooding	Infrastructure and Engineering Services	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	Infrastructure and Engineering Services	Short term	High
ii. Develop natural buffer zones around critical stormwater infrastructure.	Flooding	Infrastructure and Engineering Services	Long term	Medium
iii. Design stormwater and rainwater harvesting systems.	Flooding	Infrastructure and Engineering Services	Medium term	Medium
iv. Retrofit or replace existing stormwater infrastructure to meet revised design criteria.	Flooding	Infrastructure and Engineering Services	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 IHLM.	Flooding, heat stress, drought, wildfires	Environmental Services	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 IHLM.	Flooding, heat stress, drought, wildfires	Environmental Services	Short term	High

Adaptation programme 3.2 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	Environmental Services, Infrastructure and Engineering Services, Planning and 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	Environmental Services, Infrastructure and Engineering Services	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 Improvement of waste management				
Adaptation Actions	Key risk or vulnerability addressed	Responsible department	Timeframe	Priority level
i. Identify suitable landfill and recovery sites.	Health risk, flooding, extreme temperatures	Infrastructure and Engineering Services, Planning and Development	Short term	High
i. Protect future landfill, recovery sites and buffer zones.	Health risk, flooding, extreme temperatures	Infrastructure and Engineering Services, Planning and Development	Medium term	High
ii. Reduce, reuse and recycle solid waste.	Health risk, flooding	Infrastructure and Engineering Services, Planning and Development, Community Services	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 information on climate change issues that are relevant to their community.	Flooding, heat stress, health risks	Community Services	Medium term	Medium
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	Planning and Development, Environmental Services.	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	Community Services, Disaster Management	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	Community Services, Disaster Management	Short term	High
iii. Develop a Community Services Plan to comprehensively dovetail municipal health needs and their climate change risks into the IHLM development planning.	Flooding, heat stress, health risks	Community Services, Planning and Development, Environmental Services	Medium term	Medium
iv. Increase capacity and resources at health facilities for climate change related impacts.	Flooding, heat stress, health risks	Community Services	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 commercial, small-scale and subsistence farmers.	Surface water depletion, heat stress	Agriculture, Environmental Services.	Short term	High
ii. Identify climate-resilient crops.	Surface water depletion, heat stress	Agriculture	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	Agriculture, Environmental Services	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	Agriculture, Environmental Services, Planning and 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	Agriculture, Environmental Services, Planning and 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	Agriculture, Environmental Services	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	Agriculture	Long term	Medium

7. Implications for the PHSHDA

One of the most significant climate risks identified for Ingquza Hill 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. 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. Lusikisiki is projected to undergo a significant increase in extreme rainfall events in the future and, and a moderate risk of floods in and around Lusikisiki is expected, specifically over the Lusikisiki Urban Development Node extending to the north-northwest and north-northeast of PHSHDA within the Ingquza Hill LM. The adaptation actions proposed consider the potential impacts of extreme precipitation on stormwater management, water quality, public health, and infrastructure.

Given the higher risk of flooding in the Lusikisiki Urban Development Node, protecting and increasing the resilience of critical municipal infrastructure in areas prone to flooding should be a priority in the municipality. This can be achieved through limiting development in high flood-risk areas and also maintaining existing infrastructure, specifically stormwater infrastructure to accommodate storm surges and increase the volume of stormwater runoff to prevent damage to infrastructure and assets. Protection of ecological infrastructure in also important since well-managed ecosystems (such as rivers, mangroves, forests, and wetlands) can reduce the impact of many natural hazards like flooding and storm surges. From a waste management perspective, landfills under pressure are more vulnerable to climate risks such as flooding, heat stress, wildfire, and increased wind speed. The adaptation actions proposed include actions related to the improvement of waste management in the municipality to reduce the impacts of extreme climate events.

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.

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