Terms of reference (ToRs) for the procurement of services below the EU threshold

Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH

Annex Three: Drakenstein Municipality Hybrid Flood Alleviation Programme for Mbekweni, Groenheuwel and Palmiet Catchments. Programme Summary. December 2024.

Drakenstein Municipality Hybrid Flood Alleviation Programme for Mbekweni, Groenheuwel, and Palmiet Catchments

DM HFA Programme Summary
December 2024

Acknowledgements

The Drakenstein Municipality acknowledges the collective effort and dedication of all individuals, organisations, and stakeholders who contributed to the development of the Drakenstein Municipality Hybrid Flood Alleviation (DM HFA) Programme.

We express our heartfelt appreciation to the dedicated teams within the Municipality, particularly the Environmental Management Section and the Roads and Stormwater Division, for their invaluable guidance and expertise, which have been central to shaping the Programme. The Spatial Planning and Land Use Planning Sections also played a vital role through their feedback and technical insights.

We extend our gratitude to our local communities in the Mbekweni, Groenheuwel, and Palmiet catchments, whose active participation provided crucial insights into the challenges and opportunities we face. Their involvement has been key to ensuring that the Programme effectively responds to real-world needs.

The Municipality further recognises and appreciates the financial and technical support provided by the C40 City Finance Facility and the Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ). Their partnership underscores the importance of adaptive and integrated approaches to flood risk management for building socio-ecological resilience.

Lastly, we commend the AIVIA project team for their professionalism, reliability and resourcefulness. Your efforts have laid a solid foundation for a transformative programme that will serve the Municipality and its residents for generations to come.

To everyone who played a role in this journey, we extend our deepest gratitude. Together, we are fostering a resilient future for the Drakenstein Municipality.

The Development of a Hybrid Flood Alleviation Programme for the Mbekweni, Groenheuwel, and Palmiet Catchments

Drakenstein Municipality has experienced significant flooding challenges in recent years. The development of a Hybrid Flood Alleviation Programme for the Mbekweni, Groenheuwel and Palmiet Catchments is part of the Drakenstein Municipality's response to the need for flood risk reduction, climate change resilience, improved urban management, and improved community engagement. Referred to as the DM HFA, the design and development of this Programme included a series of technical studies in order to develop hybrid flood alleviation measures for these three catchments.

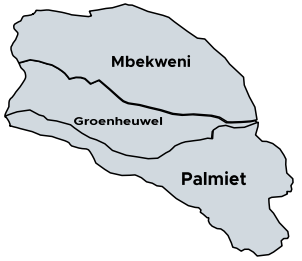
The vision for the Hybrid Flood Alleviation Programme:

"Developing hybrid flood risk solutions that protect and enhance lives, livelihoods, infrastructure and open space to ensure flood-resilient communities and sustainable municipal infrastructure."

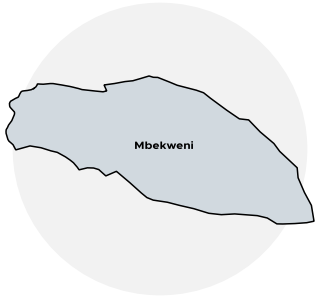
These measures and interventions include **strategic interventions** that span across the study area, including the **identification of catchment specific projects** for each catchment, and the **prioritisation of six (6) catchment specific projects selected for the development of more detailed concept notes**. These 6 projects are the Beets Street Hybrid Flood Alleviation Project, the Drommedaris Street Hybrid Flood Alleviation Project, the New Orleans Park Hybrid Flood Alleviation Project, the Prelude-Symphony-Bach Stormwater Park Network Hybrid Flood Alleviation Project, and the Palmiet River Management Projects for Palmiet River along Strelitzia Street and the stretch of the Palmiet from Van der Stel to Jan van Riebeeck Drive.

Drakenstein in the context of the Western Cape, South Africa

Mbekweni, Groenheuwel and Palmiet Catchments in the context of DM

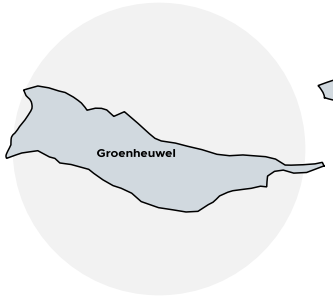


Mbekweni, Groenheuwel and Palmiet Catchments – DM HFA Study Area



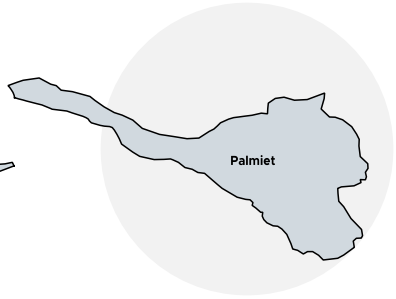
Mbekweni Catchment

Size: 3 000 ha
Wards: 7, 8, 9, 11, 12, 14, 16 and 29
People: 81 736
Mbekweni River: 8km
Kleinbosch River: 10,87 km
Dal River: 10,55 km



Groenheuwel Catchment

Size: 2480 ha
Wards: 13, 16, 17, 22, 24 and 32.
People: 22 346
Tributary 1 (unnamed river): 6,80 km
Boontjies River: 9,48km

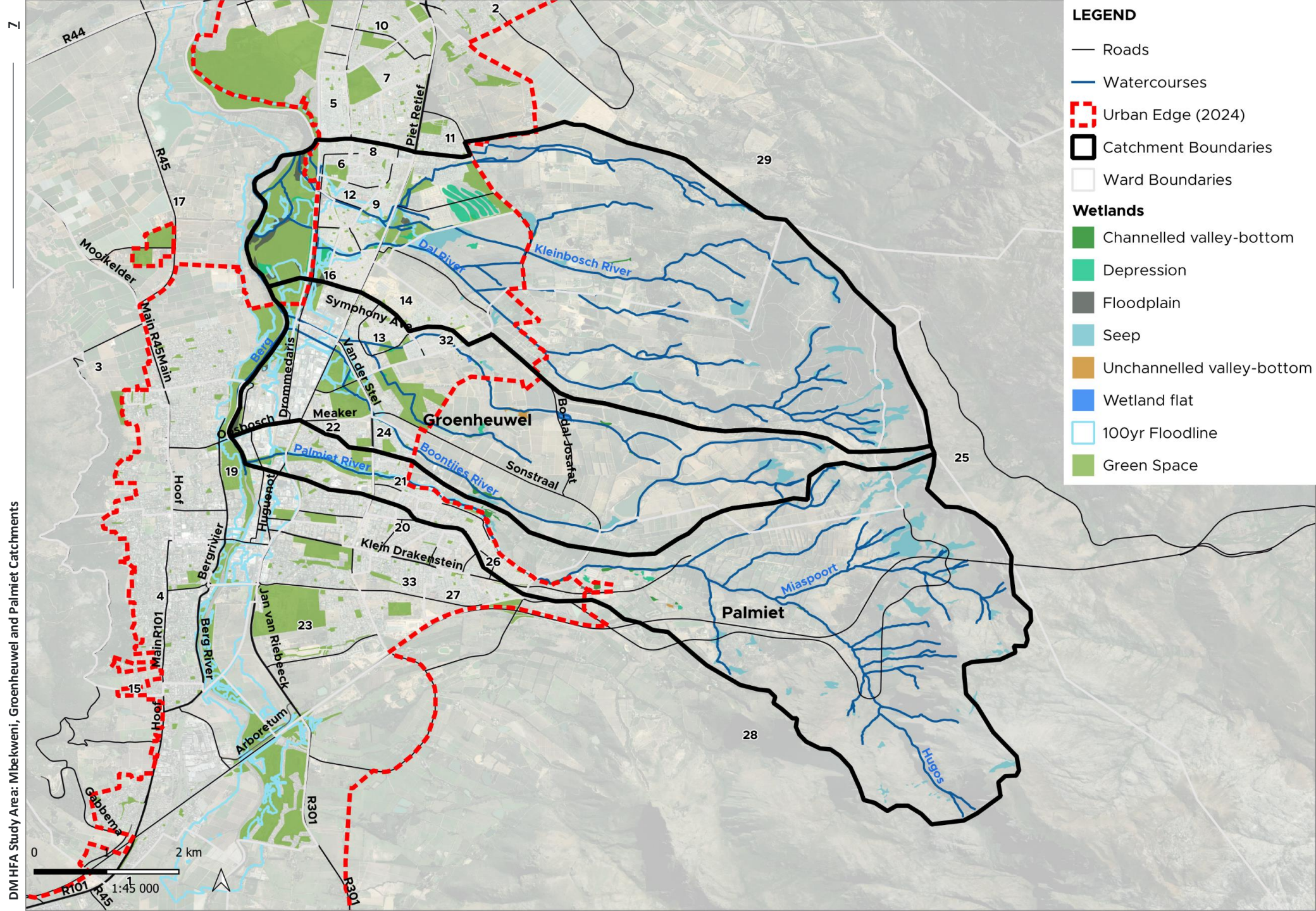


Palmiet Catchment

Size: 2480 ha
Wards: 19, 20, 21, 25, 26, and 28.
People: 49 058
Palmiet River: 13,82 km

11 July 2024 Floods
Mbekweni Catchment – view from Beets Street

11 July 2024 Floods
Mbekweni Catchment – view of Prelude Street Detention Pond



DM HFA Study Area: Mbekweni, Groenheuwel and Palmiet Catchments

Technical Studies – Informants to the DM HFA

01. PROJECT INCEPTION

Overview of Project Inception, including the proposed working partnerships i.e. project governance and management, key personnel, and key roles and responsibilities.

Inception
Project Launch Week

02. FLOOD RISK PERCEPTION STUDY

To develop an understanding of what flooding risks the communities currently perceive, the impacts they have experienced and their understanding of the drivers of flood risk.

Community Flood Risk Perception Study

03. CLIMATE CHANGE PROJECTIONS

Review of the projected changes in future climate to inform flood risk assessment and identification of hybrid flood alleviation options.

Climate Change Projections Report

04. ECOLOGICAL, INFRASTRUCTURE AND LAND USE ANALYSIS

Delivery of a combination specialist studies to develop a Land Use, Ecological and Infrastructure Analysis Report.

Climate Change Projections Report

05. DATA GATHERING FOR ASSESSMENT OF EMPLOYEMENT OPPORTUNITIES

Development of the methodology to assess the job creation potential of hybrid flood alleviation measures.

Jobs Estimation Methodology Report

06. FLOOD RISK ASSESSMENT

Hydrological model of Historical Flood Analysis, Status Quo, Geo-hydrological Assessment and Climate Change Impact Assessment.

- **Flood Risk Assessment Report**
- **Hydrogeological Assessment**

07. CLIMATE CHANGE RISK AND VULNERABILITY ASSESSMENT

A comprehensive and systematic assessment of risks and vulnerabilities.

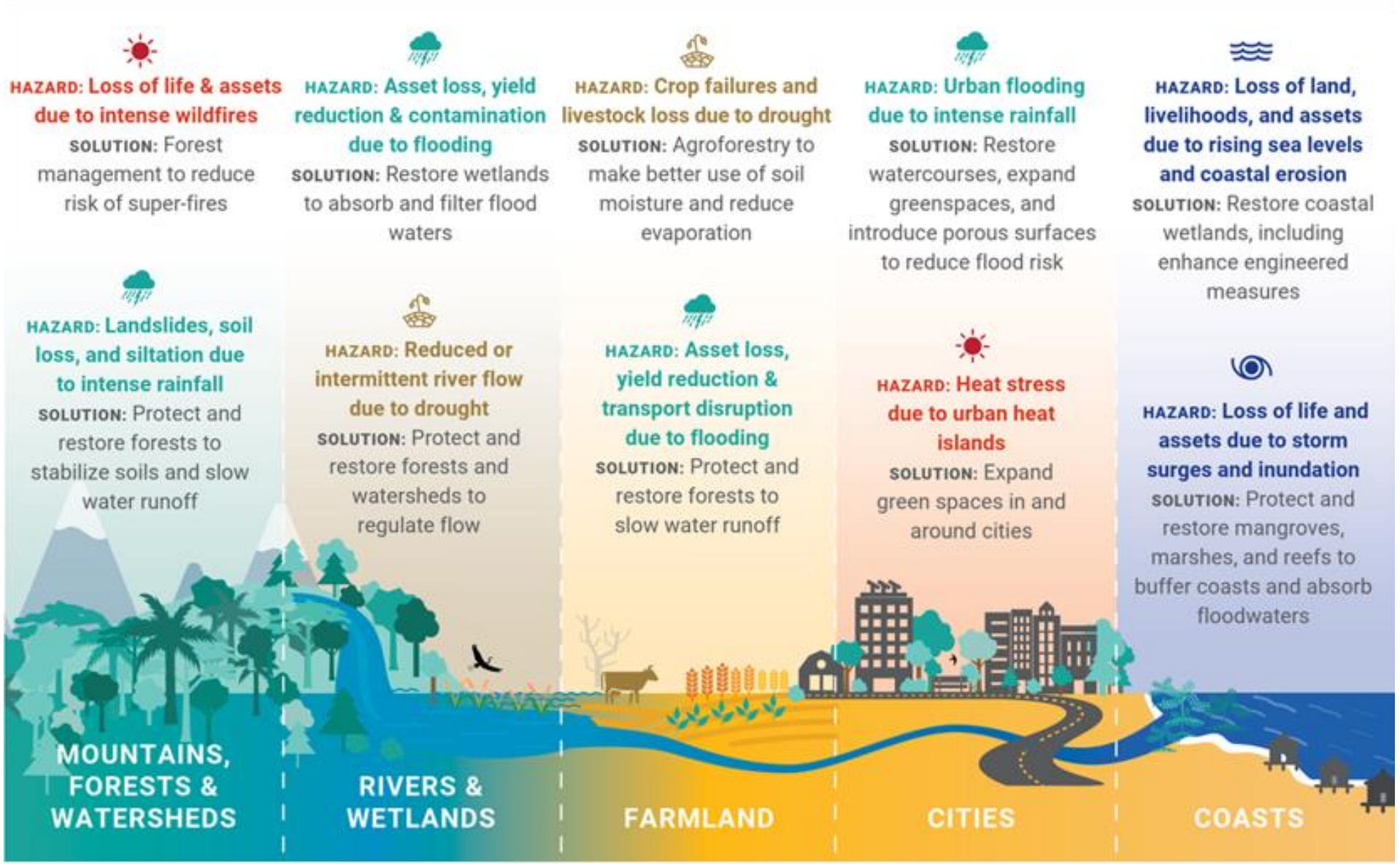
- **Climate Change Risk Vulnerability Assessment (CCRVA)**
- **Hydroclimatic Assessment**
- **Catchment Risk Profiles**
- **Damage Assessment**

08. DEVELOPMENT OF HYBRID FLOOD ALLEVIATION INTERVENTIONS

Compilation of a comprehensive programme of HFA measures for the project study area.

Programme Strategies and Interventions including Strategic Interventions, HFA Programme Catchment Projects, and Concept Notes for selected projects

Nature-based Solutions



Global Commission on Adaptation, 2019. "Adapt Now: A Global Call for Leadership on Climate Resilience." Rotterdam and Washington, DC: Global Commission on Adaptation

Defining Hybrid Flood Alleviation and it's benefits

Hybrid flood alleviation refers to the use of a combination of **grey infrastructure and Nature-based Solutions** designed to mitigate flood risk through the capture and dispersal of stormwater runoff. Integration may occur in the form of **green infrastructure providing additional services or functions to grey infrastructure, or grey infrastructure increasing the functionality of green infrastructure**. Hybrid approaches aim to address multiple challenges in addition to flood risk, including water quality and biodiversity management.

Grey infrastructure approaches are generally defined as engineered and human-built infrastructures developed to protect humans from hazards. This includes dams, barriers, dikes, seawalls, waterpipes and levees, often made out of concrete (IFRC, 2022).

Green Infrastructure and Nature-based Solutions (NbS) are actions to protect, sustainably manage and restore natural or modified ecosystems that address societal challenges effectively and adaptively, while simultaneously providing human-wellbeing and biodiversity benefits (IFRC, 2022).

The benefits of a hybrid approach to flood alleviation can achieve the broad benefit categories of Flood Risk Reduction, Improved Urban Management and Open Space Optimisation, Climate Adaptation and Community Engagement and Meaningful Engagement. The implementation of the interventions in the programme could thus result in a wide array of co-benefits including cost-effectiveness in the long term due to reduced maintenance costs, enhanced biodiversity, job creation, contributions to the local and national economy, and improved aesthetic value due to the transformation of the landscape.

Benefits of Nature-based Solutions

Ommer et al., 2022

DM HFA Programme Objectives

Flood Risk Reduction and Resilience through Hybrid Flood Alleviation Interventions

This objective focuses on implementing a combination of grey (engineered) and green (nature-based) infrastructure solutions to mitigate flood risks in flood-prone areas. By using a hybrid approach, the DM HFA Programme aims to reduce the immediate and long-term flood vulnerability of Drakenstein's communities and infrastructure, ensuring that flood alleviation measures are effective under changing climate conditions. This will enhance community resilience, minimise property damage, and protect lives and livelihoods.

Achieve Optimised Flood Attenuation through Flood Alleviation Infrastructure

Effective flood attenuation requires infrastructure that can slow down and manage floodwater, reducing peak flow rates in high-risk areas. This objective involves leveraging opportunities for installing and upgrading flood control structures, such as retention basins, swales, and overflow channels, that control water flow and limit downstream flood risks. This will support not only immediate flood management needs but also sustainable water management practices, creating a catchment area that is better equipped to handle seasonal and extreme rainfall.

Healthy, Well-Managed, and Maintained Municipal Infrastructure and Public Spaces

Ensuring that municipal infrastructure and public spaces are well-maintained and resilient to flooding is critical to the DM HFA's objectives. This includes regular maintenance of stormwater systems, culverts, and drainage channels, as well as the upkeep of public parks, open spaces, and wetlands that support flood mitigation. The objective aims to protect municipal assets from flood damage while providing safe, accessible spaces for residents and preserving ecological infrastructure essential for flood risk reduction.

Promoting Community and Catchment Health and Well-Being

This objective highlights the DM HFA's commitment to improving the quality of life in Drakenstein by supporting both physical and mental well-being through a healthy environment. Flood risk reduction efforts not only reduce the stress and disruption caused by flood events but also enhance the overall health of the catchment by preserving green spaces, improving water quality, and supporting biodiversity. Community health and well-being will be promoted by creating safe, flood-resilient spaces that provide recreational and social benefits.

Planning for Resilience

The explicit mainstreaming of resilience into planning is essential to showcase the role of future planning in relation to adaptation to future flood risks. This objective calls for strategic land-use planning, climate adaptation measures, and policies that proactively address flood risk as part of municipal development and zoning plans. By integrating flood risk management into urban and regional planning, the DM HFA Programme aims to anticipate and prepare for changes in climate, land use, and hydrology, ensuring that new developments are safe and resilient over the long term.

Effective flood risk management requires coordinated efforts across municipal departments, community stakeholders, and external partners. This objective promotes collaborative governance, encouraging input and participation from various sectors, including public works, environmental management, community groups, and private stakeholders. By fostering a cooperative environment, the DM HFA Programme will ensure that flood risk reduction is managed in a holistic, inclusive manner that leverages the expertise and resources of all relevant stakeholders.

DM HFA Programme Summary

Strategy 1:

Institutionalising the DM HFA Programme

- Create supporting institutional arrangements to implement, replicate and scale-up interventions
- Mainstream the DM HFA Programme into the Stormwater Master Plan to support the institutionalisation of the Programme
- Update Drakenstein Municipality Stormwater Master Plan and integrate the DM HFA Programme
- Update the Drakenstein Municipality Climate Change Action Plan and integrate the DM HFA Programme
- Incorporate the DM HFA Programme into the SDF's Spatial Interventions and Spatial Focus Areas (SFAs)
- Develop a Nature-based Solutions Policy and Guideline

Strategy 2:

Strengthened livelihoods and inclusivity through meaningful stakeholder engagement

- Develop a meaningful engagement strategy with local communities
- Develop an Integrated Flood Early Warning System (EWS)
- Develop an engagement strategy for the mobilisation and support of Private Landowners, Civil Society Organisations (CSOs), and Business Stakeholders
- Development of DM HFA Hybrid Flood Alleviation Youth Awareness Programme

Strategy 3:

Promoting Community and Catchment Health and Well-Being through the delivery of basic services

- Develop a Long-Term Pipeline Plan for the Upgrading of Informal Settlements
- Develop a Solid Waste Management Strategy for Solid Waste Management to support healthy watercourses

Strategy 4:

Transformative River and Catchment Management

- Develop a Catchment Management Strategy
- Development a Nature-based Flood Alleviation Strategy in upstream areas of the DM HFA catchments
- Develop a Wetland Rehabilitation Programme
- Develop a strategy to retrofit open spaces for stormwater detention
- Develop a Drakenstein Municipality River Environmental Management Plan
- Develop Maintenance Management Plans (MMPs) for Rivers in the Mbekweni, Groenheuwel and Palmiet Catchments
- Implement the DM HFA Programme: Stage 1 DM HFA Concepts and Identify Stage 2 DM HFA Projects and Develop Concept Notes

Strategy 1:

Institutionalising the DM HFA Programme

This Strategy to Institutionalise the DM HFA Programme focuses on the establishment of the required institutional arrangements and supporting capacity to ensure that the DM has the necessary institutional support and access to resources to implement the DM HFA Programme. The enablement of DM HFA Programme is strategically advantageous for the DM as it will position the DM at the forefront of hybrid infrastructure for flood alleviation amongst local governments in the Western Cape.

During the development of the Programme, three primary structures were created: The Political Steering Committee, Project Management Team (PMT), and Project Implementation Committee (PIC).

Create supporting institutional arrangements to implement, replicate and scale-up interventions	This intervention focuses on interventions that can support the Drakenstein Municipality to build and sustain an appropriate institutional structure and mobilise the necessary support from officials and the political sphere within Drakenstein and strengthen relationships with other stakeholders. This intervention aims to build on the working relationships established during the DM HFA Programme Development and is closely linked to Strategy 2: Meaningful Stakeholder Engagement for Community Resilience and Empowerment.
Mainstream the DM HFA Programme into the Stormwater Master Plan to support the institutionalisation of the Programme	For the mainstreaming of the project to be optimised, the key documents –policies, assessments, strategies, and plans must be well-formulated and geared toward mainstreaming. The incorporation of the DM HFA Programme into the Integrated Development Plan (IDP) will also position the projects forming part of the programme for funding, since the IDP sets out the Development Plan, Financial Plan and Implementation Plan of the municipality, and is the first step toward unlocking budget for project implementation in the municipal funding cycle.
Update Drakenstein Municipality Stormwater Master Plan and integrate the DM HFA Programme	An updated Stormwater Master Plan will provide a framework to assess current stormwater infrastructure, identify gaps, and integrate nature-based solutions and climate-resilient measures aligned with DM HFA objectives. This plan is essential for guiding infrastructure upgrades, improving flood resilience, ensuring regulatory compliance, and aligning with national and provincial stormwater management requirements.
Update the Drakenstein Municipality Climate Change Action Plan and integrate the DM HFA Programme	To support the DM HFA Programme and align with South Africa's recently enacted Climate Change Act 22 of 2024, it is recommended that the Drakenstein Municipality updates its Climate Change Action Plan (CCAP). This update is essential to meet regulatory requirements, support local climate resilience, and integrate flood risk reduction strategies as part of a comprehensive response to climate change. The updated CCAP will serve as a key framework for adapting to climate impacts and implementing nature-based solutions in alignment with the DM HFA Programme.
Incorporate the DM HFA Programme into the SDF's Spatial Interventions and Spatial Focus Areas (SFAs)	Development planning plays a critical role in setting out the developmental agenda for cities and is thus one of the key mechanisms through which climate change adaptation can be achieved. Effective implementation should be undertaken through the identification and optimal utilisation of existing mechanisms at the local level, whereby spatial planning is recognised as a key and strategic entry point that can be used to mainstream resilience and the transversal proposals.
Develop a Nature-based Solutions Policy and Guideline	Development planning plays a critical role in setting out the developmental agenda for cities and is thus one of the key mechanisms through which climate change adaptation can be achieved. Effective implementation should be undertaken through identification and optimal utilisation of existing mechanisms at the local level, whereby spatial planning is recognised as a key and strategic entry point that can be used to mainstream resilience and the transversal proposals.

Members of the DM HFA Project Team at the October 2024 DM HFA Workshop (Source: AIVIA, 2024)

Strategy 2:

Strengthened livelihoods and inclusivity through meaningful stakeholder engagement

The development of the DM HFA Programme for Mbekweni, Groenheuwel and Palmiet demonstrated the need for engagement with a wide range of stakeholders.

The Meaningful Stakeholder Engagement for Community Resilience and Empowerment Strategy focuses on sustaining the existing relationships and initiatives formed with members of the community, and expanding the stakeholder engagement to other key stakeholders.

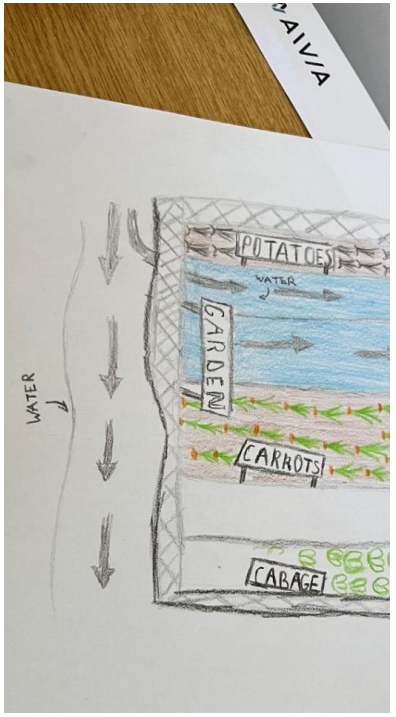
During the development of the DM HFA, emphasis was placed on engagement with local communities as a first focus of the DM HFA engagement (including engagement with ward councillors).

Develop a meaningful engagement strategy with local communities	This intervention therefore focuses on the sustained engagement with the specific wards identified as part of this project, as well as the broader Portfolio Council and Ward Council structures that builds on the work undertaken as part of the DM HFA Programme development process. The further development of this strategy will aim to achieve sustained, meaningful engagement with affected communities, and will serve to maintain moment and build trust between the DM and local communities.
Develop an Integrated Flood Early Warning System (EWS)	This strategy proposed the development of an enhanced Early Warning System (EWS) as a key element of climate change adaptation and disaster risk reduction. Its effectiveness and efficiency rely on the active involvement of the people and communities at risk through education and awareness campaigns, and the dissemination of messages to ensure that warnings efficiently reach at-risk groups to allow for early action.
Develop an engagement strategy for the mobilisation and support of Private Landowners, Civil Society Organisations (CSOs), and Business Stakeholders	Engaging landowners, businesses, and civil society groups can facilitate activities such as invasive species removal, riparian buffer zone maintenance, wetland conservation, and sustainable land-use practices, which are all integral to flood resilience in the catchment areas. Through structured engagement, these stakeholder groups can contribute directly to the DM HFA's goals, increasing community buy-in, building resilience, and fostering a shared sense of responsibility for flood management across Drakenstein. Additionally, such partnerships can help leverage resources, expertise, and local knowledge, making the DM HFA more impactful and sustainable.
Development of DM HFA Hybrid Flood Alleviation Youth Awareness Programme	To support the DM HFA Programme and align with South Africa's recently enacted Climate Change Act 22 of 2024, it is recommended that the Drakenstein Municipality updates its Climate Change Action Plan (CCAP). This update is essential to meet regulatory requirements, support local climate resilience, and integrate flood risk reduction strategies as part of a comprehensive response to climate change. The updated CCAP will serve as a key framework for adapting to climate impacts and implementing nature-based solutions in alignment with the DM HFA Programme.


PARK


RIVER


Rivers
Foot Bridge
Park
Playground


POTATOES
WATER
GARDEN
CARROTS
CABAGE
WATER

Strategy 3:

Promoting Community and Catchment Health and Well-Being through the delivery of basic services

The development of the DM HFA Programme for Mbekweni, Groenheuwel and Palmiet demonstrated the need for engagement with a wide range of stakeholders.

The Meaningful Stakeholder Engagement for Community Resilience and Empowerment Strategy focuses on sustaining the existing relationships and initiatives formed with members of the community, and expanding the stakeholder engagement to other key stakeholders.

During the development of the DM HFA, emphasis was placed on engagement with local communities as a first focus of the DM HFA engagement (including engagement with ward councillors).

Develop a Long-Term Pipeline Plan and Strategy for the Upgrading of Informal Settlements

The Drakenstein Municipality faces increasing pressure for Human Settlement opportunities and land to accommodate the growing housing need. South Africa has well-developed policies which address the upgrading of informal settlements. The Upgrading of Informal Settlements will support the overall DM HFA Programme Objectives. The provision of basic services through informal settlement upgrading can increase the capital assets of a community and reduce their overall vulnerability to flood events. Moreover, the provision of basic services such as solid waste management and sanitation (grid or off-grid) can serve to improve the health of the catchment through improved water quality, reduced solid waste pollution, and improved heath of communities.

Develop a Solid Waste Management Strategy for Solid Waste Management to support healthy watercourses

Solid waste accumulation in watercourses, such as rivers, canals, and wetlands, can block stormwater flow, increase flood risks, and degrade natural flood mitigation systems. By implementing a targeted strategy that addresses the challenges in the catchments, and further prevents solid waste from reaching the waterways, cleaner and more resilient catchments can be realised. The intervention therefore proposes an improved and integrated solid waste management strategy, as well as the development of a clear approach to managing solid waste that has entered watercourses. This intervention requires a collaborative approach, engaging municipal departments, local businesses, and residents, to effectively address the sources of solid waste pollution.

Solid waste between dwellings in Drommedaris Informal Settlement after July 2024 storms (Source: AIVIA, 2024)

Palmiet River (Source: AIVIA, 2024)

Strategy 4:

Transformative River and Catchment Management

Strategy 4 focuses on Strategic Interventions and Catchment Projects that are specific to watercourses, wetlands and the implementation of hybrid infrastructure.

Develop a Catchment Management Strategy

The Municipality develops a Catchment Management Strategy to guide sustainable water resource and flood management practices across all catchments within the municipal jurisdiction. It should be aligned with local government mandates, focusing on activities that support flood mitigation, water quality improvement, erosion control, and ecological restoration, specifically within the scope of municipal responsibilities. The Strategy can support the scaling of the DM HFA Programme to a municipal level and ensure a comprehensive approach to catchment management that integrates infrastructure, natural systems, and community engagement to reduce flood risks effectively.

Development a Nature-based Flood Alleviation Strategy in upstream areas of the DM HFA catchments

Catchment land use and land use conditions have a marked influence on catchment stormflow response. It is important that the land cover upstream of the urban edge is maintained to manage catchment stormflow response as the space available within the urban edge is limited for large stormwater management interventions and is generally characterised by competing land use priorities. To address the areas outside the DM 2024 Urban Edge, the DM HFA Programme included an Opportunity Mapping Assessment to identify the potential for Nature based Solutions (NbS). This should be used to develop a NbS Strategy for Rural Areas.

Develop a Wetland Rehabilitation Programme

The degradation of wetlands in the study area poses a significant threat to flood risk management. The Development of a Wetland Rehabilitation Programme will serve as a guideline to promote the good health of rivers and wetlands through rehabilitation. The intervention includes suggested criteria for prioritising rehabilitation, general steps for rehabilitation, and rehabilitation steps for river reaches, seep wetlands, depression and wetland flats, floodplain wetlands and valley bottom wetlands.

Develop a strategy to retrofit open spaces for stormwater detention

Open spaces in DM should be targeted for the retrofitting of stormwater interventions to create stormwater parks and other Nature-based Solutions. This intervention aims to enhance access to healthy, safe, and restorative open spaces while also serving as multi-benefit spaces for local communities and the municipality at large.

Develop a Drakenstein Municipality River Environmental Management Plan

This intervention focuses on developing an Environmental Management Plan (EMP), specifically with the purpose of river and wetland maintenance. The development of an EMP will be essential for biodiversity conservation, water quality and availability, flood mitigation, climate change adaptation as well as providing socio-economic benefits, as it will be legally binding once approved. It is proposed that the EMP covers rivers in the Drakenstein Municipality.

Develop Maintenance Management Plans (MMPs) for Rivers in the Mbekweni, Groenheuwel and Palmiet Catchments

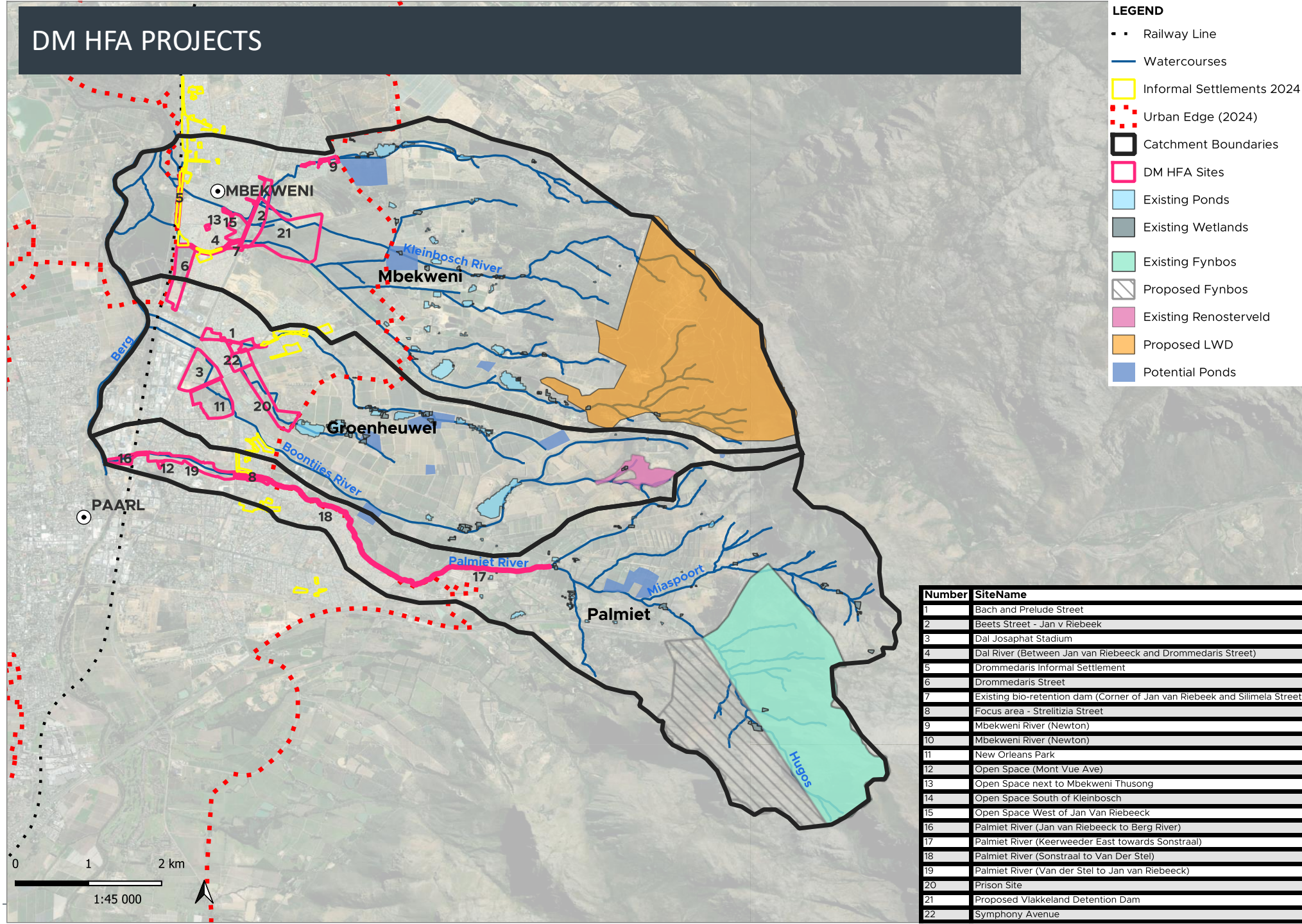
The development of the MMPs can assist to fast-track the ability of the DM to intervene in riverine environments. The MMPs must focus on maintenance and specify the proposed activities to be undertaken for maintenance purposes within the DM, together with the relevant work statements indicating the approach to be taken in the event of these maintenance activities. An MMP, (when approved), is legally binding.

Implement the DM HFA Programme:

The intervention has two primary components:

- The detailed planning and design, construction and implementation of the 6 DM HFA Stage 1 Priority Projects
- Identify and Package Stage 2 DM HFA projects based on identified Catchment Projects

DM HFA PROJECTS



LEGEND

- Railway Line
- Watercourses
- Informal Settlements 2024
- Urban Edge (2024)
- Catchment Boundaries
- DM HFA Sites
- Existing Ponds
- Existing Wetlands
- Existing Fynbos
- Proposed Fynbos
- Existing Renosterveld
- Proposed LWD
- Potential Ponds

Number	SiteName
1	Bach and Prelude Street
2	Beets Street - Jan v Riebeek
3	Dal Josaphat Stadium
4	Dal River (Between Jan van Riebeeck and Drommedaris Street)
5	Drommedaris Informal Settlement
6	Drommedaris Street
7	Existing bio-retention dam (Corner of Jan van Riebeek and Silimela Street)
8	Focus area - Strelitizia Street
9	Mbekweni River (Newton)
10	Mbekweni River (Newton)
11	New Orleans Park
12	Open Space (Mont Vue Ave)
13	Open Space next to Mbekweni Thusong
14	Open Space South of Kleinbosch
15	Open Space West of Jan Van Riebeeck
16	Palmiet River (Jan van Riebeeck to Berg River)
17	Palmiet River (Keerweeder East towards Sonstraal)
18	Palmiet River (Sonstraal to Van Der Stel)
19	Palmiet River (Van der Stel to Jan van Riebeeck)
20	Prison Site
21	Proposed Vlakkeland Detention Dam
22	Symphony Avenue

Mbekweni Catchment Project Concepts

1 Strategic Interventions

1. These interventions are typically city-wide or catchment wide and are thus not 'site specific'. They are strategic in nature and aid in the mainstreaming of resilience at the institutional, technical, and societal levels.

2 Mbekweni HFA Programme Catchment Projects– Urban

Catchment Projects have been identified on the basis of the catchment-specific technical studies in the Mbekweni, Groenheuwel and Palmiet Catchments, and focus on areas that could be suitable for place-based interventions. These projects were identified as part of site identification process based on findings from the Phase 4 Ecological, Land Use and Infrastructure Analysis Report which included a detailed review of the DM SDF 2024 as well as the 2015 Drommedaris Stormwater Master Plan; The Phase 2 Flood Risk Perception Study Report; and various Site Visits conducted in June, July, August and October 2024.

Catchment Projects are described in detail in Part B of the Programme and are then further explained in Part C (Mbekweni Projects), Part D (Groenheuwel Projects) and Part E (Palmiet Projects) of the Programme document.

The following projects were identified in the urban areas of Mbekweni:

1. Mbekweni River Site
2. Beets Street to Jan van Riebeeck Street Site
3. Open Space West of JvR
4. Existing bio-retention dam (Corner of Jan van Riebeeck and Silimela Street):
5. Dal River (between Jan van Riebeeck and Drommedaris Street)
6. Drommedaris Street
7. Drommedaris Informal Settlement
8. Open Space next to the Mbekweni Thusong
9. Open Space South of Kleinbosch
10. Vlakkeland

Selected Sites and Intervention Concept:

- Beets Street Constructed Wetland and Park
- Drommedaris Street Constructed Wetland and Park

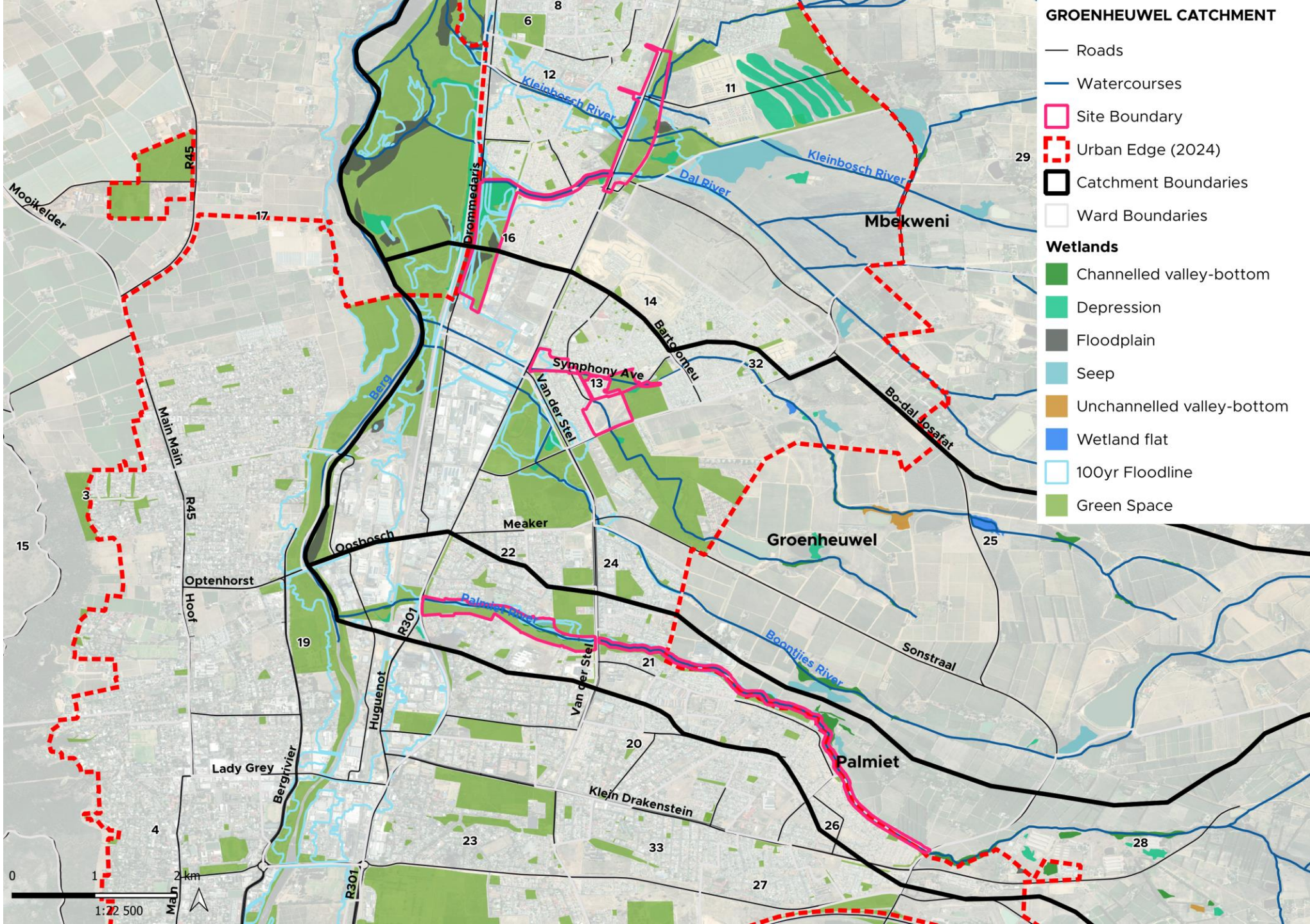
3 Mbekweni HFA Programme Catchment Projects– Rural

To address the rural areas (areas outside the DM 2024 Urban Edge), the DM HFA Programme included an Opportunity Mapping Assessment to identify the potential for Nature based Solutions (NbS) in the Drakenstein Municipality, with a particular focus on the upstream catchment. The intervention includes the introduction of runoff attenuation feature, Large Woody Debris, and proposed fynbos areas, as well as the increased capacity of existing dams and ponds. The full Opportunity Mapping Assessment to Identify the Potential for Nature-Based Solutions (NbS) in the three Drakenstein Catchments is available as part of the DM HFA Programme document.

Urban Projects

Hybrid Flood Alleviation Priority Projects – Mbekweni Catchment:

- Beets Street HFA Project
- Drommedaris Steet HFA Project


GROENHEUWEL CATCHMENT
Roads
Watercourses
Site Boundary
Urban Edge (2024)
Catchment Boundaries
Ward Boundaries
Wetlands
Channelled valley-bottom
Depression
Floodplain
Seep
Unchannelled valley-bottom
Wetland flat
100yr Floodline
Green Space
Groenheuwel
Mbekweni
Palmiet
Optenhorst
Lady Grey
Meaker
Symphony Ave
Sonstraal
Klein Drakenstein
Kleinbosch River
Dal River
Boontjies River
Palmiet River
Drommedaris
Van der Stel
Bo-dal Josafat
Bartholomeu
Oosbosch
Huguenot
Bergrivier
Main Main
Hoof
Berg
Mooikelder
R45
R301
0
1
2 km
1:22 500

Mbekweni HFA Programme Project Screening

10 sites:
1. Mbekweni River Site
2. Beets Street to Jan van Riebeeck Street Site
3. Open Space West of JvR
4. Existing bio-retention dam (Corner of Jan van Riebeeck and Silimela Street)
5. Dal River (between Jan van Riebeeck and Drommedaris Street)
6. Drommedaris Street
7. Drommedaris Informal Settlement
8. Open Space next to the Mbekweni Thusong
9. Open Space South of Kleinbosch
10. Vlakkeland

Urban vs Rural: All sites located within the urban edge

10 sites

Land ownership: 3 Sites Privately-Owned; 2 sites with combination ownership

5 sites:
1. **Beets Street**
2. **Dal River**
3. **Drommedaris Street**
4. **Open Space next to the Mbekweni Thusong**
5. **Open Space South of Kleinbosch**

Open space available for hybrid flood attenuation infrastructure (suitable as catalytic projects):

- Beets Street: **Opportunity for constructed wetland and park**
- Dal River: **No space available for Flood Alleviation Infrastructure**
- Open Space next to the Mbekweni Thusong: **Limited space available for Flood Alleviation Infrastructure**
- Drommedaris Street: **Opportunity for constructed wetland and park**
- Open Space South of Kleinbosch: **Limited space available for Flood Alleviation Infrastructure**

2 Projects:
1. **Beets Street**
2. **Drommedaris Street**

Local and regional benefit

- Beets Street: Constructed wetland/s and park **offer local and regional benefit**
- Drommedaris Street: Constructed wetland/s and park **offer local and regional benefit**

Alignment with SDF

- Beets Street: **Alignment with Green Space Designation**
- Drommedaris Street: **Alignment with Green Space Designation**

Consultation with the DM PMT to agree on catalytic sites with potential for the development of flood alleviation infrastructure with opportunities for Nature-based Solutions

Selected Sites and Intervention Concept
1. **Beets Street Constructed Wetland and Park**
2. **Drommedaris Street Constructed Wetland and Park**

Mbekweni Concept 1: Beets Street HFA Project

Informants and Context

Ward 11

Erf 12633, Erf 8399, Erf 8400, and Erf 12628.

13,8 hectares

Direct beneficiaries: 81 737 (2021); 108 401 (2031)

Spatial Development Framework (SDF) designation: Green Space

The Mbekweni, Kleinbosch, and Dal Rivers traverse the site, contributing to significant flood risks in downstream residential areas.

Concept Design and Key Components

The proposed interventions aim to combine flood risk reduction with social and ecological enhancements. Key interventions include:

- Stormwater Management Features: Including ponds, constructed wetlands, and swales to manage floodwaters, improve water quality, and support biodiversity.
- Recreational Spaces: A play park and stormwater-attenuating sports fields offer community benefits while doubling as flood attenuation features.
- Solid Waste Management and Riparian Zone Rehabilitation: Ensuring sustainable site management and ecological restoration.
- **Gateway Entrances and Pedestrian Pathways:** Promoting connectivity with safe crossings and accessible routes.
- **Solid Waste Management**: Including refuse collection points and strategies to mitigate illegal dumping.

Cost Estimates

The total estimated cost is R111.9 million, covering planning, construction, and operational phases.

Benefits and outcomes

Flood Risk Reduction: PCSWMM modelling demonstrated significant flood reduction benefits, especially for the 20- and 100-year flood scenarios. Including flood depths reduced by 0.25m to 0.5m in downstream areas and proposed interventions prevent overtopping at critical points.

Ecological Restoration: The rehabilitation of wetlands will restore flood attenuation ecosystem services (FAES) .

Community Empowerment: Engagement processes incorporated community input, ensuring the project meets local needs for recreation and safety.

Job Creation Potential: The project's estimated cost is R111.9 million, including planning, construction, and operational phases. It is expected to create over 26 job-years during design and construction, with permanent positions for site maintenance.

Recommendations and Way Forward

To maximise flood attenuation and community benefits:

- Refine designs during the detailed planning phase, focusing on wetland restoration and storage optimisation.
- Ensure integration of community feedback into all design and operational aspects.
- Expand the project's scope to address upstream challenges and ensure downstream flood risk reduction.

MBEKWENI CATCHMENT

Beets Street
Landscape Concept Plan

1:2000 on A1 or 1:4000 on A3
Date: 30 October 2024

0 100 200 300 400m

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Mbekweni Concept 2: Drommedaris Street HFA Project

Informants and Context

Ward 16

Erf 584

23 hectares

Direct beneficiaries: 81 737 (2021); 108 401 (2031)

Spatial Development Framework (SDF) designation: Green Space

The site includes several wetlands, including floodplain and depression wetlands, which play a vital role in flood attenuation and water quality regulation.

The area faces significant flood risk, particularly around informal settlements near the Drommedaris Canal, where flood depths of up to 2.5 m have been recorded during the 100-year return period. The site also experiences challenges related to solid waste dumping, pollution, and poor water quality, presenting an opportunity for integrated ecological and social solutions.

Concept Design and Key Components

The project incorporates a hybrid flood alleviation approach combining nature-based solutions with recreational infrastructure. Key interventions include:

- Water Treatment Pond and Wetland System: Designed to improve water quality and provide flood attenuation.
- Raised Sports Fields: Elevated to remain functional during wet periods.
- Pedestrian Pathways and Berms: Promoting accessibility and serving as flood management infrastructure.
- **Bird-Watching Island and Marsh Planting**: Enhancing biodiversity and ecological functionality.
- Solid Waste Management: Including refuse collection points and strategies to mitigate illegal dumping.

Cost Estimates

The total estimated cost is R118.8 million, covering planning, construction, and operational phases.

Benefits and outcomes

Flood Risk Reduction: The proposed interventions are projected to reduce flood depths by 0.25 m to 0.5 m in high-risk areas. The system also optimises stormwater storage and improves water conveyance.

Ecological Restoration: The rehabilitation of wetlands enhances flood attenuation, streamflow regulation, and water quality, while supporting biodiversity.

Climate Resilience: Adaptation measures such as wetland restoration and urban drainage solutions align with Drakenstein's climate action goals, promoting flood and drought resilience.

Community Benefits: Recreational spaces and pedestrian pathways improve livability, safety, and social cohesion.

Job Creation Potential: The project is expected to create approximately 33 job-years during design and construction and additional permanent maintenance positions.

Recommendations and Way Forward

To maximise project benefits:

- Refine designs during the detailed planning phase, focusing on enhancing wetland functionality and stormwater management.
- Integrate community feedback into final designs to ensure alignment with local needs.
- Expand the project's scope to address upstream challenges and ensure downstream flood risk reduction.

MBEKWENI CATCHMENT

Drommedaris Street
Landscape Concept Plan

1:2000 on A1 or 1:4000 on A3
Date: 30 October 2024

0 100 200 300 400m

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Urban Projects

Hybrid Flood Alleviation Priority Projects – Groenheuwel Catchment:

- New Orleans Park HFA Project
- Prelude-Symphony-Bach Stormwater Park Network HFA Project

Groenheuwel Catchment Project Concepts

1 Strategic Interventions

1. These interventions are typically city-wide or catchment wide and are thus not 'site specific'. They are strategic in nature and aid in the mainstreaming of resilience at the institutional, technical, and societal levels.

2 Groenheuwel HFA Programme Catchment Projects– Urban

Catchment Projects have been identified on the basis of the catchment-specific technical studies in the Mbekweni, Groenheuwel and Palmiet Catchments, and focus on areas that could be suitable for place-based interventions. These projects were identified as part of site identification process based on findings form the Phase 4 Ecological, Land Use and Infrastructure Analysis Report which included a detailed review of the DM SDF 2024 as well as the 2015 Drommedaris Stormwater Master Plan; The Phase 2 Flood Risk Perception Study Report; and various Site Visits conducted in June, July, August and October 2024.

Catchment Projects are described in detail in Part B of the Programme and are then further explained in Part C (Mbekweni Projects), Part D (Groenheuwel Projects) and Part E (Palmiet Projects) of the Programme document.

The following projects were identified I the urban areas of Groenheuwel:

1. Open Space South of Bach Street
2. Prelude Street Low-flow channel and detention pond enhancement
3. Allandale Correctional Facility / "Prison Site"
4. Dal Josaphat Stadium
5. New Orleans Park

Selected Sites and Intervention Concept:

- New Orleans Park Detention Ponds
- Prelude Street Detention Pond Extension to Erf 16755 (Open Space Next to Cemetery and Open Space South of Bach Street (Erf 17091)

3 Groenheuwel HFA Programme Catchment Projects – Rural

To address the rural areas (areas outside the DM 2024 Urban Edge), the DM HFA Programme included an Opportunity Mapping Assessment to identify the potential for Nature based Solutions (NbS) in the Drakenstein Municipality, with a particular focus on the upstream catchment. The intervention includes the introduction of runoff attenuation feature, Large Woody Debris, and proposed fynbos areas, as well as the increased capacity of existing dams and ponds. The full Opportunity Mapping Assessment to Identify the Potential for Nature-Based Solutions (NbS) in the three Drakenstein Catchments is available as part of the DM HFA Programme document.

Groenheuwel HFA Programme Project Screening

Site Name	Intervention Concept	Urban Focus	Land ownership	Open space available for hybrid flood attenuation infrastructure (indicative)	Local and regional benefit	Alignment with Municipal SDF
Open Space South of Bach Street	Detention Pond	Located in urban edge	Municipal	2ha (assuming approximately 75% of the site is used for flood alleviation infrastructure)	Local and regional benefit	The site is currently earmarked for community use, however DM Spatial Planners expressed support for the use of the site as part of the DM HFA Programme.
Prelude Street Low-flow channel and detention pond enhancement	Extension of the detention pond to erf 16755; Open space optimisation, recreational spaces.	Located in urban edge	Municipal	7,5 ha (assuming the 75% of the extension site (erf 16755) is used for flood alleviation infrastructure.	Local and regional benefit	The site is currently earmarked for community use, however DM Spatial Planners expressed support for the use of the site as part of the DM HFA Programme.
Allandale Correctional Facility / "Prison Site"	Water retention and storage	Located in urban edge	National	15ha (assuming that 75% of the site can be leveraged for attenuation and water storage)	Local and regional benefit	Green Space
Dal Josaphat Stadium	Optimisation: Detention Pond/ Upgrade/ beautification of open space	Located in urban edge	Municipal	5 ha (assuming approximately 75% of the remaining open space can be used for flood attenuation infrastructure). Erf 4920 is 21,15 hectares in size.	Local and regional benefit	There are plans to construct a warm-up track as an extension to the stadium infrastructure.
New Orleans Park	Flood Attenuation Infrastructure (Ponds)	Located in urban edge	Municipal	10ha (assuming sections of the open space will be used for flood attenuation ponds)	Local and regional benefit	Green Space

Groenheuwel HFA Programme Project Screening

5 sites:
1. Open Space South of Bach Street
2. Prelude Street Low-flow channel and detention pond enhancement
3. Allandale Correctional Facility / "Prison Site"
4. Dal Josaphat Stadium
5. New Orleans Park

Urban vs Rural: All sites located within the urban edge

5 sites

Land ownership: 1 site not owned by DM

4 sites:
1. Open Space South of Bach Street
2. Prelude Street Low-flow channel and detention pond enhancement
3. Dal Josaphat Stadium
4. New Orleans Park

Open space available for hybrid flood attenuation infrastructure (suitable as catalytic projects)

- **Open Space South of Bach Street**
- **Prelude Street Low-flow channel and detention pond enhancement**
- **Dal Josaphat Stadium**
- **New Orleans Park**

4 Projects:
1. Open Space South of Bach Street
2. Prelude Street Low-flow channel and detention pond enhancement
3. Dal Josaphat Stadium
4. New Orleans Park

Local and regional benefit

- Open Space South of Bach Street Ponds **offers regional and local benefit**
- Prelude Street Low-flow channel and detention pond enhancement and extension **offers regional and local benefit**
- Dal Josaphat Stadium Optimisation: Detention Pond **offers regional and local benefit**
- New Orleans Park detention ponds **offers regional and local benefit**

Alignment with SDF and municipal plans

- Open Space South of Bach Street Ponds **earmarked for community use. In principle support for project achieved.**
- Prelude Street Low-flow channel and detention pond enhancement and extension – extension area earmarked for community use. **In principle support for project achieved.** .
- Dal Josaphat Stadium Optimisation: Detention Pond designated as green space
- New Orleans Park detention pond designated as green space

Consultation with the DM PMT to agree on catalytic sites with potential for the development of flood alleviation infrastructure with opportunities for Nature-based Solutions

Selected Sites and Intervention Concept:
- **New Orleans Park Detention Ponds**
- **Prelude Street Detention Pond Extension to Erf 16755 (Open Space Next to Cemetery and** Open Space South of Bach Street (Erf 17091)

Groenheuwel Concept 1: Prelude-Symphony-Bach Stormwater Park Network HFA Project

Informants and Context

Ward 13

Erf 16654, Erf 22263, Erf 16755, and Erf 17091

9.17 hectares

Direct beneficiaries: 22 347 (2021) 27 674 **(2031)**

Spatial Development Framework (SDF) designation: Green Space and Community Use

The project addresses flood risks which impact surrounding residential areas, informal settlements, and industrial zones.

Each site has unique interventions:

Prelude Section: Meandering water channels, a sports field with swales, and riparian vegetation enhancements.

Symphony Section: Large stormwater ponds, cricket fields, and a community garden.

Bach Section: Open space featuring a cricket field, netball courts, and a playground.

Concept Design and Key Components

The proposed interventions integrate flood risk reduction with ecological restoration and community benefits. Key design components include:

- **Stormwater Management:** Cascaded stormwater ponds, water treatment wetlands, and swales to improve flood attenuation, enhance water quality, and support biodiversity.
- **Recreational Facilities:** Creation of sports fields, pedestrian walkways, and playgrounds to promote active community use and connectivity.
- **Riparian Zone Rehabilitation:** Restoration of vegetation to improve ecological functionality and aesthetics.
- **Solid Waste Management:** Introduction of refuse bins and routine waste collection to address solid waste pollution.

Cost Estimates

The total estimated cost is R106.1 million, covering planning, construction, and operational phases.

Benefits and outcomes

Flood Risk Reduction: PCSWMM modelling demonstrates significant reductions in flood depths, ranging from 0.25m to 0.5m in the 20- and 100-year flood scenarios. These benefits extend downstream into residential areas.

Environmental Benefits: Rehabilitation of wetlands and riparian zones restores flood attenuation ecosystem services and improves water quality.

Community Benefits: The inclusion of recreational spaces and pedestrian pathways addresses social needs and fosters a sense of community ownership.

Solid Waste Management: Improved refuse collection mitigates pollution and enhances overall site health and safety.

Job Creation Potential: It is projected to create 31 job-years during design and construction and two permanent maintenance jobs.

Recommendations and Way Forward

To maximise the project's impact:

- Conduct detailed engineering and ecological designs to optimise flood attenuation.
- Ensure robust stakeholder engagement and integration of community feedback.
- Implement regular monitoring and adaptive management strategies to sustain the site's functionality over time.

GROENHEUWEL CATCHMENT

Symphony Way (Part 01)
Landscape Concept Plan

1:1000 on A1 or 1:2000 on A3
Date: 30 October 2024

0 50 100 150 200m

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Jan Van Riebeeck Drive
Proposed container to activate space (for example a buy-back center, bicycle repair shop or tuck shop)
Divert stormwater from channel next to Jan van Riebeeck Drive into swale to improve water quality
Bach Street
Symphony Avenue
Cricket field
3387 m²
Existing sewer lines
Proposed multipurpose courts or similar recreational activity to activate the site
Proposed new playground potentially with flood alleviation theme
Proposed swale with riparian vegetation to treat polluted stormwater run-off
Existing stormwater canal
Proposed stormwater treatment pond
Refurbish existing playground potentially with flood alleviation theme
Proposed road surface change to visually link traffic island, with potential seating to increase passive surveillance with park
Existing pedestrian bridge to connect various pedestrian pathways
Proposed terrestrial vegetation
Formalise pedestrian pathway along existing stormwater channel
379 m²
802 m²
Existing stormwater channel
Prelude Street
Symphony Avenue
New trees to soften solid boundary walls, provide habitat and shade along pathway
Formalise pedestrian pathways around the wetland and create circular routes
Refurbish existing playground with possible wetland theme
Rehabilitate channel banks with terrestrial vegetation
Symphony Avenue
Culvert
Existing culvert / overflow
Proposed stormwater pond / cricket field
Riparian vegetation
Incorporate seating into embankment for spectator seating
Chopin Avenue
GROENHEUWEL CATCHMENT
Symphony Way (Part 02)
Landscape Concept Plan
1:1000 on A1 or 1:2000 on A3
Date: 30 October 2024
0
50
100
150
200m
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Groenheuwel Concept 2: New Orleans Park HFA Project

Informants and Context

Ward 22

Erf 4920

27.69 hectares

Direct beneficiaries: 22 347 (2021) 27 674 (2031)

Spatial Development Framework (SDF) designation: Green Space

The park lies south of the Dal Josafat Stadium and features the Boontjies River and an existing stormwater attenuation dam.

Frequent flooding downstream of the park is exacerbated by limited stormwater capacity and overland flows. The site includes a conservation area with endangered Renosterveld species and serves as a recreational hub, with over 16,000 annual visitors.

Concept Design and Key Components

Key interventions include:

Flood Risk Management:

- Widening the Boontjies River with multi-stage channels and terraces to manage stormwater.
- Increasing the capacity of the attenuation dam and integrating off-channel retention areas.
- Constructing swales and realigning internal circulation for improved water management.

Recreational Enhancements:

- Upgraded play parks and pedestrian pathways.
- Development of multi-functional spaces for community activities.

Ecological Restoration:

- Biodiversity conservation.
- Riparian rehabilitation and invasive species management.

Cost Estimates

The total estimated cost is R64.5 million, covering planning, construction, and operational phases.

Benefits and outcomes

- **Flood Risk Reduction**: Reductions in downstream flood depths of up to 0.5m for 20- and 100-year flood events, through increased flood storage capacity within the park.
- **Environmental Gains**: Improved biodiversity, ecological restoration including enhanced water quality and climate resilience.
- **Community Benefits**: Expanded recreational opportunities and educational awareness, as well as strengthened community ownership and engagement through participatory planning.
- **Job Creation Potential:** The project is expected to create approximately 25 job-years during design and construction and additional permanent maintenance positions.

Recommendations and Way Forward

- To maximise project benefits:
- Advance detailed designs, hydraulic modelling, and regulatory approvals.
- Address relocation of households still residing on-site and integrate community feedback into the project design.
- Secure funding and establish partnerships with local stakeholders, including NGOs and schools.

GROENHEUWEL CATCHMENT

Orleans Park
Landscape Concept Plan

1:2000 on A1 or 1:4000 on A3
Date: 30 October 2024

0 50 100 150 200m

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Palmiet Catchment Project Concepts

1 Strategic Interventions

1. These interventions are typically city-wide or catchment wide and are thus not 'site specific'. They are strategic in nature and aid in the mainstreaming of resilience at the institutional, technical, and societal levels.

2 Palmiet HFA Programme Catchment Projects – Urban

Catchment Projects have been identified on the basis of the catchment-specific technical studies in the Mbekweni, Groenheuwel and Palmiet Catchments, and focus on areas that could be suitable for place-based interventions. These projects were identified as part of site identification process based on findings form the Phase 4 Ecological, Land Use and Infrastructure Analysis Report which included a detailed review of the DM SDF 2024 as well as the 2015 Drommedaris Stormwater Master Plan; The Phase 2 Flood Risk Perception Study Report; and various Site Visits conducted in June, July, August and October 2024. Catchment Projects are described in detail in Part B of the Programme and are then further explained in Part C (Mbekweni Projects), Part D (Groenheuwel Projects) and Part E (Palmiet Projects) of the Programme document.

The following projects were identified I the urban areas of Palmiet:

1. Palmiet River (Keerweeder east towards Sonstraal Road)
2. Palmiet River (Sonstraal to Van der Stel Drive)
3. Palmiet River (Van der Stel to Jan van Riebeeck Street)
4. Open Space (Mont Vue Avenue)
5. Palmiet River (Jan van Riebeeck Street to Berg River)

Selected Sites and Intervention Concept:

- Palmiet River (Sonstraal to Van der Stel Drive)
- Palmiet River (Van der Stel to Jan van Riebeeck Street) in combination with Open Space (Mont Vue Avenue)

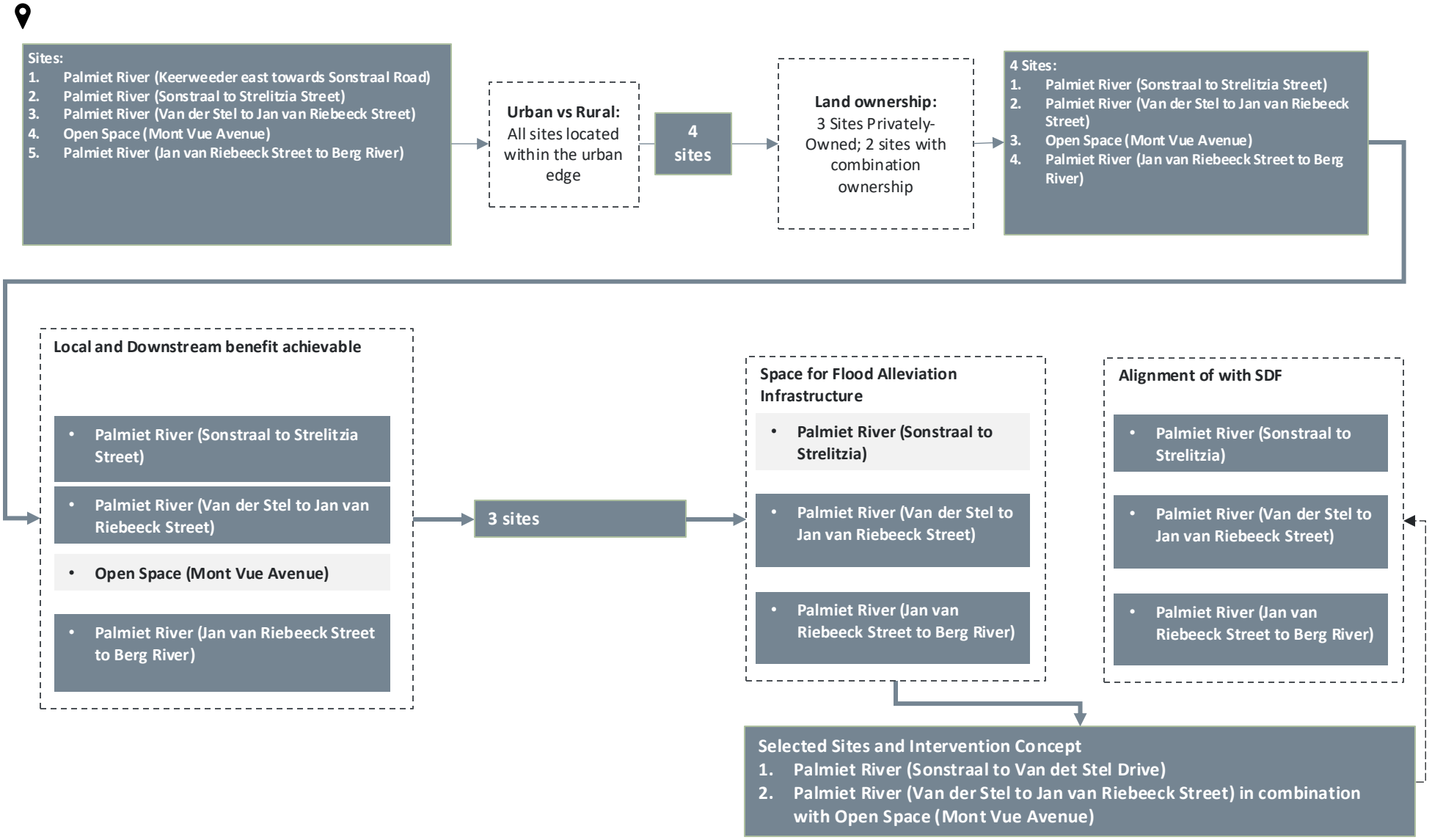
3 Palmiet HFA Programme Catchment Projects – Rural

To address the rural areas (areas outside the DM 2024 Urban Edge), the DM HFA Programme included an Opportunity Mapping Assessment to identify the potential for Nature based Solutions (NbS) in the Drakenstein Municipality, with a particular focus on the upstream catchment. The intervention includes the introduction of runoff attenuation feature, Large Woody Debris, and proposed fynbos areas, as well as the increased capacity of existing dams and ponds. The full Opportunity Mapping Assessment to Identify the Potential for Nature-Based Solutions (NbS) in the three Drakenstein Catchments is available as part of the DM HFA Programme document.

Palmiet HFA Programme Project Screening

Site Name	Intervention Concept	Urban Focus	Land ownership	Local and Downstream benefit achievable	Open space available for hybrid flood attenuation infrastructure	Alignment with Municipal SDF
Palmiet River (Keerweeder east towards Sonstraal Road)	**River Management**	**No – the site is located outside the urban edge**	**Private**	Site is located upstream relative to the urban edge.	No readily available space outside of riverbank area.	Earmarked in SDF as agricultural. River management activities could be aligned.
Palmiet River (Sonstraal to Strelitzia)	**River Management and Open Space Optimisation**	**Urban**	**Combination**	Local and downstream benefits are achievable – site is located relatively far upstream in the urban area with opportunities to reduce flow velocity downstream.	Some open space availability around the riverbank in some areas around this stretch of river.	Aligned with Green Space designation in the SDF
Palmiet River (Van der Stel to Jan van Riebeeck Street)	**River Management and Open Space Optimisation**	**Urban**	**Combination**	Local and downstream benefits are achievable – site is located relatively far upstream in the urban area with opportunities to reduce flow velocity downstream.	Open space around the riverbank in some areas around this stretch of river.	Aligned with Green Space designation in the SDF
Open Space (Mont Vue Avenue)	**Open Space Optimisation**	**Urban**	Municipal	Local benefit	Can be achieved through the development of a pocket park and some on-site interventions.	The site is currently earmarked for urban infill and redesignation of open space will be required
Palmiet River (Jan van Riebeeck Street to Berg River)	**Open Space Optimisation**	Urban	**Municipal**	Local (with possible benefits for the management of water into the Berg River)	Some open space availability around the riverbank in some areas around this stretch of river.	Aligned with Green Space designation in the SDF

Palmiet HFA Programme Project Screening



Urban Projects

Hybrid Flood Alleviation Priority Projects – Palmiet Catchment:

- Sonstraal Road to Van der Stel Drive – Strelitzia Street Focus Area HFA Project
- Palmiet River Management - Van der Stel to Jan van Riebeeck Drive HFA Project

Palmiet Concept 1: Palmiet River Management - Sonstraal Road to Van der Stel Drive HFA Project - Strelitzia Street Focus Area

Informants and Context

Ward 21, 25, and 26

Erf 665/1, 17610, 17570, 17490, 625/0, 612/8, 10490, 22160, 1635/0, 612/13, 613/0, 612/11, 1675/0, 31039, 8811

185,75 hectares

Direct beneficiaries: 49 058 (2021); 57 587 (2031)

Spatial Development Framework (SDF) designation: Green Space

This project targets the Palmiet River stretch between Sonstraal and Van der Stel Streets, primarily addressing flood risks affecting nearby residential areas in Wards 21, 25, and 26 of Drakenstein Municipality.

The low-lying northern banks face recurring flooding during extreme events, exacerbated by inadequate drainage and adjacent landfill constraints.

Concept Design and Key Components

The Hybrid Flood Alleviation project integrates nature-based solutions, structural interventions, and community-centric design, focusing on the Strelitzia Street Area. Key interventions include:

- **Check Dams with Fishways:** Manage water flow and sediment while ensuring ecological connectivity.
- **Low Flood Walls and Berms:** Reduce flood depths and protect properties.
- **Gabion Retaining Walls:** Stabilise embankments and prevent erosion.
- **Riparian Planting and Ecological Restoration:** Enhance biodiversity, stabilise banks, and improve water quality.
- **Stormwater Management:** Incorporate plunge pools and enhanced drainage systems.
- **Recreational Infrastructure:** Develop pathways, green spaces, and seating areas to encourage safe community interaction with the river.

Cost Estimates

The total estimated cost is R64.6 million, covering planning, construction, and operational phases.

Benefits and outcomes

Flood Risk Reduction: Hydraulic modelling (PCSWMM) predicts reductions in flood depths of up to 2.0 m for the 100-year flood event in affected residential areas, mitigating property damage and infrastructure risks.

Environmental and Community Benefits:

- Ecological restoration promotes biodiversity and flood alleviation ecosystem services.
- Recreational spaces improve urban aesthetics and community well-being.
- Green infrastructure supports climate resilience and urban cooling.

Community Empowerment: Collaboration with local communities fosters ownership and participation in maintenance and stewardship.

Job Creation Potential: The project is expected to create approximately 25 job-years during design and construction and additional permanent maintenance positions.

Recommendations and Way Forward

To maximise project benefits:

- Refine hydraulic models to assess downstream impacts and optimise floodwall designs.
- Strengthen participatory planning to align interventions with local needs.
- Mobilise funding and initiate regulatory approvals, including Water Use Licence Applications.

PALMIET RIVER

Sonstraal to Van der Stel (Strelitzia Street Focus Area)
Landscape Concept Plan

1:1000 on A1 or 1:2000 on A3
Date: 30 October 2024

0 50 100 150 200m

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Palmiet Concept 1: Palmiet River Management - Van der Stel to Jan van Riebeeck Drive HFA Project

Informants and Context

Ward

Erf 16000, 10886, 10186, 10312, 9335

24,57 hectares

Direct beneficiaries: 49 058 (2021); 57 587 (2031)

Spatial Development Framework (SDF) designation: Green Space

The Palmiet River from Van der Stel to Jan van Riebeeck Drive is a critical urban stretch within the Drakenstein Municipality, prone to frequent flooding.

Residential, industrial, and public-use spaces along this river segment are at risk due to low-lying terrain and inadequate drainage.

Concept Design and Key Components

Key interventions include:

- **Flood Management Infrastructure**: Low flood walls, berms, and gabion retaining walls to stabilise banks and reduce flood risks.
- **Sustainable Urban Drainage Systems (SUDS)**: Swales and plunge pools for stormwater management.
- **Wetland Restoration**: Rehabilitation of a historical wetland and landfill to improve flood attenuation and ecological health.
- **Riparian Planting and Ecological Restoration**: Enhancing biodiversity and bank stabilisation.
- **Community Infrastructure**: Pedestrian pathways, landscaped greenbelts, and recreational areas to improve accessibility and usability.

Cost Estimates

The total estimated cost is R168.5 million, covering planning, construction, and operational phases.

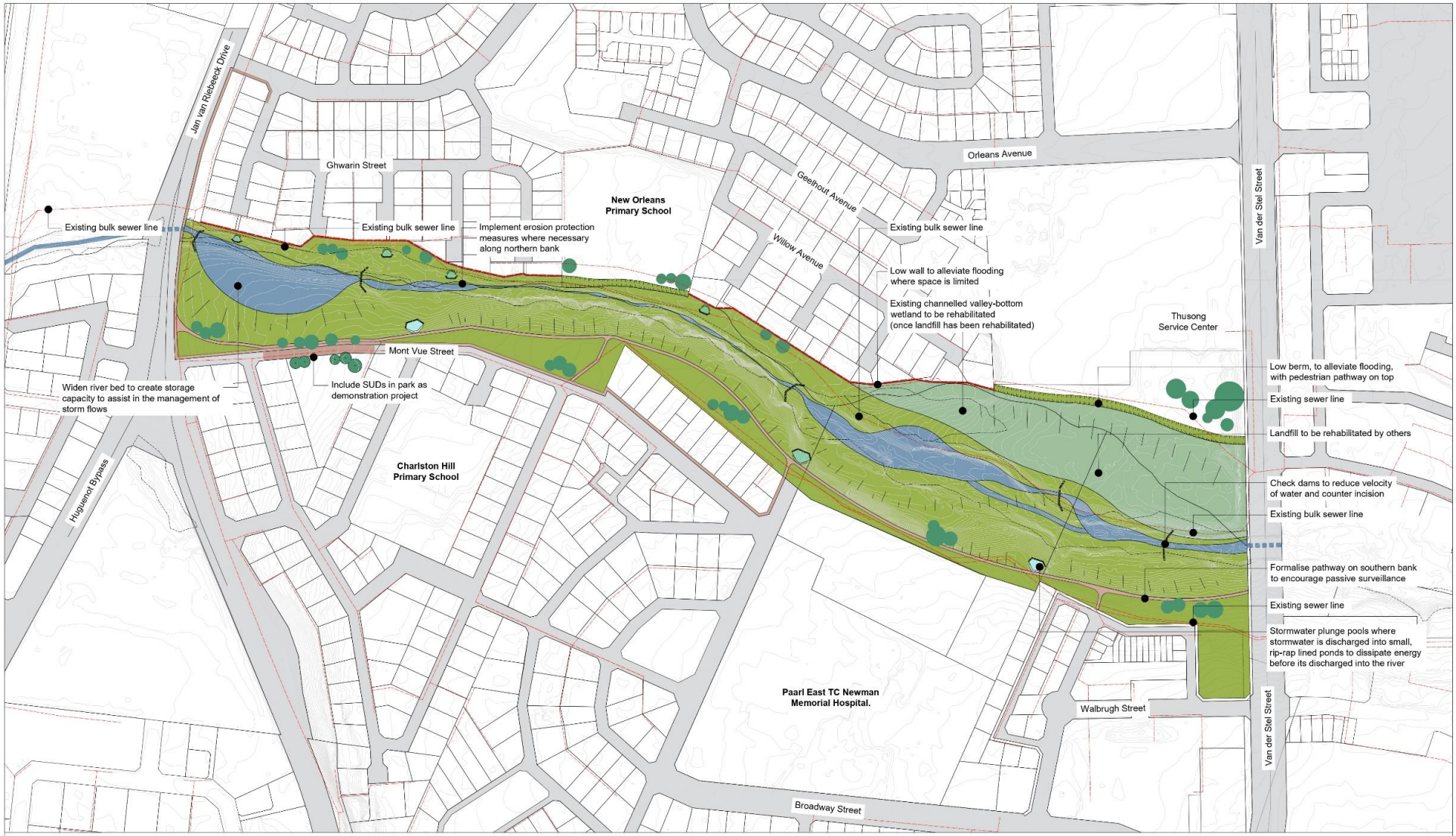
Benefits and outcomes

- **Flood Risk Reduction**: Modelling indicates flood depth reductions of up to 1.0 m in residential areas, with significant alleviation in flood-prone zones.
- **Environmental Gains**: Enhanced water quality, biodiversity, and urban cooling effects from wetland and riparian restoration.
- **Community Benefits**: Increased recreational opportunities, improved urban aesthetics, and empowerment through participatory planning.
- **Job Creation Potential:** The project is expected to generate 33 job-years during the design and construction phases.

Recommendations and Way Forward

To maximise project benefits:

- Conduct further hydraulic modelling to optimise downstream flood risk mitigation.
- Engage with communities to refine designs and incorporate local knowledge.
- Mobilise funding and initiate regulatory approvals, including Water Use Licence Applications.



PALMIET RIVER

Van der Stel to Jan Van Riebeeck Street
Landscape Concept Plan

1:2000 on A1 or 1:4000 on A3
Date: 30 October 2024

0 50 100 150 200m

DRAKENSTEIN MUNISIPALITEIT • MUNICIPALITY • UMASIPALA

AVIA

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C40 CITIES FINANCE FACILITY

ARLA Consulting Landscape Architects

Size	Size of the property (ha)	List the Main components	Erf #s	Compliance with SDF
Beets Street	106,60	• Gateway Entrances • Pedestrian Pathways • Play Park • Stormwater Ponds and Constructed Wetlands • Stormwater Attenuating Sports Fields and Swales • Integration of Existing Channels and Riparian Vegetation for Bank Stabilisation • Solid Waste Management	557, 21806, 532/0, 12628, 8400, 2316, 12633, 156, 13176, 8399, 8359	Beets Street has been allocated for green space, and a large portion of the site has been allocated as a critical biodiversity area with smaller pockets as ecological support areas, rivers crossing through the site at several points and a critical water body located to the east of the site. A solid waste management intervention has been included at this site, which will ensure that the water body and the site is preserved. As the site is quite well used for throughfare, the play park, gateway entrances and sports fields ensure this is still encouraged but allows for throughfare at certain points, thereby allowing for the implementation and development of riparian vegetation, stormwater attenuation and wetlands across most of the site. This reaffirms the SDF's allocations for ecological support and the preservation of critical biodiversity.

Size	Size of the property (ha)	List the Main components	Erf #s	Compliance with SDF
Drommedaris Street	23,65	• Water Treatment Pond and Wetland System • Raised Sports Fields • Entrance gateways to the sports fields • Swales • Berm with Pedestrian Pathways • Bird-Watching Island • Marsh Planting • Proposed Road to Connect to Drommedaris Street • Solid Waste Management.	584	The entire Drommedaris site has been allocated as a critical biodiversity area with rivers travelling through the site and 100-year flood line running through the entire length of the site. This marks the site has one of the largest flooding hotspots. This site is surrounded by settlements with most residents living along Drommedaris Street / Railway line which the site abuts. Intentionally allocating specific areas to establish pedestrian pathways, entrance gateways and sports fields ensures that movement occurs safely at specific points while optimising space for flood alleviation using berms, marsh planting, a water treatment pond and a wetland system. The proposed road to connect to Drommedaris Street addresses the site's role for the community, while still preserving its role as a CBA and ESA.

Size	Size of the property (ha)	List the Main components	Erf #s	Compliance with SDF
New Orleans Park	51,20	• Widening of the Boontjies River and the creation of a multi-stage channel • Upgrading and refurbishing the recreation area and splash pad • Increasing the capacity of the Existing Stormwater Attenuation Facility (existing dam) and surrounding infiltration areas • Upgrade and Refurbish Play Park • Tree Planting and Survey • Maintaining the Biodiversity Area • Upgrading of the ablution facilities	4920, 1788	NO Park has been earmarked as green space with a significant waterbody – this is important because of the 100-year flood line located within the site. The NO concept has preserved this function by widening the Boontjies River and implementing the Biodiversity Conservation Area and tree planting, this also repsonds to its allocation as a critical biodiversity area. But as a public open space it also accommodates the pedestrian traffic allocated in the activity corridor by upgrading ablution facilities and maximising the environmental features to include pedestrian uses such as the upgrading play park and adding a recreation area with a splash pad.

Size	Size of the property (ha)	List the Main components	Erf #s	Compliance with SDF
Prelude	2,47	• Creating a meandering channel and stormwater treatment wetland • Sports field with swale and seating • Riparian Vegetation, and culverts connecting the ponds (Prelude and Symphony)	16654, 22263	The Prelude site has been allocated as green space edged in ecological support areas (west and south). The site is in close vicinity with other sites allocated for community, solidifying its role for some sort of communal facility – the sports field with seating (and swale) facilitates this. The concepts for a meandering channel, riparian vegetation and culverts to connect ponds across this site and Symphony allow for it to perform its role of ecological support.

Size	Size of the property (ha)	List the Main components	Erf #s	Compliance with SDF
Symphony	6,7	• Cascaded stormwater ponds • Sports field for cricket • Pedestrian Walkways • Meadow grass planting • Soup Kitchen • Community Garden	16755	The Symphony site is set aside for community use and is bordered by green spaces and ecological support areas with a small patch allocated as a critical biodiversity area in the south of the site. The soup kitchen, abutting community garden, sports fields and pedestrian walkways facilitates the community use. While meadow grass planting and cascaded stormwater ponds allow for the site to provide ecological support to the surrounding green spaces and biodiversity areas.

Size	Size of the property (ha)	List the Main components	Erf #s	Compliance with SDF
Bach	2,63	• Cascaded stormwater ponds • Sports field for cricket • Pedestrian Walkways • Meadow grass planting • Soup Kitchen • Community Garden	17091	The Bach site is allocated for community use. A 100-year flood line runs through the site and also abuts Jan van Riebeeck Drive and its vicinity to informal settlements, this emphasises the significance of solid waste management and the swale to direct the movement of water. Sports fields and play parks allow the community to use the site while it provides engineering solutions that will benefit the public.

Size	Size of the property (ha)	List the Main components	Erf #s	Compliance with SDF
Palmiet (Sonstraal to Strelitzia)	212	• Fishways • Bank Stabilisation and Erosion Control • Riparian Planting and Ecological Restoration • Trapezoidal Retaining Wall • Stormwater Management • Recreational and Green Space	613/0, 665/0, 1675/0, 17607, 665/6, 665/1, 17608, 17604, 17603, 17600, 17599, 17596, 17595, 17592, 17591, 17588, 17587, 17584, 17610, 17583, 17579, 17578, 17577, 17576, 17575, 17574, 17573, 17570, 17489, 17488, 17470, 17480, 17479, 17478, 17477, 17476, 17475, 17474, 17473, 17469, 17464, 17463, 17490, 625/0, 612/8, 22062, 10490. 22160, 10284, 15547, 15548, 15549, 15550, 10449, 10296, 1635/0, 612/13, 612/11, 31542, 31540, 31541, 9335, 31039, 8811	This portion of the Palmiet site plays the role of river management and ecological support as well as a smaller role for recreation. The site has been earmarked for ecological support all along the Palmiet River. Widening the river, check dams, and fishways, riparian planting, and ecological restoration and stormwater management are all approaches taken to provide ecological support with the trapezoidal retaining wall, bank stabilisation and erosion control acting as river management that both benefits river health and surrounding communities living in close vicinity with the river.

Size	Size of the property (ha)	List the Main components	Erf #s	Compliance with SDF
Palmiet (Van der Stel to Jan van Riebeeck)	30,43	• Widening of the River • Include Sustainable Urban Drainage Systems (SUDS) in the park • Plunge Pools • Formalisation of Pedestrian Pathway on Southern Bank • Check dams with Fishways • Landfill rehabilitation • Reconnection of historical wetland • Low flood wall/ berm with pedestrian pathways • Gabion retaining walls • Riparian Planting and Ecological Restoration for Erosion control • Landscaped Greenbelt and Pathways	5185, 9335, 25440, 16000, 10886, 10311, 10157, 10186, 10108, 10312	Similar to the Sonstraal to Strelitzia portion of the Palmiet site, this site is is allocated for ecological support. This is achieved by widening the river and wetland attenuation. River braiding plays the double role of habitat variation and flow management, while the greenbelt also provides pathways for movement.

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