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FOREWORD

Variations in weather conditions generally follow certain patterns, based on cyclical and seasonal changes in climate. The difference between weather and climate is time. "Weather" refers to current conditions, and "climate" reflects atmospheric trends over longer periods.

Investments in community infrastructure, emergency planning and resource management (urban forests, source water) are all based on expected variations in weather conditions, in response to climate data collected over time. A shift towards investing in ecological infrastructure to ensure on-going ecosystem services remains the key mitigation objective for the Eden District Municipality, whilst building resilience amongst rural communities remains our key adaptation focus.

A changing climate means that expected patterns of variability in the weather-temperature, precipitation, extreme storms and other events no longer apply. Under such conditions, infrastructure fails to perform as it should; new aliens can migrate and decimate local biomes; frequent heat waves put vulnerable populations at risk-and the list goes on. Local governments are left to deal with the social, environmental and economic consequences of these changes to their communities, often at high cost. Timely adaptation can improve community resilience and reduce the severity of these effects over time.

The ways in which climate change affects local governments will vary across different landscapes, communities and economies. The effects of climate change will be influenced by local weather patterns, topography, nearby bodies of water, development patterns and many other factors.

Anticipated challenges across Eden District include increased frequency and severity of extreme weather events (e.g., heat waves, floods, coastal storm surges and droughts), more outbreaks of disease, social unrest and rising sea levels. These challenges will affect local governments large and small, urban and rural. They will also have both a positive and negative impact on many aspects of daily life and the municipal services upon which people rely.

This document has been compiled in a joint initiative between Eden District Municipality and the Western Cape Provincial Department of Environmental Affairs in an attempt to capture present data on risk and vulnerability across Eden, what interventions are underway and what is planned for the future.

I take this opportunity of thanking Penny Price and her team at the Western Cape Provincial Department of Environmental Affairs for the robust public and private sector engagement which has resulted in this valuable document; a must for any IDP nationally.

VERNON GIBBS-HALLS

2 INTRODUCTION

2.1 Introduction and Background:

This document constitutes the draft climate Change Adaption Plan of the Eden District Municipality which was developed in partnership with the Climate Change Sub Directorate of the Western Cape Department of Environmental Affairs and Development Planning as part of the Climate Change Municipal Support Programme. This plan is a first step that aims to create an enabling environment which will support a district-wide and a coordinated response to climate change in the Eden District.

It aims to draw on the momentum and the work that has already been done throughout the district and aims to provide a structure through which existing interventions can be further strengthened and supported. It further aims to identify appropriate coordination platforms, encourage collaboration amongst stakeholders, and attempts to outline the various roles and responsibilities that can enhance a smarter approach towards reducing climate vulnerability within the Eden district.

The plan is structured in a manner that firstly it gives an overview of the of the process followed in during the climate change municipal support programme, outlines some of the key and tangible outcomes of this process and lastly attempts to map out the road going forward and areas of immediate attention regarding climate adaptation in the Eden district municipality.

2.2 Defining the term “Adaptation”

Many people use the IPCC definition of adaptation:

“Adjustment in natural or human systems in response to actual or expected climatic stimuli or their effects, which moderates harm or exploits beneficial opportunities. Various types of adaptation can be distinguished, including anticipatory and reactive adaptation, private and public adaptation, and autonomous and planned adaptation” (IPCC TAR, 2001).

Moser and Ekstrom's (2010) definition of adaptation is also useful:

“Adaptation involves changes in social-ecological systems in response to actual and expected impacts of climate change in the context of interacting non-climatic changes. Adaptation strategies and actions can range from short-term coping to longer-term, deeper transformations, aim to meet more than climate change goals alone, and may or may not succeed in moderating harm or exploiting beneficial opportunities.”

This definition recognizes that adaptation to climate change takes place in a complex context where climate variability and change is only one of many stressors that require response. It also acknowledges that some adaptive responses help deal with current variability and others may be more transformative and sustainable; yet there is no defined separation between the two and they can, and in fact in many circumstances should, be linked.

Much research on climate change adaptation jumps right in to assume that all sectors and actors want and need to adapt to climate change. However, it is very important to understand the broader development context and urgent priorities first, in order to determine where climate impacts and potential responses might fit in.

3 ADAPTING TO CLIMATE CHANGE IN THE EDEN DISTRICT

Climate adaptation is about reducing climate vulnerability and developing adaptive capacity to cope with what one can't avoid. In South Africa and in Eden in particular, climate risk is relatively high, with Eden District being hit by significant climate related disasters on an annual basis. These climate related disasters have had significant financial implications for the district, province, and national government. Climate related disasters have had huge financial implications for the Eden district, based on the report published in 2010 by the University of Cape Town's Disaster Mitigation for Sustainable Livelihoods Programme, the cost damages caused only/just by cut-off lows in the periods 2003 – 2008 have amounted to R360 million, whereas the total for the entire Western Cape amounted to R513 million¹. This means that about 70% of these costs were incurred by the Eden district for the period mentioned above just from cut-off lows.

Climate-related impacts such as flooding, fires, and droughts are not new to the Eden district but they are likely to continue in terms of their frequency and severity. Hence it is of importance for Eden District to continue to plan for climate related disasters, understand the potential impacts, and develop interventions aimed at reducing climate risks and vulnerabilities. This plan is thus a first step that aims to create an enabling environment which will support a district-wide and a coordinated response to climate change in the Eden District.

3.1 The Climate Change Municipal Support Programme

The effective implementation of the National Climate Change Response Policy (NCCRP) (2011) is dependent on the efforts of provincial and local governments². In fulfilment of this the Western Cape Climate Change Response Strategy (WCCCRS) (2008) has been reviewed and adopted by cabinet in February 2014, in order to bring it in line with the more recent NCCRP. In so doing, it commits to assisting and supporting local municipalities in the development of sustainable energy plans, climate change adaptation plans, and implementation frameworks³. A Municipal Support Programme (MSP) was therefore initiated, and a letter of invitation to express interest in taking part in WCG's Climate Change Sub-Directorate's Municipal Support Programme was sent from the Minister: Environmental Affairs and Local Government's office to all municipalities in the province in May 2012.

Twelve municipalities responded positively to both the development of Sustainable Energy Plans and Climate Adaptation Plans. Eight municipalities were selected, four per programme. Eden District was one of the municipalities selected for the development of a draft climate adaptation plan during the 2012/13 financial year. These plans would hopefully be adopted by Council, with elements mainstreamed into key municipal master plans such as the Integrated Development Plan (IDP), the Spatial Development Framework (SDF), and the Disaster Management Plan (DMP).

Continued support is to be provided in the implementation and reviewing of these plans. The MSP is not approached as a discrete once-off engagement, but rather as an on-going series of partnerships between national, provincial, and local government; NGO's, CBO's and special interest groups; scientists and specialists; and the private sector. It is envisaged that in this way

¹ RADAR Western Cape 2010: Risk and Development Annual Review. University of Cape Town: PeriPeri Publications

² Section 10.2.6 National Climate Change Response Policy

³ Section 9.2.2 Draft Western Cape Climate Response Strategy

capacity can be developed amongst all involved, knowledge co-produced and shared, and valuable experience developed around successful climate adaptation. It is hoped that this model will assist in the relatively low cost, rapid roll out of climate adaptation mainstreaming in local municipalities across the province.

4 EDEN DISTRICT MUNICIPALITY CONTEXT:

4.1 Geographical Overview (in the context of a changing climate):

Eden District, as its name implies, is a place of exceptional natural beauty which offers a range of environmental goods and services that, to a large extent, underpin the economic activity in the area. This 'sense of place' has resulted in a significant area of the district being collectively termed 'The Garden Route' and is a major tourism draw card. However the same things that form part of this tourism draw card, such as the lovely beaches, estuaries and rivers, pose a serious disaster risk to the area, particularly in the face of a changing climate. Over the past decade the district has been hit annually by climate related extreme events, resulting in a string of massive floods, coastal inundation, fires, and drought. Between 2003 and 2008 alone, direct damage costs associated with climate related extreme events in the Western Cape amounted to approximately R 3 161.1 million⁴. The 2009/10 Eden District drought damage was estimated at R300 million, and the 2011 Eden District floods estimated at R350 million. There is clearly a need to increase the climate resilience in the region.

4.2 Establishment and Constitutional Mandate

The Municipal Structures Act, 1998 (Act 117 of 1998) outlines the roles and responsibilities functions of district municipalities. Related to climate adaptation, the Act provides for the following roles and responsibilities for the Eden District Municipality in these broad areas such as:

- Master planning such as development of a framework through which local municipalities can development their integrated development plans. These include the Spatial Development Frameworks and Disaster Management Plans.
- Solid waste management
- Health services
- Fire services

4.3 Existing Policies, Strategies, Plans and Reports

It is essential to first examine existing related strategies, plans, and reports that Eden District has in order to avoid duplication and ensure alignment with current local strategic initiatives. A list of these is presented in Table 1 below.

Table 1: Frameworks and plans relevant to Eden District Municipality

FRAMEWORK / SECTOR PLAN

⁴ RADAR Western Cape, 2010. Disaster Mitigation for Sustainable Livelihoods Programme

FRAMEWORK / SECTOR PLAN
Draft Integrated Development Plan (IDP) First Review (2013/14)
Spatial development framework (2013)
Revised Disaster Management Plan (2013)
Housing Pipeline (2012)
Water Services Development Plan (2010)
LED Strategy (2010)
Eden District Municipality Biodiversity Report (2012)
Local Biodiversity Strategic And Action Plan (LBSAP) (2011)
2012/13 Risk Register
Air Quality Management Plan (2012)
Draft Integrated Waste Management Plan (2012)
Integrated Coastal Management Plan (2013)
Climate Change Adaption Plan (2013)

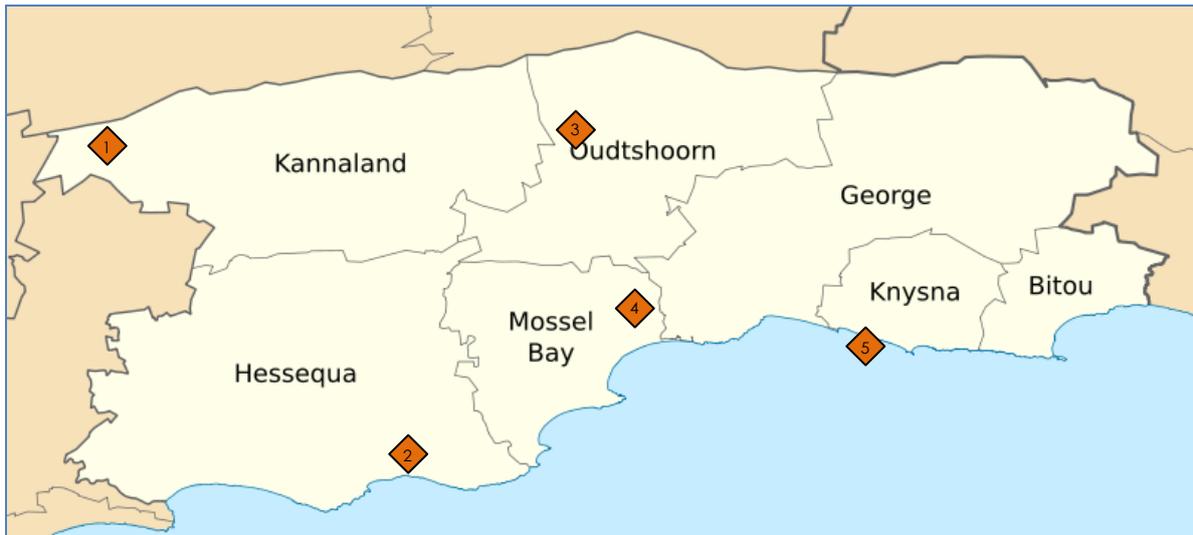
5 EDEN DISTRICT CLIMATE OVERVIEW

5.1 Observed Climate

5.1.1 Rainfall

The Western Cape climate is classed as Mediterranean and as such is largely a winter rainfall region. Winter rainfall is the result of mid-latitude disturbances commonly known as cold fronts. While these frontal systems continually pass to the south of the country all year round, during winter their tracks move northwards and their influence on the regional climate is significant. Flood events are often associated with strong cold fronts or their closely related cousins, cut-off low pressure systems, which are more frequent during the transition seasons (i.e. spring and autumn).

The southern coastal areas, including the Eden district, experience rainfall almost all year around. This is a result of the onshore flow of moisture from the south (over the warm Agulhas Current), rising up the coastal mountains and producing summer rainfall. Additionally, moisture originating from the tropics is transported southwards towards the southern cape during the summer months, leading to occasional favourable conditions for rainfall. However the dominant strong rainfall events still occur in winter as a result of cold fronts passing across the country. It must be kept in mind that many local factors, such as topography, play a key role in the rainfall patterns of this region. This is evident when one looks at the spatial distribution of rainfall patterns across the region.



KEY: 1 Ladismith 2 Witteklip 3 Oudtshoorn 4 George (Pacaltsdorp) 5 Knysna (Rexford)

Figure 1: Monitoring stations in Eden District used for this report

It is apparent that rainfall patterns vary considerably between the five selected observation stations. The Ladismith and Witteklip, and Oudtshoorn stations receive very low levels of rainfall (on average, each month has less than 50mm rainfall) (Fig. 2a), whilst Knysna and George receive substantially more rainfall (Fig. 2b). This is partially explained by the location of the stations, with those near the coast receiving more rainfall. For all stations, total monthly rainfall shows a roughly even distribution throughout the year and is not heavily concentrated in any particular month/season. However, in Ladismith and Oudtshoorn most of the rain days are observed during the winter months of May, June, July and August (Fig. 3a). This suggests that rainfall events in the summer months bring heavier rain than winter rainfall events, at these two locations. On average George and Knysna receive the most rain days throughout the year (Fig. 3b), with Oudtshoorn experiencing the least amount of rain days (Fig. 3a). Considerable inter-annual rainfall variability is also experienced at all stations, with the inland stations containing more variability than those found along the coast.

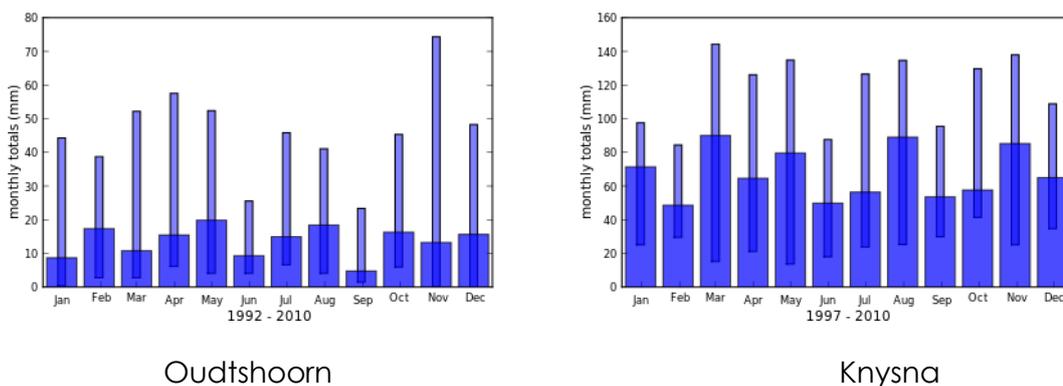


Figure 2: a) Oudtshoorn observed monthly rainfall totals b) Knysna observed monthly rainfall totals. Average climatology (wide bars) with 10th to 90th percentile inter-annual range (narrow bars)

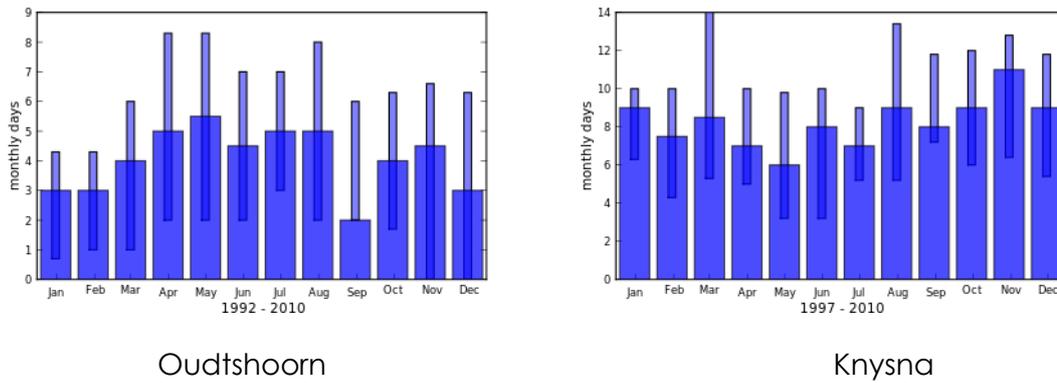


Figure 3: a) Oudtshoorn observed monthly rain days b) Knysna observed monthly rain days. Average climatology (wide bars) with 10th to 90th percentile inter-annual range (narrow bars).

5.1.2 Temperature

The Eden District's highest mean maximum temperatures generally occur during the late summer months (January and February). Of the five observing stations, Oudtshoorn on average has the highest maximum temperatures, exceeding 34°C at times, followed by Ladismith with highest maximum temperatures exceeding 32°C. The coastal stations remaining considerably cooler when compared to the inland stations. Oudtshoorn has the highest inter-annual variability of mean maximum temperatures, with George having the least inter-annual variability. Again, this is likely due to the proximity of the station to the coast.

When comparing the five observation stations, it is clear that Oudtshoorn has the most extreme temperature variations. In the winter months of June, July and August, Oudtshoorn gets minimum temperatures as low as 3°C. The remaining four observation stations' lowest minimum temperatures are generally around 7°C. Ladismith's minimum temperatures have the highest inter-annual variability, with Witteklip having the lowest inter-annual variability of mean minimum temperature.

5.2 Western Cape climate change summary

Climate change impacts for the Western Cape carry a high degree of uncertainty due to the complexity of the frontal systems and their interaction with the complex topography of the region. However there is a fairly confident message present in two strong climate drivers, which adds weight to some of the changes projected. The first is the shift in the South Atlantic High Pressure systems further south. Many models produce a similar shift south in the future and the result is to push the winter cold fronts further south, away from the country, during winter.

However, a counterpoint to this is the increase in atmospheric moisture due to a warmer climate. Orographic (mountain) rainfall is a significant component of rainfall in the mountainous regions of the Western Cape and the magnitude of such rainfall is often limited by the moisture content of the air flowing over the mountains. Increases in the moisture content could produce more orographic rainfall in mountain locations. The net result is a possible shift towards generally drier conditions but with wetter conditions in mountain locations (e.g. coastal region of the Eden district). Many river catchments include large portions of mountainous regions and hence the impact of climate change on river flows is likely to be complex and require a considerable modelling effort.

Finally, many projections suggest that changes in rainfall will occur through shifts in seasonality. Most distinctly through decrease in peak winter rainfall but possible increases in the transition or “shoulder” seasons of autumn and winter. This shift agrees with the two large scale drivers discussed above as the shoulder season rainfall is often dominantly orographic while the core season rainfall is dominantly driven by strong cold frontal systems which, under climate change, could shift further from the continent.

There is some evidence that some of these changes are already being experienced which adds further weight to the evidence for general drying, seasonal shifts, and increased mountainous rainfall.

6 EDEN CLIMATE ADAPTATION PROCESS/METHODOLOGY

South Africa in general and Eden District in particular is no stranger to extreme climate related events⁵. As climate related hazards are far reaching in their impacts, it is imperative to consider the vulnerability and coping capacity of the receiving environment, which includes the communities, infrastructure, landscapes, biota, etc. This requires a system wide approach that looks at planning and operational strategies, through identifying and quantifying risk and vulnerability and identifying measures that will help towards reducing such risks and vulnerabilities.

In response to the call for expression of interest to participate in the Municipal Support Programme, which was originally designed for B-municipalities, Eden District submitted a special request for provincial government to provide support in the development of a district-level climate adaptation plan. An inception meeting was held in George on the 16th of August 2012 to discuss and plan the process for the development of the plan. This was attended by the mayor, local councillors, and officials from most of the B-Municipalities in Eden, and other key stakeholders. It was decided that three workshops would be held with a multiple stakeholder group which would include representation from the following sectors and organisations:

- Eden District Disaster management
- B-Municipalities (George, Knysna, Oudtshoorn, Mossel Bay, Bitou, Hessequa, and Kannaland)
- CapeNature and SANParks
- DWA
- Gouritz Cluster Biosphere Reserve and Garden Route Initiative

6.1 Workshop 1 – Identifying key Vulnerabilities

⁵ RADAR Western Cape 2010: Risk and Development Annual Review. University of Cape Town: PeriPeri Publications

The first workshop took place on 25th of October 2012. This was reasonably well attended (see attached attendance register appendix 1.1). The focus of this workshop was to introduce the stakeholders and participants to the climate adaptation planning process and its envisaged outputs and to explore vulnerability in Eden District. This entailed an introduction and overview of the Western Cape 'downscaled' climate projections and observed climatic trends (the various possible climate stressors), an overview of the previous climate-related disasters within the Eden District. Overall, this gave the participants an indication of the range of vulnerability⁶ within the Eden district and this was followed by a prioritisation exercise to draw up a list of key areas of vulnerability for Eden. The areas of vulnerability identified by participants in the workshops were as follows:

- Infrastructure
- Agriculture
- Human Settlements
- Coastal
- Water
- Tourism
- Economy
- Health
- Environment
- Communities / Society



Figure 4: Participants of Workshop 1 identifying climate vulnerable sectors

6.1.1 Climate hazards

After areas of vulnerability were identified, this was followed by an exercise that looked at these through the lens of climatic stressors/hazards. The following climate hazards were identified as the key climate related factors impacting on, or expected to impact on Eden District

- Increased temperatures
- Shifts in seasonality
- Increased incidence of fire
- Higher and more frequent storm surges
- Increased number of dry days
- Increased magnitude and frequency of storm events
- Increased wind associated with storm events and intensification of prevailing winds

Participants were then asked to identify areas of vulnerability under each climatic hazard and prioritise these. The results of this exercise are listed in Table 2 below.

Table 2: Prioritised areas of vulnerability per climatic hazard for Eden District

Climate Change Hazard	Vulnerable areas
1. Temperature dependant vulnerability:	i. Water;

⁶ Vulnerability in this context means the likelihood of occurrence and impacts of weather and climate-related events.

	<ul style="list-style-type: none"> ii. Agriculture; iii. Environment
2. Extended Dry Spell periods (longer periods between rainfall events and more intense rainfall events – this does vary between areas within EDM due to different landscapes and location)	<ul style="list-style-type: none"> i. Water ii. Agriculture iii. Communities/Society iv. Tourism
3. Fire Risks (there are fire regimes that are needed i.e. Fynbos, but this focussed on unwanted fires)	<ul style="list-style-type: none"> i. Community/Society ii. Human Settlements iii. Environment
4. Increased intensity of Storm Events	<ul style="list-style-type: none"> i. Infrastructure ii. Humans settlements – Built environment, planning, location iii. Communities/Society – safety, emergency response
5. Coastal areas (Storm Surge and Sea-level rise)	<ul style="list-style-type: none"> i. Infrastructure ii. Coastal areas, Built environment, natural barriers, dunes, ecosystem services iii. Human settlements

6.2 Workshop 2 – Identifying Key Impacts

The second workshop was aimed at identifying key impacts for the vulnerabilities identified in the first workshop. Taking into account the Western Cape and the downscaled Eden climate projections which were presented to the participants of the workshop, the following key impacts were identified.

6.2.1 Damage to infrastructure in flood plains

In the Eden District, flooding has been one of the key frequent hazards that have resulted in direct negative financial implications for the local municipalities, the district, provincial and national government (WC Risk and Development, 2010). Flood events in Eden have impacted negatively on the environment, society and key economic sectors within the region including agricultural, tourism, and forestry. During the workshop, participants identified that an effective response to flood vulnerability in Eden will require a coordinated and holistic approach that targets the various aspects of the problem. Such an approach would need to incorporate the following.

6.2.2 Environmental

- Geomorphological features and land use planning and patterns that drive or increase vulnerability to flooding
- Maintaining the health of natural buffers and ecosystems that have flood regulation capacity i.e. riverine and fluvial wetlands, riparian zones and flood plains

- Protection of biophysical barriers to coastal storm surges such as rehabilitation of dune systems and the establishment of coastal management zones that will restrict development within at risk areas.

6.2.3 Infrastructure

- Location of key infrastructure and settlements with respect to proximity to flood risk areas, and
- Restricting development within such high-risk areas and integrating this into key planning tools such as spatial development frameworks
- Ensuring that future infrastructure developments have climate change factored into the design capacity and specifications

6.2.4 Policy and early warning

- Early warning and citizen education/awareness-raising regarding climate risks
- Development of policy tools to inform land-use planning and regulate activities that will exacerbate flood risks.
- Mapping of flood risk areas within the district in order to inform resource flow and optimisation (i.e. deployment of response mechanisms and capacity)

6.2.5 Economic / financial

- Increase investment in ecological infrastructure that translates into financial revenue for the district such as ecosystem services bonds and market options that reduce flood risk within the region
- Incorporate climate-related disaster information into current property valuations and insurance schemes



Figure 5: Flood damage Eden District, 2006

6.2.6 Impact on roads

Approximately 45% of the disaster relief budget in Eden goes towards repair and maintenance of flood damaged roads. A problem with the repair of flood damaged roads comes in when the cause of the damage is not addressed in the repair/ replacement, as this would often times trigger an EIA process, which would result in the repair becoming unaffordable. The result is that in situations where future risk could be reduced or eliminated through the relocation or redesign of the particular piece of infrastructure, this does not take place as risk reduction funding is either not sourced or when it is, it takes too long to realise. It is rare for a municipality to be able to fund such an undertaking and reclaim the funds when they eventually become available. The result is that infrastructure at risk remains at risk. Hence a fast-tracked process is urgently required that allows local authorities to pre-emptively access disaster risk reduction funds to address these 'known' disasters in waiting.

6.2.7 Impact on agriculture

A climate change agricultural study has been done for the Eden District, with a focus on the loss of agricultural land. This is in a large part as a result of flooding and erosion, and is in many

respects indicative of the broader trend towards environmental degradation in the area. Farmers, needing fertile lands and a secure water supply, are increasingly ploughing flood plains and wetlands. This provides short term gains, but long term losses in the form of loss of vital ecosystem services, such as flood attenuation provided by wetlands and flood plains. These compromised lands are easy 'targets' for the raging floodwaters that result from the increased intensity rainfall resulting from climate change, sweeping away large swathes of agricultural land.

In addition there is insufficient monitoring and inspection of farm dams, which often have problem-causing outlet structures not designed to facilitate the through puts experienced during these intense flood events. In addition there is illegally damming up or weiring of water courses, which, amongst other activities, results in inaccurate extractions figures.

The study mentioned above also examined alternative irrigation techniques and alternative crops, such as game ranching, flower harvesting.

6.2.8 Impact on Human Settlements

Creating more climate resilient human settlements will require a huge shift in the design philosophy and design specifications. These include considerations for location of settlements (i.e. proximity to flood lines, coastal risk zones, etc.), use of alternative building materials that reduce risks to fires particularly for low cost housing, and other measures that reduce climate risk and vulnerability of human settlements per se. This rapid shift in the design philosophy requires political will through adoption and regulation of building standards (such as SANS 10400) and making provision for the existing government subsidies to take these specifications into account. Environmental Impact Assessments related to new settlements need to factor climate change considerations in to ensure that any future developments are increasingly climate resilient.

6.2.9 Fire

Eden has seen a huge increase in the occurrence of unwanted veld fires, both in terms of intensity and scale, which have had a devastating impact on the district's primary economic sectors such as farming, tourism, and the plantation forestry. These fires have resulted in huge financial costs for the district, with approximately 45% of the disaster relief budget is spent on fire-related disasters. As is the case with most other climate-related disasters, fire can be seen as an aggregation of a number of interacting factors, such as land degradation, excessive illegal water extraction, insufficient capacity to respond locally, drought, etc.

A coordinated and effective approach will need to consider some of the following aspects:

- Identifying and mapping fire risk in Eden, including hotspots/high risk areas and areas where capacity needs to be directed depending on socio-economic and environmental impacts.
- Strengthening of existing initiatives such as Working on Fire and the GEF climate change and fire project.



Figure 6: Fire threatening housing development in Eden District.

- Effective management of Invasive alien vegetation that increases fuel loads for fires to thrive.
- Buy-in from private landowners and farmers through the construction of fire breaks.
- Improvement of fire safety through urban fringe management
- Fire proof alternative building/construction materials

6.2.10 Environmental degradation

There are substantial research outputs listing the negative impacts climate change will, and in some cases is, already having on the natural environment, i.e. loss of biodiversity and ecosystems and their associated goods and services – particularly those regulatory services that reduce our risk to climate related disasters.

A degraded environment and dysfunctional ecosystems also increases our risk profile to climate related disasters. For example, degrade waterways, wetlands, and coastal dunes that have lost their natural buffer capacity will increase susceptibility of the society's (which are often poor communities) and infrastructure that are in close proximity to those ecosystems to flood risk.

An effective approach to reduce the negative impacts of climate change and climate related disasters require an in-depth understanding of the abundance of ecological infrastructure. Through measures that aim to map and quantify ecological infrastructure in terms of its associated ecosystem services and goods, and a detailed understanding of the investment options needed to protect it. However, in the Eden district such investment options and biodiversity protection interventions are not something new, there is much happening to reduce the negative impacts on the receiving environment through risk assessments that are done by provincial and district disaster management centres and private institutions such as SANTAM.

Investment in the protection of biodiversity has also taken place through the government led EPWP's natural resource management programme (NRM), including all the working for programmes such as environmental protection and infrastructure programme (EPIP), the Working on Fire programme (WoF), working for wetland and working for water. These programmes have tackled issues such as management of invasive alien vegetation, rehabilitation of catchments from source to sea and related inland and coastal ecosystems. Hence there is much happening on the ground to reduce the negative impacts on the Environment; however, coordination and combination of efforts are amongst some of the key challenges that still inhibit a breakthrough to effective protection of Ecological infrastructure in the Eden District.

6.2.11 Water

DWA State of Rivers Report

6.2.12 Food Security

Extended dry spell periods, increase in severity of storms and floods, fires, intense winds, high temperatures and shift in seasonality will all have negative impacts on food security. Increase in crop failures, decrease in water availability, increase in pests, and system-wide implications such

as availability of pollinators, are among some of the key negative impacts that will impact negatively on the agricultural sector and thus food security⁷.

Various measures that increase food security that aim at increasing resilience of the agricultural sector will require immediate attention. Such interventions will need to explore the possibility of alternative crops and testing the drought tolerance capability of these, conservation agriculture that makes use of wise farming techniques such as crop rotation and water use efficiency. On the other hand it is also of paramount importance to support locally viable farming practices that are less resource intensive such as food gardens and promotion of permaculture in the Garden Route and Eden as a whole, as these alternative farming methods bring a number of benefits such water and energy use efficiency, organic farming practices, job creation and empowerment.

6.3 Workshop 3 – Identifying Climate Adaptation Interventions

The third workshop was held in George on the 25th of April 2013 and was well attended by various key stakeholders in Eden including all B-Munics (except Kannaland), Eden District Municipality officials, some political champions in the form of local councillors, local NGOs, and SALGA. (refer attached attendance register appendix 1.3)

The broad aim of this workshop was to identify and prioritise adaptation interventions aimed at reducing the climate impacts on specific high risk activity areas as identified in:

- Previous workshops which aimed at identification of key high priority areas of vulnerability in Eden,
- Climate-related risks and vulnerabilities identified in the revised Eden Risk Assessment undertaken Disaster Management.

A session in the workshop was run by SALGA on how to integrate and mainstream the identified adaptation interventions into the IDP using the 'Let's respond' toolkit.

Based on the findings of the previous workshop, the following key high priority areas were identified:

- Infrastructure
- Water Supply
- Coastal Areas
- Human Settlements
- Environment
- Agriculture

6.4 Workshops with B-Municipalities

In February 2014 a round of workshops were held with individual B-Municipalities in Eden District in order to firstly verify the inputs received in Workshop 3 (mentioned above, and listed in Appendix

⁷ Western Cape Climate Change response Strategy 2008

1.4), and secondly to seek to deepen these commitments by extending the identified adaptation interventions further.

Unfortunately it was not possible to meet with all of the municipalities as planned, but four of the six municipalities were covered, namely Mossel Bay, Hessequa, and Knysna.

The extensive list of adaptation interventions gathered from these engagements is listed as Appendix 1.5, 1.6, and 1.7 respectively.

7 CONCLUSION

In order to reduce climate risk and vulnerability in Eden, and to achieve the objectives set out in this plan it is of importance to outline and identify the various roles that each of the stakeholders (both public and private) would need to play, and to identify key linkages and areas of collaboration amongst these stakeholders.

The climate change unit at provincial government of the Western Cape, through its Climate Change Municipal Support Programme, will continue to provide support at district level in order to:

- Provide assistance to the Eden district with identifying opportunities for an effective and a coordinated response at a district level, it is hoped that such coordination could help reduce duplication of efforts, creates an environment where stakeholders can communicate effectively and share resources, identify linkages and share knowledge amongst stakeholders in the Eden District.
- appropriate coordination; Support local authorities with identification and incorporation of climate adaptation interventions in their master planning documents such as Integrated Development Plans, Spatial Development Frameworks, Disaster Management Plans, Water Services Development Plans, etc.
- Continue to provide support with identifying funding and financing opportunities for climate adaptation and related work at district level, and supporting climate adaptation initiatives being implemented by various partners within the district.

Eden district municipality's role would be to:

- Continue to further support local municipalities with identifying and designing of programmes and interventions that are aligned with the key priority areas of action outlined in the adaptation planning process,
- Assist local authorities with the implementation of interventions and to provide support with local stakeholder coordination,
- Encourage and support local municipalities to continue to incorporate climate change considerations in their master planning documents such as IDPs and SDFs (from a local government level), through the use of planning tools such as the *Let's Respond* Toolkit by SALGA.

8 CLIMATE ADAPTATION INTERVENTIONS:

The third and final workshop of the Climate Change Municipal Support Programme was aimed at assisting Local Municipalities to identify climate adaptation and risk reduction projects. However, during these workshops representation and participation of key municipal units and individuals was limited, and therefore it was necessary to setup additional engagements with B-Municipalities in the Eden District. On the other hand interventions that were captured during the third MSP workshop were largely focused on mitigation and energy efficiency aspects and further detailed engagements were still needed to capture adaptation and risk reduction initiatives. In order to address this gap and to strengthen the representation of Local Municipalities within this district-wide adaptation plan, further engagements have taken place with Local Municipalities in the district. Engagements took place with Hessequa, Bitou, George, Knysna, and Mossel Bay during the course of February – April 2014; these engagements were attended by senior municipal officials from the strategic services, integrated development planning, engineering/technical services and infrastructure, environmental and spatial planning, disaster management, and human settlements units of the municipalities. The purpose for these engagements was to:

- Conduct a thorough analysis of the climate adaptation status quo: looking at what steps have municipalities taken to reduce risk and vulnerability. In doing this we looked at programmes and projects at planning or implementation stage that the municipalities are leading with associated partners and these could be aimed at various levels including institutional, technical, financial, and behaviour change measures.
- The process also aimed to identify some of the challenges faced by Local Municipalities to respond effectively to climate change looking at critical barriers where most effective changes could be targeted,
- Identify some of the gaps and opportunities for effective climate change response at Local Municipality level and to highlight key areas where the Eden District can add value, coordinate and support a district-wide climate adaptation response.

During this participatory and consultative process certain issues and concerns were raised again and again in several engagements. These can be broadly summarized into infrastructure planning guidelines which are often too prescriptive to allow for the kind of flexibility required for climate adaptation mainstreaming, governance issues and lack of clarity in terms of roles and responsibilities and climate change often perceived as an unfunded mandate, and lack of human and financial resources to oversee and coordinate climate change adaptation interventions. Details for some of these are given below:

Infrastructure guidelines (design norms and standards):

Often referred to as the 'Red Book' these guidelines are used for settlement and infrastructure planning across the country. The municipality however mentioned that there are a number of issues that still need to be addressed at a strategic planning level in order to respond effectively to and adapt to climate change. Of particular importance, when looking at general industry practice in the infrastructure sector is stormwater infrastructure. A key issue here is the level at

which the current planning guidelines often do not allow for adaptation interventions to be implemented by Local Municipalities (be it outdated data that these are based on or the change in the timing of flood/storm events that has taken place since the guidelines have been published as a result of climate change). Examples were cited as follows:

Flood structures: Stormwater systems are designed to cater for three systems, namely

- A Minor system (which caters for a 1 in 2 year storm), a
- Major system (which caters for a 1 in 50 year storm) and an
- Emergency system (which caters for less frequent storm events i.e. a 1 in 100 year storm).

However based on observed patterns in the past 12 years, an almost unbroken record of annually occurring flood events would be classified as 1 in 100 year events (e.g. the March '03, Dec '04, Apr '05, Aug '06, Nov '07, July '08, Jun '11, Jul / Aug '12, Nov '13 and Jan '14 floods). Where available storm water systems could not cater for these flood events. Hence there are disparities between what is prescribed by the planning guidelines and what is observed on the ground. These planning guidelines need to be revisited and revised to ensure that stormwater infrastructure planning is responsive to observed climatic patterns and conditions. Apart from changes in flood-recurrence intervals, stormwater infrastructure design needs to be continuously updated in order to incorporate changes in urban dynamics, changes in surface hydrology and drainage patterns that have changed due to catchment modifications and settlements in flood plains etc.

On the other hand when engaging with Bitou Local Municipality, there was consensus amongst some of the engineering officials that the climate data used to inform storm water design and planning (i.e. division of areas into wet, dry and moderate regions and subsequent infrastructure requirements) needs to be updated and take into account future climatic conditions. This as an area where academic and research institutions can play a role and for the DEADP to coordinate amongst these stakeholders to initiate such monitoring and modeling research.

Droughts/Water implications: Municipal water storage capacity is calculated over a 6-month cycle (i.e. water supply could be secured for a period of 6 months following the onset of a drought period). Engagements with stakeholders like the Department of Water Affairs need to take place in order to plan for longer storage timeframes and explore alternative surface water storage systems. Climate impacts have industry-wide implications for infrastructure development and as a result at least within the next year (2014/15 financial year) there should be consensus amongst all B-municipalities within the district for the revision of these guidelines.

Adaptation interventions elsewhere can lead to downstream impacts:

Clearing of invasive alien vegetation in upper catchments for purposes of reducing wildfire risk and securing water resources is a key climate adaptation initiative that almost all municipalities within the district are involved in implementing. However, a concern was raised around the disposal of the cleared biomass. This cleared biomass is often stacked and not disposed properly, and during events of heavy rains it is washed away downstream where it collects and causes blockages in storm water drainage systems leading to localized flood events. Hence, apart from being an important initiative, alien vegetation clearing needs to carefully look at issues of biomass disposal and attention needs to be dedicated towards alternative uses of the cleared biomass.

Access to critical information to enable efficient Early Warning Systems:

Engaging with Disaster Management personnel in Hessequa, there is often a good understanding of where the risks are within the municipal area, however there is a lack of resources and capacity to be able to deal with these disasters and risks. There are also key information databases that were identified, if these could be made accessible to disaster management personnel, could unlock some of the barriers around communication and early warning systems for private landowners particularly around veld fires. A specific database mentioned was the private landowners database with contact information of all the private landowners in Hessequa (however currently this is classified information for national security purposes).

8.1 Bitou Local Municipality

Bitou Local Municipality has identified areas where climate adaptation interventions should be targeted, particularly around protection of infrastructure and securing a sustainable water supply for the municipal area. The municipality has identified key infrastructure that is at risk from climate related disasters and/or has been impacted by such, identified key challenges associated with inappropriate infrastructure planning, and initiated actions to address this through relocation and upgrading. The municipality is also active in protection of water supply infrastructure and continues to explore opportunities to diversify water supply sources for the municipal area, these include institutional measures (at a policy level), technical and financial measures (through desalination, groundwater and surface water supply schemes). Bitou municipality is also taking advantage of some of the opportunities associated with climate change through better ecosystems management and protection within the municipal area through the stimulation of local economies by means of indigenous and medicinal nurseries funded through EPIP, attracting private sector funding (this is corporate contribution from the mining sector as required by the Mineral and Petroleum Resources Development Act) to support permaculture interventions, and creation of incentives to attract private landowners in protection and expansion of key biodiversity corridors.

Moving forward the municipality has identified areas, gaps and challenges that they would like to address relating to climate adaptation and building adaptive capacity. These range from behaviour change initiatives which have been identified as a gap within the municipality to encourage WC/WDM; shift in industry and the associated water, energy consumption, and people movement patterns that will also change; health challenges associated with changes in disease distributions, waste management etc. The municipality would like to highlight these as key areas (amongst others) that need attention going forward. Captured in Table 1 below is a list of adaptation initiatives that have been put forward by Bitou Local Municipality and these include both current and proposed initiatives.

Table 1: List of current and proposed climate adaptation interventions for the Bitou Local Municipality.

Key Risk/Vulnerability addressed	Project	Detail/project status	Responsible Department/Unit	Stakeholders or Partnerships	Budget and timeframe
Flooding and Infrastructure	<p>Protection of Infrastructure from flooding: Relocation of Pump stations located in flood risk zones. This project deals with multiple aspects including:</p> <ul style="list-style-type: none"> ● Relocation of the pump station at risk ● Movement of storm water out of the flood plains into runoff area <p>Protection of embankments from heavy winds and sea-level rise. This will protect roads services and reticulation systems.</p>	<p>A pump station was located in the coastal zone (close to the Keurbooms Lagoon); in the past this infrastructure was often impacted by flooding. Hence it is currently being relocated. Construction started in May 2013. Project planned to be completed by the end of April 2014. The project is in the municipal IDP.</p>	<p>Municipal Services and Infrastructure development.</p>	<p>The funding for this project was received from disaster funding to relocate the pump station.</p>	<p>R13.48M has been spent and total project cost was R19Million)</p>
Droughts (Alternative Water supply)	<p>Water Supply in response to Droughts:</p> <p>Plettenberg Bay Desalination plant (overall capacity of 2 Ml/day).</p>	<p>The project has been completed and it is captured in the municipal IDP. The desalination plant is currently operated during the summer months from December to April to meet the peak demands.</p>	<p>Municipal Services and Infrastructure development.</p>	<p>Funded by DWA and Council.</p>	<p>A total of R32 Million with R20Million from the Department of Water Affairs and R12Million from Council.</p>
Droughts (Alternative Water	<p>Diversification of water supply sources through the use of</p>	<p>Extra boreholes have been constructed, the aim is to reach a</p>	<p>Municipal Services and Infrastructure</p>		

Supply)	Groundwater supply.	50/50 supply scheme) where water supply would be 50% from surface water and the other 50% from groundwater and desalination schemes.	development: Water Quality Control		
Droughts (Water Demand Management and Water Conservation)	The municipality is currently reviewing its water management related policies including: <ul style="list-style-type: none"> WC/WDM Plan A drought management policy (in response to the droughts in year 2009) 2008 Water conservation policy 	These plans should be completed by the end of the 14/15 financial year. The review process is also conscious of other water demand management planning processes such as those led by SALGA.	Municipal Services and Infrastructure development: Water Quality Control		Funds for this received from RBIG
Flooding and Infrastructure	Protection of Infrastructure from Flooding: Upgrading various pump stations – especially those close to water sources (rivers and water abstraction points).	Pump stations located in the following areas: <ul style="list-style-type: none"> Nature's valley (completed), Kurland abstraction (completed), Uplands, and Keurbooms River, This project also forms part of the Water Augmentation programme currently underway between Bitou and Knysna.	Municipal Services and Infrastructure development: Water Quality Control		The project is about 90% completed.
Flooding (Storm water)	Stormwater Management: Currently in the process of appointing a service provider to develop a Stormwater Master Plan.	In certain areas such as Kwanokuthula the stormwater is inadequately-designed and needs to be redesigned and/or upgraded. In the past this has led	Municipal Services and Infrastructure development: Roads and	Project to be completed in the 2014/15 financial year.	

		to challenges such as flooding in human settlements, in certain areas the water table is high and causes flooding in households.	Stormwater		
Key Risk/Vulnerability addressed	Project	Detail/project status	Responsible Department/Unit	Stakeholders or Partnerships	Budget and timeframe
Flood Risk reduction	Development Restriction in flood risk areas	The municipality has mapped all Flood Prone Areas in within the municipal area, for purposes of being able to restrict development in Flood risk areas. The spatial information provides the municipality with tangible information to argue against development within these flood risk areas. The project is not included in the municipal IDP.	Municipal Services and Infrastructure development:	None	Project Completed
Veld Fire Risk	Veld Fire Risk	<u>Need for Fire breaks</u> and in certain cases increase these to deal with big fires. <u>Clear Alien Invasive Plants in steep slopes</u>			
Disaster Management (Institutional)	Disaster Management Planning	A preliminary Disaster Management Plan – was updated in November 2013.			
Food security	Food for Waste programme	Communities getting trained and employed to clean the local area and in return for food parcels, now will be changed to a stipend.	Once a week.	On-going (Project rolling once a week)	

<p>Local Economic Development</p>	<p>Opportunities associated with changing seasonality.</p> <p>Changes in Industry:</p> <p>Historically Bitou had a strong fisheries industry (which is now no longer part of the industries in Bitou). Now taking more of the typical agricultural produce such as sawmills and wood mills, There is an opportunity to pursue new industries linked to permaculture.</p>	<p>This has implications for jobs within the municipal area,</p> <p>This will impact on people-movement patterns, water allocation, and electricity usage patterns are going to change as well.</p> <p>There is an LED project concept for this, working with stakeholders to develop this into a business plan.</p>		<p>Partners include: Landowners and Farmers, The Mining industry is the huge contributor to the finances needed for the project (through the Minerals Resources Development Act. all Quarries and Mines are required to contribute to projects.</p>	<p>Project to be completed in the 2014/15 financial year</p>
<p>Coastal Risk Reduction (Coastal Management)</p>	<p>Integrated Coastal Management (ICM) (Eden District Plan)</p>	<p>Appointing consultants to do the implementation of the programme (this will include coastal erosion, sea-level rise etc.) To do By-Laws, identify risk areas and to do coastal zoning, and come up with management activities for the various risk zones.</p>	<p>Programme will be completed in 2017</p>		
<p>Waste Management</p>	<p>Waste transfer station/rehabilitation of landfill site,</p>	<p>The project is in the municipal IDP</p>	<p>Thembinkosi Henge</p>		
<p>Veldfires risk reduction</p>	<p>Establishment of a Veld fire satellite station</p>	<p>To enable a quicker response to veld fires within the Bitou Municipality.</p>	<p>Thembinkosi Henge</p>		
<p>Droughts and Water Security</p>	<p>Construction of an Off-channel dam</p>	<p>Rainwater harvesting that is channelled to a separate dam for storage</p>	<p>Thembinkosi Henge</p>		

		The project is in the municipal IDP			
Coastal Risk Reduction (Coastal Management)	Coastal management projects	This involves a host of coastal management projects such as removal of IAPs in coastal areas, Blue Flag programme, and Improving Beach management infrastructure The project is in the municipal IDP	Thembinkosi Henge		
Drought (Water Supply Security)	Water augmentation Project.	This project has been initiated by Eden District Municipality in order to explore the feasibility of a Regional Water Supply scheme between Bitou and Knysna. Various options being considered, multi-stakeholder process underway to prioritise options. Aurecon doing all the assessments. The project is in the municipal IDP	Municipal Services and Infrastructure development:	Various Stakeholders being consulted including DWA and Eden DM	Funded through RBIG
Droughts	Water Storage	Alternative storage capacity – the municipality has been using aquifers for surface water storage (off-season) and this water is then abstracted (in-season) as needed. This water is monitored on an on-going basis for quality purposes (including pH, Temp, EC and other parameters).	Municipal Services and Infrastructure development: Water Quality Control		
Protection of ecological infrastructure	Bitou wetland rehabilitation project.	This project involves rehabilitating the Bitou Wetland Corridor to maximise its functionality and	Thembinkosi Henge	Partners include Table Mountain Fund, WESSA.	

(Ecosystem-based Adaptation)		<p>create local eco-tourism opportunities. This will also see an Environmental Education Centre to be established.</p> <p>The project is in the municipal IDP</p>			
Protection of ecosystems (Ecosystem-based Adaptation)	Protected area expansion	<p>Incentives offered to farmers to reintroduce biodiversity (on zoned areas this is a 100% complete rates rebates;</p> <p>Additional residential opportunities, where Bitou municipality allows these private landowners to sell these residential opportunities for these farmers to be able to raise capital.</p> <p>The project is in the municipal IDP.</p>	Thembinkosi Henge		
Biodiversity protection and resilient landscapes	Biodiversity and Ecosystems protection, looking at growing natural and medicinal plants in Nurseries. Two sub-projects under this include:	<p>Environmental Protection and Infrastructure Programme (EPIP). Projects located in Nokuthula and Krantshoek.</p> <p>These projects will focus on three aspects:</p> <ul style="list-style-type: none"> ● Growing local trees for reforestation purposes (added to this is the carbon credits), ● Planting of vegetables for food security purposes, ● Medicinal plants for 			R8.6Million in total (R4.3 M for each project).

		traditional healers and/or for introduction into the local economy.			
Behaviour change	Education and awareness raising	<p>There is a strong need for such programmes – this will be captured and incorporated as part of the ICM implementation to be done by consultants.</p> <p>During Water Week the Schools are educated around water (sources and efficiency)</p>			

The projects and initiatives identified below are areas where the municipality has identified gaps and recurring challenges, and projects that they would like to embark on.

Key Risk/Vulnerability addressed	Project	Detail/project status (Problem Statement)	Responsible Department/Unit	Stakeholders or Partnerships	Budget and timeframe
Air Quality management	Air Quality	IAPs have increased pollen levels, farmers are now using more pesticides; herbicides etc. due to shift in seasonality and the increase in pollen levels due to ecosystems change.			

<p>Health</p>	<p>Responding to climate related diseases</p>	<ul style="list-style-type: none"> ● Health systems need to be upgraded to be able to detect and deal with these on time. ● <u>Own staff members</u> that work in waste and waste water plants need to be sent to regular health check-ups (these could be Bi-yearly thorough check-ups for climate related diseases). ● A strong health <u>awareness for health practitioners</u> within the municipal are to build awareness about climate related diseases. 			
<p>Health and Infrastructure</p>	<p>Non-motorised transport (Infrastructure link and Health).</p>	<p>For health reasons, getting people to exercise, walking and cycling.</p> <p>Get infrastructure such as cycle paths, walkways, and ensure that these are linked to main transport systems and are integrated.</p>			
<p>Waste Management</p>	<p>As identified by the DEADP's waste management unit, the Eden District is in a crisis with waste management issues.</p> <p>The municipality is looking at the</p>	<p>Waste disposed in low-lying areas and areas where there are water sources. This compromises water supply and water quality and increases flood risk within the municipality.</p>			

	<p>impact of Waste disposal and Landfill sites on river systems as this compromises water supply and air quality.</p>	<p>Limited land available to dispose the waste within the municipality.</p>			
<p>Effects management:</p>	<p>Landslides and soil sleeps and debris flows. More and more in Bitou these are being taking place in Bitou, Beacon Way, and Julia avenue and on the N2 above Beacon Way.</p>	<p>This is also partly due to inadequate stormwater infrastructure which results in high stormwater runoff during the wet season.</p> <p>This is also caused by inappropriate development in low-lying areas with no provisions made for stormwater mitigation measures during construction. (No Geotec investigations were done)</p> <p>People within the low-lying areas never acquired occupation certificates – now claiming for flood damage caused by inappropriate stormwater infrastructure) –</p> <p>the settlement is located in Bentonite which extends it volume 13X when it is wet, and drainage issues have not been</p>			

<p>Agriculture/Food Security/and linkages with Water Supply</p>	<p>Looking forward, Bitou's climate is becoming similar to that of Stellenbosch (getting more Mediterranean and the Wine industry is growing), This requires for alternative water supply sources to be considered in order to sustain this industry. – i.e. Off-channel/runoff dams and effluent treatment.</p>	<p>Harkerville (only one river – the Bos River but under stress form the informal settlements)</p>			
<p>Needed Intervention:</p> <p>Stormwater flow (Lateral water course management, bridge and channel maintenance)</p>	<p>This refers to outlying roads within the municipality (i.e. the Storms River bridge, the Bloukraans bridge) these often impacted and washed away by floods caused by inappropriate clearing of Invasive Alien Plants (IAPs) upstream.</p>	<p>IAP biomass collects and causes localised flooding which washes away bridges. This has occurred in Nature's valley and some of the rural roads.</p> <p>Without these roads, access is often an issue.</p> <p>High risk areas include: Nature's Valley, Groot River, and the Whole Uniondale road to Prince Alfred's pass (R40)</p> <p>One of the major contributors to this problem is inappropriate disposal of cleared IAP biomass. This creates a flood and fire hazard in the municipality.</p>		<p>Dupree</p>	

<p>Needed Interventions</p>	<p>Redesign of Stormwater design Norms and Standards:</p> <p>The current design norms and standards are based on environmental and climate data that is outdated.</p> <p>What needs to be revised is the climate information for the country as a whole (which informs the subdivision of the country into design requirements for wetter, drier, and moderate regions); over time these regions have changed.</p> <p>This should also relook at current definitions of 1:100year floods etc. (flood timescales/Limits within these climate regions)</p> <p>Changes in Urban dynamics, rainfall changes within climate regions, redesign of floodplains which have been encroached by human settlements, floodlines etc.</p>	<p>This project needs to look at the following:</p> <ul style="list-style-type: none"> ● Climate data used to inform climate regions (i.e. wetter, drier and moderate) ● Revision of flood limits and occurrence/half-life 	<p>DEADP to coordinate with partners like SALGA</p>	<p>The Department needs to look at initiating research between higher education institutions and government led research bodies at a National Level.</p> <p>SAWS, ,CSIR,CSAG and academic institutions</p>	
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8.2 Hessequa Local Municipality

The Hessequa local municipality has a well-developed coastal management programme which contains a number of projects relating to dune management and rehabilitation, estuary management, coastal access and control, coastal education and awareness etc. Within the municipal area there are also a number of green economy initiatives that aim to ensure sustainable natural resource utilisation. The municipality, with partners like CapeNature and the Department of Agriculture's Landcare Programme, implements a number of alien clearing projects including clearing on formal protected areas/Reserves municipal land.

From a technical services, infrastructure, town planning, and human settlements perspective the Hessequa Municipality continuously implements infrastructure maintenance and upgrade projects and has identified opportunities and challenges for climate adaptation mainstreaming at the planning phase i.e. use of alternative climate resilient building materials. However, an area that has been identified as of critical importance is the location of critical infrastructure in high risk areas such as floodplains. A strong need exists to relook at the location of such infrastructure and revision of floodlines, case studies of such cases need to be made available and used to inform future planning.

With regards to Disaster Management in Hessequa, there is a good understanding of where the risks are, however there is a lack of resources and capacity to be able to deal with these disasters and risks. There are also key information databases that, once accessible to disaster management personnel, could unlock some of the barriers around early warning systems for private landowners. A specific database mentioned was the private landowners database with contact information of all the private landowners in Hessequa (however currently this is classified information for national security purposes).

The Hessequa municipality has also partnered with Stellenbosch University on certain project that relate to climate change and its implications for the municipal area. Current research studies include the roof-top PV study completed in 2013. This year, starting in March 2014, in conjunction with the Norwegian Government and Stellenbosch University Hessequa is doing a research study looking at water sources and the impact of climate change on these.

The details of the initiatives that were identified in the workshop are captured in the table 2 below.

Table 2: Hessequa Local Municipality Climate Adaptation Interventions

Sector/Thematic area	Project	Detail/project status	Responsible Department/Unit	Stakeholders or Partnerships	Budget & Project in the IDP Yes/No	Project Timeframes
Coastal Management (Sea-level rise and Storm Surges)	Coastal Management Programme: Coastal Management Plan: All the coastal management programmes mentioned below will be incorporated into the coastal management plan.	<ul style="list-style-type: none"> Environmental Mangament Plan for the Gouritz coast (with Industrial Coastal accesses) - Plan currently with DEADP. This will feed into the Coastal Management Plan. (From the road to the beach). 	Shagon Carelse, Environmental Manager, Hessequa Local Municipality, shagon@hessequa.gov.za	Cape Nature, DEADP, Blue Flag Beaches and Eco-schools and coastal education through local NGOs like WESSA		ICM Projects to be completed in 2016.
		Dune Managment Plan for Lapiabay/Stillbay.	Same as above	Same as above	Same as above	Same as above
		Jongensfontein planning in process for the establishment of a coastal wall - to deal with sea-level rise.	Same as above	Same as above	Same as above	Same as above
		Adapting to coastal accretion: a basic assesment for the dune systems in Witsand and a dune management plan has been completed.	Same as above	Same as above	Same as above	Same as above

		<p>Coastal Education - Environmental Education - Eco-schools, puppet shows presented to most of the schools in the municipal area (covering themes related to wetlands, Marine, coastal education etc.).</p> <p>Coastal educational outings to the beach with local schools.</p>	Same as above	Same as above	Same as above	Same as above
		Maintenance management plans for all public slipways and Jetties (licences and RODs for slipways) in the Municipal area as these are often washed away by floods.	Same as above	Same as above	Same as above	Same as above
		<ul style="list-style-type: none"> ● 3 Estuary Management Plans with forums in place (Breede, Goukou, and Gouritz). ● Currently in the process of determining coastal setback lines. ● Following this will be the development of management activities to deal with each risk zone. 	Shagon Carelse, Environmental Manager, Hessequa Local Municipality, shagon@hessequa.gov.za			
Fire risk reduction and Protection of water resources	Alien Clearing	<ul style="list-style-type: none"> ● IAP clearing within municipal reserves and on municipal land. ● Notices provided to property owners within residential areas to clear IAPs. 	Shagon Carelse, Environmental Manager, Hessequa Local Municipality, shagon@hessequa.gov.za	Department of Agriculture Forestry and Fisheries (DAFF), CapeNature, DoA Landcare		

Flooding (Development restriction in high risk areas)	Compliance and Law enforcement	<ul style="list-style-type: none"> These EMI's will focus on compliance issues such as: Farmers working in wetlands within the 100m high water mark. 	Shagon Carelse, Environmental Manager, Hessequa Local Municipality, shagon@hessequa.gov.za	DEADP Section 24G		Ongoing
Food Security	Small-scale farmer support	<ul style="list-style-type: none"> Training workshops for emerging farmers offered focussing on good farming practices and alternative farming practices. 	Shagon Carelse, Environmental Manager, Hessequa Local Municipality, shagon@hessequa.gov.za	Western Cape Department of Agriculture (DoA), Hessequa Agricultural Forum		Ongoing
Food Security	School- and Community-based Permaculture Projects	<ul style="list-style-type: none"> Rain Water Harvesting tanks to support school based permaculture projects. 		Local Schools		Ongoing
Protection of Ecological Infrastructure		<ul style="list-style-type: none"> Wetland Rehabilitation - Duiwenhoks and Goukou catchments . This project is implemented by CapeNature. 	Shagon Carelse, Environmental Manager, Hessequa Local Municipality, shagon@hessequa.gov.za	Cape Nature		about 50% of the programme has been completed.
Green Economy		<ul style="list-style-type: none"> Sustainable flower harvesting industry - Happening within the district (Rhett Hiseman issues the permits and responsible for this programme) 	Shagon Carelse, Environmental Manager, Hessequa Local Municipality, shagon@hessequa.gov.za	CapeNature		

Green Economy		<ul style="list-style-type: none"> ● Sustainable Thatching industry in Albertinia (and a forum attached to this is in place), ● Sustainable aloe harvesting. ● Some of the small scale farming land is in the process of being registered under the stewardship programme with the idea of making it a green initiative. 	Shagon Carelse, Environmental Manager, Hessequa Local Municipality, shagon@hesseq.ua.gov.za			
Droughts (WC/WDM)	Water Services	<ul style="list-style-type: none"> ● Statutory planning processes - looking at long term water planning in terms of water services development plan -will be reviewed in 2014 	Technical Services and Infrastructure Mr Reggie Wesso			
Droughts (WC/WDM)	Water Services - Water Safety planning	<ul style="list-style-type: none"> ● Currently undertaking water Safety planning as part of the water services development plan. Water safety plans are an adaptation intervention - as this looks at multiple scenarios in terms of water planning. Both in terms of quantity and quality. 	Technical Services and Infrastructure Mr Reggie Wesso			
Water Quality and Quantity	Blue-, Green- and No-Drop compliance	<ul style="list-style-type: none"> ● Management processes to deliver safe drinking water, reduce impact of waste water treatend on the environment and to reduce network losses and inefficiencies. Compliance and monitoring programme done throughout the year. 	Technical Services and Infrastructure Mr Reggie Wesso			Ongoing

Water Services	Water Services Development Plan	<ul style="list-style-type: none"> The WSDP approved in 2012, a review will be done in 2014/15 financial year. This addresses all water related interventions at the municipal level, including financial, technical, behavioural, and institutional measures. 	Technical Services and Infrastructure Mr Reggie Wesso			2014/15 financial year
Water Security (Alternative Water Supply)	Alternative Supply Sources	<ul style="list-style-type: none"> The Municipality has applied to the various funding agencies, Accelerated Community Infrastructure programme; Regional Bulk Services funding sources, all of these waiting for approval. MIG funding for projects looking at water infrastructure requirements (Municipal Storage and network capacity); 	Technical Services and Infrastructure Mr Reggie Wesso			Waiting for Approval from funders
Waste management	Sewage management and infrastructure challenges	<ul style="list-style-type: none"> There is a MIG project scheduled to start this financial year which will lead to the Riversdale main sewer outfall to be upgraded. The Riversdale Abattoir has applied for starting a Biogas facility onsite - where they will transport all their biomass waste to this biogas facility - it is a private initiative funded by the Riversdale Abattoir. This will reduce traffic of sewage in that line thus reducing the infrastructure failure/problems encountered in the 	Riversdale Abattoir			

		past.			
Infrastructure and Flooding	Infrastructure (Roads and Storm Water)	<ul style="list-style-type: none"> Limited to funding - The stormwater management plan is due for update in 2014/15, as well as the pavement management systems which caters for roads as well. 	Technical Services and Infrastructure Mr Reggie Wesso		2014/15 financial year.
Flooding	Infrastructure upgrade and protection from flooding	<ul style="list-style-type: none"> Infrastructure - Major projects underway - The 2011 flood damage funding was approved in November 2013, and the funding will be made available this financial year over the next three years. Total flood damage/claim was 25 million rands, and this was for infrastructure in Heidleburg, Riversdale, Albertinia, and Stillbaai. Funding will be used to address and upgrade infrastructure. 	Technical Services and Infrastructure Mr Reggie Wesso		2014/15 financial year.
Flooding	Infrastructure upgrade and protection from flooding	<ul style="list-style-type: none"> 2014 floods Hessequa submitted a total claim of R147million rands claim for Heidleburg main stormwater outfall, and the Riversdale main stormwater outfall. The Heidleburg is a major problem - the structures are located in the canal direction and that creates a major barrier - need to look at either increasing those or look at alternative location sites. Various options are being considered for 	Technical Services and Infrastructure Mr Reggie Wesso		

		adapting to flooding in Hessequa.				
Flooding (Alternative Low-water crossing)		<ul style="list-style-type: none"> Using Concrete instead of Asphalt in the initial construction of Low-water crossings in Riversdale. Asphalt is usually damaged by flooding (i.e. observed during the January 2014 floods). 	Technical Services and Infrastructure Mr Reggie Wesso			
Climate resilient Human Settlements	Town Planning and Building Control	<ul style="list-style-type: none"> Most of the newly built low-cost housing units in Hessequa have been oriented to maximise direct sunlight and these are in compliance with the SANS10400X building regulations. Also looking at how to evaluate building plans in terms of energy efficiency 	Town Planning and Building Control			

Disaster Management

With regards to Disaster Management in Hessequa, there is a good understanding of where the risks are, however there is a lack of resources and capacity to be able to deal with these disasters and risks on time. There are also key information databases that, once accessible to disaster management personnel, could unlock some of the barriers around early warning systems for private landowners.

Sector/Thematic area	Project	Detail/project status	Responsible Department/Unit	Stakeholders or Partnerships	Budget & Project in the IDP Yes/No	Project Timeframes
Disaster Management	Alien vegetation clearing	Clearing of IAPs on privately owned land in Hessequa to reduce	Adneshei Voss - Protection Services Hessequa;	Eden District Management Gerhard	Disaster Centre; Otto.	

		wildfire risk.	yossie@hessequa.gov.za	gerhardo@edendm.co.za		
Disaster Management	Fire response	Establishing Hessequa's own fire department through BAAM/Santam programme.	Same as above	Same as above		
Disaster Management	Disaster Education Outreach	Disaster Geraffe; working with Working on Fire, this is an outreach project including going out and educate communities and schools about fire safety and emergency response measures.	Mr Frikie Muller - Senior disaster official Protection Services Department	Working on Fire		
Disaster Management	Early Warning System Communications	Hessequa is currently working with the Local Economic Development department to establish a communication system that will support an effective Early Warning System for disasters.	Same as above	Same as above		

8.3 Mossel Bay Local Municipality

Mossel Bay Municipality, as part of their disaster management planning processes, has conducted an indepth strategic risk assessment for the municipal area, with support from the Western Cape Disaster Management Center. This strategic risk assessment (outcomes of) was referenced in the 3rd planning workshop of the Climate Change Municipal Support Programme as a key contributor to the Eden district adaptation plan which will capture the status quo of climate adaptation in the municipal area. Through this process the municipality has identified areas of risk and vulnerability, rated all identified risks according to their likelihood of occurrence and potential impacts, and identified initiatives needed to address these risks and vulnerabilities. The outcomes of this exercise have been mainstreamed into the municipal IDP and are reflected in Table 1 below.

Apart from the initiatives identified in the strategic risk assessment, the municipality has a number of ongoing risk reduction initiatives that they implement on an on-going basis. The ultimate aim of the Climate Change Municipal Support Programme is to ensure that interventions identified through the MSP planning process are mainstreamed into municipal master planning instruments like IDPs. Hence, Mossel Bay Municipality has taken a step forward and demonstrated leadership in dealing with climate adaptation issues within their municipal area.

The details of the initiatives that were identified in the workshop are captured in the tabel 3 below.

Table 3: Adaptation Interventions for the Mossel Bay Local Municipality

Specific risk addressed	Likelihood of occurrence:	Consequence rating:	Risk Rating:	Activities to address risk/Initiatives	Currently funded or proposed	Stakeholders/Partners	Responsible Unit	Project Time Frames
	A. Almost certain B. Likely C. Possible D. Unlikely E. Rare	1. Insignificant 2. Minor 3. Moderate 4. Major 5. Catastrophic	Extreme High Medium Low Negligible					
Streets and Stormwater Flooding Infrastructure	B	1 to 4	Low-High	<ul style="list-style-type: none"> Continuous upgrading of infrastructure (IDP link) 	Proposed			
				<ul style="list-style-type: none"> Maintenance of major stormwater systems (IDP link) 	Proposed			
Storm Surges	B	1 to 5	Extreme	<ul style="list-style-type: none"> Early warning notification to affected areas (Little Brak and Great Brak) 	Proposed			

<u>Pollution and Waste Management</u> Fires at transfer stations	B	2,3,4	Extreme	<ul style="list-style-type: none"> Installation of fire breaks. 	Proposed			
				<ul style="list-style-type: none"> Fire extinguishing equipment installed to be used by workers to extinguish small fires 	Proposed			
				<ul style="list-style-type: none"> Fire and Rescue Service to respond when required 	Proposed			
Floods at transfer stations	B	3,4,5	Medium, High, Extreme	<ul style="list-style-type: none"> Closure of sites 	Proposed			
				<ul style="list-style-type: none"> Identify alternative methods of waste storage 	Proposed			
Pollution (waste, air, noise)	B	2,3,4,5	Medium, High, Extreme	<ul style="list-style-type: none"> Inspections and notifications 	Proposed			
				<ul style="list-style-type: none"> Law enforcement 	Proposed			
<u>Traffic Services</u> Flooding	B	1 to 4	Extreme	<ul style="list-style-type: none"> Departmental response as required to close roads, guide traffic and warn residents of dangers 	Proposed			
Major Fires	B	1 to 4	Extreme	<ul style="list-style-type: none"> Departmental response as required to close roads, guide 	Proposed			

				traffic and warn residents of dangers				
Parks and Recreation Green Belts/Areas (veld fires) Municipal Plantation, Friemersheim	A	1 to 5	Low	<ul style="list-style-type: none"> Create fire breaks where the green belts adjoin residential areas. 	Proposed			
				<ul style="list-style-type: none"> Reduction of fire load where possible 	Proposed			
Floods	B	5	Low	<ul style="list-style-type: none"> Intervention by clearing estuaries and rivers of obstructions and debris 	Proposed			
Coastal Oil Spills	C	1 to 5	Low	<ul style="list-style-type: none"> Coastal Management Plan 	Proposed			
Fire and Rescue Services Veld Fires	A	2,3,4,5	Extreme	<ul style="list-style-type: none"> Installation of fire breaks. 	Proposed			
				<ul style="list-style-type: none"> Reduction of alien invasive plants 	Proposed			
				<ul style="list-style-type: none"> Fuel load reduction through deforestation projects 	Proposed			
				<ul style="list-style-type: none"> Clearing and fire load reduction on vacant Erwin 	Proposed			

Floods	C	3,4,5	Medium, High, Extreme	<ul style="list-style-type: none"> Early warning systems implemented 	Proposed			
				<ul style="list-style-type: none"> Breaching of estuary mouths 	Proposed			
				<ul style="list-style-type: none"> Warning residents of possibility of flooding 	Proposed			
<u>Waterworks</u> Water shortage/managem ent	C	4	Medium to High	<ul style="list-style-type: none"> Refer to Water Demand Policy and Buisplaas Water Supply System Water Safety Plan 	Proposed			
				<ul style="list-style-type: none"> Friemersheim Water Supply System Water Safety Plan 	Proposed			
				<ul style="list-style-type: none"> Great Brak River Water Supply System Water Safety Plan 	Proposed			
				<ul style="list-style-type: none"> Herbertsdale Water Supply System Water Safety Plan 	Proposed			
				<ul style="list-style-type: none"> Mossel Bay Water Supply System Water Safety Plan Friemersheim Ruitersbos System 	Proposed			

				<input checked="" type="checkbox"/> Water Safety Plan	Proposed			
Ongoing Risk Reduction Initiatives Implemented by Mossel Bay Municipality include:								
				<input checked="" type="checkbox"/> Education in prevention of fires.				Ongoing
				<input checked="" type="checkbox"/> Assistance to victims (emergency alleviation).				Ongoing
				<input checked="" type="checkbox"/> Training on fire fighting.				Ongoing
				<input checked="" type="checkbox"/> Expeditious repair of infrastructure where possible.				Ongoing
				<input checked="" type="checkbox"/> Upgrading of existing infrastructure.				Ongoing
				<input checked="" type="checkbox"/> Education with regard to the prevention of human illnesses.				Ongoing
				<input checked="" type="checkbox"/> Financial support to victims				Ongoing
				<input checked="" type="checkbox"/> Relocating victims to less dangerous areas.				Ongoing
				<input checked="" type="checkbox"/> Giving attention to early warning systems.				Ongoing
				<input checked="" type="checkbox"/> Proper identification of communities who are the most vulnerable.				Ongoing
				<input checked="" type="checkbox"/> Handing out pamphlets at local shebeens - with basic fire prevention/safety measures (to reduce alcohol induced structural fires at informal settlements)				Ongoing
				<input checked="" type="checkbox"/> Education for Adults - Fire safety/fire prevention				Ongoing
				<input checked="" type="checkbox"/> The municipality also has specific disaster management plans for specific areas i.e. Great Brak 1 and Little Brak 1				Ongoing
				<input checked="" type="checkbox"/> Department of Human settlements - funding for mitigation of flooding from stormwater; management and mitigation of stormwater especially in settlements where steep slopes occur.				Ongoing

<ul style="list-style-type: none"> ● These initiatives have been built into the Key Performance Indicators of relevant disaster management personnel. 	Ongoing
<ul style="list-style-type: none"> ● The new SDF of Mossel Bay municipality incorporates the SANS10400 regulations as a specific requirement for new building designs. 	Ongoing
<ul style="list-style-type: none"> ● Water tank project – where RWH tanks are provided to rural farm dwellers – this project has been going for about 3 years. 	Ongoing
<ul style="list-style-type: none"> ● Council has employed a contractor to ensure that Invasive Alien Vegetation in private land is cleared for compliance purposes and to eliminate fire risks. 	Ongoing

8.4 Knysna Local Municipality

A workshop was held with Knysna local municipality on the 11th of February 2014, attended by officials from the traffic department and environmental sections of the municipality, SANParks, Eden District, and DEA Local Government Support. However, as much as there was poor turnout in this workshop, the Knysna municipality had already provided sufficient information on current climate adaptation initiatives being implemented. During this workshop when engaging with the municipality some of the following challenges were identified:

It has been identified that in the Knysna area there is a need for an advisory body that will advise the municipality on climate adaptation issues, particularly around:

Water Sources:

- Water supply sources and advise the municipality on the effective management of these and which alternative options to pursue.
- Desalination plant design and location (estuary/sea-intake abstraction)
- Groundwater abstraction
- Purification processes for all these water sources (mentioned above) will require different infrastructure investments and it is of utmost importance that a think-tank is formulated that looks at the long-term viability of the water sources and infrastructure requirements for these, bearing in mind sea-level rise and how this infrastructure might be impacted.
- Expansion of human settlements continues to take place in high-risk areas such as flood plains and this is likely to result in huge financial implications for the municipality. Dedicated attention needs to be placed around identifying alternative sites that are located in low-risk areas.

Also linked to climate adaptation and resilient ecosystems, the Knysna municipality has recently completed Ecosystem Services Assessments in partnership with SANParks, which looked at the distribution, demand and valuation of ecosystem services in the Knysna catchment. It is envisaged that this work will feed into the Integrated Sustainable Development Framework (another key area of work led by Knysna municipality) which integrates Local Economic Development strategy, Integrated Human Settlements Plan, Strategic Environmental Assessment, and Spatial Development Framework of the Knysna municipality. It is also emphasised that it should be ensured that climate change is mainstreamed in an integrated manner at this strategic planning level.

Table 4: Knysna Municipality Adaptation Interventions

Sector/Thematic area	Project	Projects/Initiatives	Responsible Department	Stakeholders/Partners	Is the Project in the IDP Yes/No	Project Timeframes
Coastal Risk Reduction	Sea walls rehabilitation project	Most communities live in the coastal area, hence this aims at reducing risk to these communities. Project manager: Fraser consultants have been appointed to do the engineering work between Knysna and Sedgefield	Environmental Management unit.	Fraser consultants	2.5 Million rand About 3 million has been spent so far. Project in IDP	
Coastal Risk Reduction	Knysna Dune Management Programme	This project came out of the 2007/8 flooding in the Knysna area. 2 sub projects under this include the Mayoli beach dune management and the Smutsville dune which is currently on tender - This project looks at alternative ways of stabilising dunes.	Environmental Management unit.	Yes		
Waste Management (Waste to	Integrated waste management Plan	Looking at using by-products from the wastewater treatment plant (sludge) for energy production purposes and the second sub project involves re-using effluent water from WWTW & RO Plant 5 mega litres/day	Environmental Management unit.		Currently at proposal stage	

Energy)						
	Renewable energy proposal in Reenendal	Currently at proposal stage – currently with Eden District Municipality for approval – using Black Wattle to convert it into pallets.	Environmental Management		Awaiting air quality licence	
Fire risk reduction and Water Security	Working for water programme	Removal of IAPs - This project has a beneficiation element where all the biomass is used for furniture (Farleish Furniture Factory) production – project is being run by SANParks	Environmental Management unit.	SANParks	R5 million Rands per year	
Waste Management	Knysna Working on Waste Programme	NB – Environmental Risk Reform NB – Knysna Environmental Risk Assessment Word based Street clean ups Recycle (Swop shop)	Environmental Management unit.		R2.5 million:	
Coastal Risk Reduction	Knysna Working for the Coast programme	Project starting from July 2013 – 2015 – project implementer is SANParks It involves rehabilitation of the coastal raising ground environment access/ clean ups alternate route	Environmental Management unit.	SANParks	R16 million rand project	
Integrated planning	Integrated sustainable development framework	Local economic development strategy, integrated human settlements plan, strategic environmental assessment, and spatial development framework – currently with Province at the moment. The ISDF has a 20 – 30 year planning horizon for the	Environmental Management unit.		R2.5 million rand from July 01 for 18 months. Project in IDP	

		Knysna municipality. It is of importance that climate change considerations be brought into this ISDF as a layer/mainstreamed into the report.				
Infrastructure and flooding	Estuary pollution prevention plan	This will look at replacing ageing infrastructure – that is resilient to flood and future climate.	Environmental Management unit.		R70 million rand project.	
Water Supply	Water Augmentation Study: Regional Integration of Bulk Water Supply Systems for Knysna and Bitou	<p>Currently underway is the water augmentation study that Eden is Project run in conjunction with DWA – which looks at the feasibility of integrated and stand-alone options for water supply over the next 30 years.</p> <ul style="list-style-type: none"> ● Various options are being considered with regards to water provision/augmentation as part of this study, including: ● There is consideration for a pipeline from Attekloof dam which will feed into an off-storage dam in Plettenbergbay. ● Proposed Inter-basin transfer scheme. ● Additional abstraction of groundwater resources to supplement current surface supplies. ● Desalination plants. 	Eden District Municipality	DWA, Knysna and Bitou Municipalities		Project currently concluding feasibility studies and prioritising options.
Flooding	Infrastructure	<ul style="list-style-type: none"> ● Infrastructure – Knysna has started looking at alternative location of infrastructure instead of 	•	•	•	•

		regular maintenance (on an ad-hoc basis).				
Behaviour Chnage	Educational Programmes	<ul style="list-style-type: none"> Knysna implements the Adopt-a-river project with schools – ongoing initiative implemented in partnership with DWA 	•	•	•	•
Adaptation	Ongoing initiatives:	<ul style="list-style-type: none"> Groundwater monitoring (temperature, Ground Water level, pH), Biological agents to control Black Wattle (weevles) Control of Invader species Water quality monitoring by SANParks Water education and awareness raising during Water Week River Health Programme (waste clearing in rivers) Focus on Septic and conservancy tanks should be emphasised to manage E-Coli levels instead of maintaining old infrastructure. 	Knysna Municipality Environmental Management			
	Human settlements	<ul style="list-style-type: none"> Housing and Infrastructure Various impact studies for additional housing – the challenge here is that the sites are located in a flood plain. 	•	•	•	•
	Alien Eradication	<ul style="list-style-type: none"> SANParks is embarking on a alien clearing project on private land – identified 17 different areas starting at Kaaimans, Elands river (All in the Eden District) – Muarita can share the shapefile. This is a 	SANParks	•	•	•

		<p>Land-User incentives programme – the management component of the project is given to the private landowner to play a more active role in the management of the contractors.</p> <p>Project will also consider alternative use of the biomass for various initiatives.</p>				
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8.5 George Local Municipality:

In Summary George Local Municipality has the following in place regarding climate adaptation:

- Master Plans reviewed regularly in order to ensure responsiveness to climate change considerations. These include the IDP reviews, SDFs, Disaster Management plans etc.
- The George Municipality's Spatial Development Framework acknowledges, recognises and will include other climate adaptation programmes currently underway in the District such as the Coastal Setback lines process.
- Catchment Management and Rehabilitation plans: George municipality is looking at issues of catchment management and rehabilitation as part of their broader Water Demand Strategy. This largely involves restoring and rehabilitating Palmiet wetlands, clearing of Invasive Alien Vegetation and management of surface water ecosystems.
- Through the Environmental Protection and Infrastructure Programme an Environmental Education Center in the George Botanical Garden has been approved for funding. This center facilitates awareness and behaviour change-centered interventions that speak to broader sustainability and environmental issues.
- Currently the municipality does not implement any largescale coastal management programmes, this is largely a function of the SANParks in association with private landowners.
- Some of the main challenges faced by the municipality are around
 - ✓ Resources to implement climate adaptation initiatives,
 - ✓ River Health has also been identified as an issue due to high E-Coli levels as a result of homeless people and increasing informality within the municipal area.

Refer to table 5 below for some of the current climate adaptation interventions identified by George Local Municipality through the MSP planning process and the second round of engagements.

Table 5: George Municipality Adaptation Interventions

Sector/Thematic area	Project	Detail/project status	Municipal Officials	Stakeholders or Partnerships	In IDP	Budget and timeframe
Research project (Integrated Public Transport System)	1. Improvement of the Public transport system	This project will be pitched under research and development and it will involve looking at current carbon emissions and looking at positive implications of this after 4 years	Carli Bunding-Venter	NMMU and other tertiary institutions CoCT (exchange)	No	Not Identified yet
Skills Development	2. Environmental Practices Skills Programme	This is a training programme for municipal officials, offered at NQF levels 5 and 2 focuses on Env. Practices at municipal level.	Carli Bunding-Venter	WESSA	No	Not Identified yet
	3. Non-motorised transport system targeting farmworkers		Carli Bunding-Venter		No	Not Identified yet

Food Security	4. Agriculture – Alternative crop production	Sustainable harvesting and honey-bush production – where George municipality would not list the project on their George IDP, but this is something that George municipality could look at facilitating the process, getting discussions going between role players etc.	Carli Bunding-Venter;	Local farmers		R145,000 2013/14 Financial year.
Water Security/Infrastructure upgrade /Flood protection	Raising of the Garden Route Dam Wall	The project will look at increasing the storage capacity of the Garden Route Dam. The technology used will allow for controlled release of flows for exceptional flood conditions and ultimately prevents the dam from being overtopped.	Civil Engineering Services George Municipality	Department of Water Affairs.		R17,5 million
Water Security	Responsiveness of the Water Demand Management Strategy to Climate Change considerations.	The Council Water Demand Management Strategy makes a specific stipulation that in order for Building Plans to be approved, a 5000 Litre rain water tank must be included in the plan in order to reduce water				Operational Budget

		demand and consumption from current supplies.				
Fire Responsiveness	A new fire fighting truck has been purchased	This is to expand fire fighting capacity in the George Municipal area.		Partners include the Working on Fire,		
Fire Responsiveness	George Fire Protection Agency	George Municipality has registered as an active member of the George Fire Protection Agency. This will strengthen current fire response capacity of the George Municipality.		George Fire Protection Agency,		

8.6 Oudtshoorn Local Municipality:

Oudtshoorn Local Municipality: Adaptation Interventions						
Sector/Thematic area	Project	Detail/project status	Municipal Officials	Stakeholders or Partnerships	In IDP	Budget and timeframe
Energy Efficiency	1. Solar water heating project	Rolling out of Solar water heaters		Eden District		currently at planning stage, proposed to start in Mid-May (this project will be on-going depending on funding)
Fire risk reduction/Water Security/	2. IAP clearing	Implemented by Cape Nature in protected areas and municipal land.		Cape Nature	YES	
Ecosystem rehabilitation	3. Spekboom planting project	The million Spekboom campaign project – which is essentially about CO2 sequestration)			No	
Energy Efficiency	4. Sunstove project	The project is starting and sunstoves have been bought (on-going depending on funding)				
Air Quality	5. Air quality management plan					Will be completed by June 2013
Renewable Energy	6. Solar energy Farm	Currently in proposal stage – solar farm to be located in Dysseisdorp		Dysseisdorp Re-Power (Pty) Ltd		
Water Security	7. Deep drilling project for alternative water supply purposes					