New Orleans Park Hybrid Flood Alleviation Concept Note

Prepared by AIVIA for Drakenstein Municipality and the GIZ

Version 1

30 October 2024

List of Figures

List of Maps

List of Tables

List of Images

Abbreviations

BA – Basic Assessment

CAPEX – Capital Expenditure

CCAP - Climate Change Action Plan

CFRPS - Community Flood Risk Perception Study

DFFE – Department of Forestry, Fisheries and the Environment

DM - Drakenstein Municipality

DWS - Department of Water and Sanitation

EA – Environmental Authorisation

EAP - Environmental Impact Assessment Practitioner

ECO - Environmental Control Officer

ECSA - Engineering Council of South Africa

EIA - Environmental Impact Assessment

EPWP - Expanded Public Works Programme

FAES – Flood Alleviation Ecosystem Services

HGM - Hydrogeomorphic

HFA - Hybrid Flood Alleviation

IDP - Integrated Development Plan

KPA – Key Performance Area

KPIs - Key Performance Indicators

LCA - Landscape Character Assessment

LiDAR – Light Detection and Ranging

MMC - Members of the Mayoral Committee

NEMA – National Environmental Management Act

NbS – Nature-based Solutions

NGO - Non-governmental Organisation

NPO - Non-profit Organisation

OHSA – Occupational Health and Safety Act

OPEX – Operational Expenditure

PCSWMM – Personal Computer Storm Water Management Model

PDO - Pre-determined Objective

PES – Present Ecological State

PPP – Public-Private Partnerships

PSOC – Personnel Specification Occupational Classification

SACPLAN – South African Council for the Planners

SAGC - South African Geomatics Council

SDBIP - Service Delivery and Budget Implementation Plan

SDF - Spatial Development Framework

SDG – Sustainable Development Goals

SOP - Standard Operating Procedure

DM SSN – Drakenstein Municipality Smart Safety Network

TLB – Tractor-Loader-Backhoe

WET-Health – Wetland Health

WULA – Water Use Licence Application

Project Summary: New Orleans Park HFA Project

Project rationale, objectives and approach of project

The Groenheuwel Catchment is drained by the Boontjies River and an unnamed watercourse. These rivers discharge into the Vosmaar and Van Der Stel canals west of Jan van Riebeek Drive into the Berg River. The Boontjies River flows east to west passing through rural agricultural areas outside of the urban edge, and passes Spooky Square informal settlement as it enters the urban area of Drakenstein. The river then flows slightly north with a residential area to the south and the planned The Nederburg Residential Development to the north. The Boontjies River continues westward across Van der Stel Street where it then connects with the south-east of the New Orleans Park site moving north-west where it crosses Bo-dal Road to connect with the Dal Josaphat Stadium.

The Orleans Park status quo PCSWMM for the 100-year return period indicates that the areas downstream of New Orleans Park are exposed to flood depths of up to 0.5m. The cause of the flooding downstream is as a result of overland flows that are being experienced in the area and the limited capacity of the Vosmaar Canal and the railway culvert.

The New Orleans Park Hybrid Flood Alleviation Project focuses on combining flood management with ecological restoration and recreational infrastructure. As an existing and well utilised public open space, this site is a strategic open space and is designated as an open space in the Drakenstein Municipality's Spatial Development Framework (SDF). Key interventions such as terraces, river widening, and the creation of a wetland area enhance the park's ability to manage stormwater while improving its biodiversity and recreational value. The integration of existing natural features like the attenuation dam and damp areas ensures that the park remains a multifunctional space for both flood mitigation and community engagement.

The project site is located on Erf 4920 and Erf 17288, and is situated south of the Dal Josafat Stadium. The development of stormwater interventions at the Stadium (also located on Erf 4920) will augment the impact of the proposed interventions in support of flood risk reduction).

The New Orleans Park receives in excess of 16,000 visitors per year (based on 2024 statistics recorded by the DM).

The Upgrading of the New Orleans Park includes:

- 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
- Biodiversity Conservation Area
- Upgrading of the ablution facilities.

The impact of the proposed interventions at New Orleans Park for the 100-year flood is localised reduced flood depths in the Dal Josafat Stadium area. Further downstream there is a reduction in flow depths in the order of 0.25m in the 100-year flood near Drommedaris Street. There is an increase in flood depths in New Orleans Park, but this is expected due to the lowering of the existing ground levels to provide additional storage. An increase in the attenuation within New Orleans Park could be explored to reduce flood depths downstream in the 100-year flood.

Alignment With Municipal Objectives:

The project aligns with all municipal objectives. It is particularly relevant to Strategic Objective 4, given the strong alignment with maintenance and provision of infrastructure for sustainable service delivery.

Municipal Strategic Objective	Alignment
To ensure good governance and compliance.	X
To ensure financial sustainability to meet statutory requirements.	X
To ensure an efficient and effective organisation supported by a competent and skilled workforce.	X
To provide and maintain the required physical infrastructure and to ensure sustainable and affordable services	X
To plan, promote investment and facilitate economic growth.	X
To facilitate, support and promote social and community development.	X

Key Performance Areas (KPAs) and Pre-Determined Objective (PDOs)

KPAs refer to the areas within the business unit for which an individual or group is logically responsible. PDOs are the areas identified as important or crucial, where a result will assist in the achievement of the set objectives or goal (DM IDP, 2024:67).

It is recommended that this project be located within **KPA 4: Infrastructure and Services**, under **PDO 23: Transport, Roads, and Stormwater. This is directly aligned with the Strategic Objective *to provide and maintain the required physical infrastructure and to ensure sustainable and affordable services.***

Estimated total project cost

The following table provides a summary of the estimated costs associated with the project.

Cost Category	CAPEX vs OPEX	Total Amount (ZAR)
Planning and Design Cost	CAPEX	6 647 128,97
Construction and Implementation Costs	CAPEX	55 842 528,00
Operation and Maintenance Cost	OPEX	1 626 850,56
Miscellaneous Costs	CAPEX/OPEX	350 000,00
Grand Total		**64 466 507,53**

The estimated total project costing is based on information available at the time of developing the concepts. The Planning and Design costs must be further refined upon the final determination of the specialist studies required. Construction and Implementation Costs as well as Monitoring and Maintenance Costs will be further refined based on the detailed designs. As the engineering design development progresses, refined estimates can be prepared by the Quantity Surveyor / Cost Estimating Consultant. This would consider local and context specific considerations for the various items.

New Orleans Park

- Roads
- Watercourses
- Urban Edge (2024)
- Catchment Boundaries
- Site Boundary
- Affected Erven

Wetlands

- Channelled valley-bottom
- Depression
- Floodplain
- Seep
- 100yr Floodline
- Ward Boundaries

Drakenstein's Prioritisation Project and Capital Expenditure Criteria

	CRITERIA FOR PRIORITISATION	Y/N
	Is **legislation regulating this project?**	
1	Legislation regulates this project. A non-exhaustive list of national legislation is provided. The Constitution of the Republic of South Africa, 1996; The National Water Act, 1998 (Act No. 36 of 1998); The National Environmental Management Act (NEMA), 1998 (Act No. 107 of 1998); The Municipal Systems Act, 2000 (Act No. 32 of 2000); The Disaster Management Act, 2002 (Act No. 57 of 2002); The Water Services Act, 1997 (Act No. 108 of 1997), Spatial Planning and Land Use Management Act (Act No. 16 of 2013), Climate Change Act (Act No. 22 of 2024); Republic of South Africa (2000). Promotion of Equality and Prevention of Unfair Discrimination Act. Act No 4 of 2000. Chapter 5, Section 28; Additional provincial and local legislation and by-laws may also be applicable.	**Y**
	Will this project **enhance service delivery (roads and storm water, electricity, water, sanitation, and refuse)?**	
2	This project will **enhance service delivery (stormwater, water, sanitation, and refuse).** The project seeks to achieve flood risk reduction benefits through the development of hybrid flood alleviation interventions- leveraging nature-based solutions for **stormwater** management as complementary to more conventional 'grey' service delivery approaches. Sustainable Urban Drainage Systems present an approach to stormwater management that aims to reduce downstream flooding, enhance infiltration into the ground, remove pollution, improve the quality of stormwater, **reduce pollution in water bodies**, and improve biodiversity. The introduction of SUDS as part of the site concept will aim to divert stormwater from Van der Stel into the New Orleans Park site. **The PCSWMM results undertaken for the DM HFA Project** (AIVIA, 2024) shows that the New Orleans Park current flooding situation for the 100-year flood indicates that the areas downstream of New Orleans Park are susceptible to flood depths of up to 0.5m. The cause of the flooding downstream is a result of overland flows that are being experienced in the area and the limited capacity of the Vosmaar Canal and the railway culvert. The impact of the proposed interventions at New Orleans Park for the 100-year flood is localised reduced flood depths in the Dal Josafat Stadium area. **The project therefore serves to facilitate more resilient stormwater management services, and also serves to protect communities and municipal and private infrastructure through flood risk reduction**. The site includes **public refuse bins** to be collected at regular intervals, particularly along pedestrian pathways, within the park and at the sports fields. The development of the site will also be accompanied by improved solid waste management, improving the health of communities and the cleanliness of the City. The project concept also includes the **refurbishment of the ablution facilities** at the park, which will be beneficial to the health and safety of park users.	**Y**

CRITERIA FOR PRIORITISATION		Y/N
	Is this **project an essential service?**	
3	**This project is an essential service.** **The project supports essential service delivery functions related to stormwater, water, sanitation and refuse removal. It will also provide essential community facilities and supports the reduction of flood risk experienced by the community.** The combination of stormwater management, the enlargement of the existing dam and the enhancement of recreational facilities will provide essential services to the Groenheuwel community.	**Y**
	Will the execution of this project **stimulate investment in the local economy?**	
4	New Orleans Park is an existing recreational area in the DM, that is well-used by community members. This project aims to enhance the recreational potential of the site through the refurbishment of the play park and splash pond, the development of a multi-purpose space, the development of a timber boardwalk and pedestrian pathways, as well as increased maintenance of the biodiversity conservation area through NGOs/NPOs/school/universities. The concept also includes an opportunity to create an *amphitheatre and to support events such as a market, summer concerts or an outdoor movie night, which could create opportunities for local vendors.* The potential for flood risk reduction, coupled with the recreational and educational benefits, as well as an improvement of the aesthetic value of the site, may increase investor confidence. Wages earned by local workers from Drakenstein will increase available incomes for spending in the local economy, making a small investment impact. The level of investment estimated in the **planning, design, and construction phase of this project will create approximately 113 indirect jobs** in the national economy, from the supply of inputs required for the project. **Estimated expenditure is expected to induce 184 jobs in the economy** as project workers spend their wages. Many of these will be in Drakenstein if local suppliers are used. It is estimated that this investment will yield 1.68 times the initial amount in income for the **national economy** amounting to an income **contribution of about R107 million**. Upgrading this site increase the potential to raise the value of the surrounding properties and attract further investment in the area. Wages paid by construction firms during the construction phase will also stimulate economic activity and lead to investment.	**Y**
5	Will this project **enhance the quality of life our local community and be for the benefit of the local community?**	

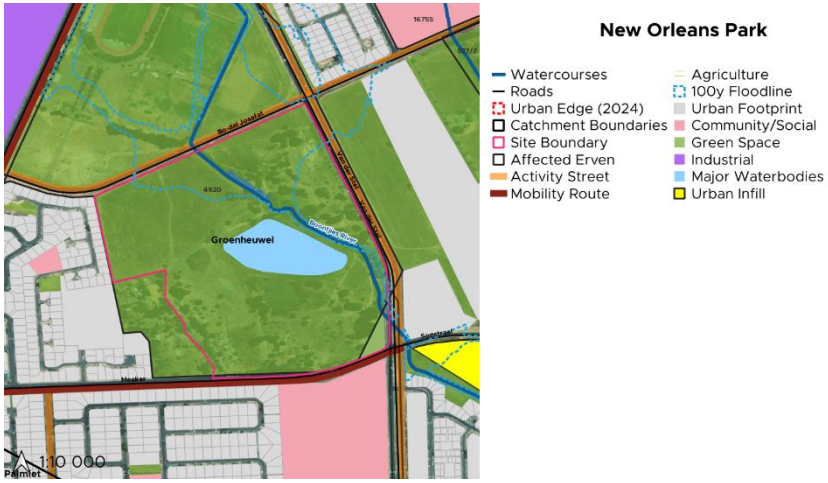
CRITERIA FOR PRIORITISATION		Y/N
	The project aims to enhance the quality of life the local community and be for the benefit of the local community. New Orleans Park is an existing community facility. Having received over 16000 visitors in the past year, this area has been identified by the community (during the Community Flood Risk Perception Study) as well as the municipal officials as a key recreational area serving Paarl East. The upgrading of the park will therefore improve their access to recreational areas whilst also improving their resilience to flooding.	**Y**
6	Will this **project lead to permanent job creation?**	
	The project components will include opportunities for job creation for local communities during the construction phases and operation and maintenance phases. The operation and maintenance in relation to the open spaces, landscaping, solid waste management, play area equipment and the stormwater ponds will require on-going human resource contributions. This may include the involvement of community members in voluntary project stewardship, the leveraging of the enhanced public works programme (EPWP), as well as other job creation opportunities. Secondary effects of expenditure in the local economy will also create permanent jobs in the local and national economy. A high-level estimate of permanent direct and induced jobs is provided in the jobs estimates. The proposed intervention at New Orleans Park will likely create an estimate of 2 permanent jobs in maintenance from the following jobs: Foreman, Mower operators, Planters, Driver and General worker. It is important to note that the 2 permanent jobs are a collection of fractions of jobs, therefore, there are more job types than jobs. The level of investment estimated in the planning, design, and construction phase of this project will create approximately 113 indirect jobs in the national economy, from the supply of inputs required for the project. Estimated expenditure is expected to induce 184 jobs in the economy as project workers spend their wages. Many of these will be in Drakenstein if local suppliers are used. See also the Job Creation Potential Section D4.7.	**Y**
7	Is this project labour intensive/ will this project lead to **temporary job creation?**	
	The project components will include opportunities for job creation for local communities during the construction phases and operation and maintenance phases. The construction phase job creation is likely to be applicable only in the short term, the operation and maintenance in relation to the open spaces, landscaping, solid waste management, play area equipment and the conservation biodiversity area will require on-going human resource contributions. Jobs estimate in this report are based	**Y**

CRITERIA FOR PRIORITISATION		Y/N
	on typical construction techniques. The is some scope to increase the labour intensity of these by using more labour-intensive techniques, particularly in relation to earth moving work. This would likely increase the estimated delivery times. The proposed intervention at New Orleans Park will likely create an estimated 25 job years in the design and construction phase. In the design phase the eight temporary job-years created will nearly all be highly skilled jobs in professional firms (Engineering, Landscape Architecture, Planning, Scientific Services). All these will be green jobs. In the construction phase, the 17 job years created will include three highly skilled job-years, nine semi-skilled job years and 5 low-skilled job-years. All of these will be green jobs except seven semi-skilled jobs, consisting of guards for 24-hour site security. All maintenance jobs are green jobs. Other semi-skilled jobs will be excavator operators, TLB operators, dump truck operators, planter, gabion basket makers and carpenters. See also the Job Creation Potential Section D4.7.	
8	**Will this capital expenditure / project generate significant additional revenue for the municipality?**	
	The project is not likely to generate significant additional revenue for the municipality. However, the components of the project provide essential basic services to communities and aims to respond to the need for flood risk reduction in the area. As such, the benefit of this project includes the protection of municipal and private infrastructure, the protection of livelihoods and community assets, and may result in cost savings due to improved infrastructure maintenance and management. This infrastructure does not sit in any of the trading services departments and is therefore not a direct revenue generator. Some elements may have access charges (such as braai facilities, and bird watching facilities) but these revenues will be small. They are likely to have operating cost reduction impacts on both water services and solid waste services. Natural water treatment services provided by this intervention will reduce water treatment costs for water abstracted form the Berg River. Increased litter trapping mechanisms provided by the intervention will also reduce damage to water infrastructure and cost of ad hoc waste removal elsewhere in the stormwater system and the municipality. The net effect is likely an increased surplus or reduced deficit in water services and solid waste management and reduced operating costs in stormwater management.	**N**
9	Will this **project improve the aesthetical appearance of the city / town?**	

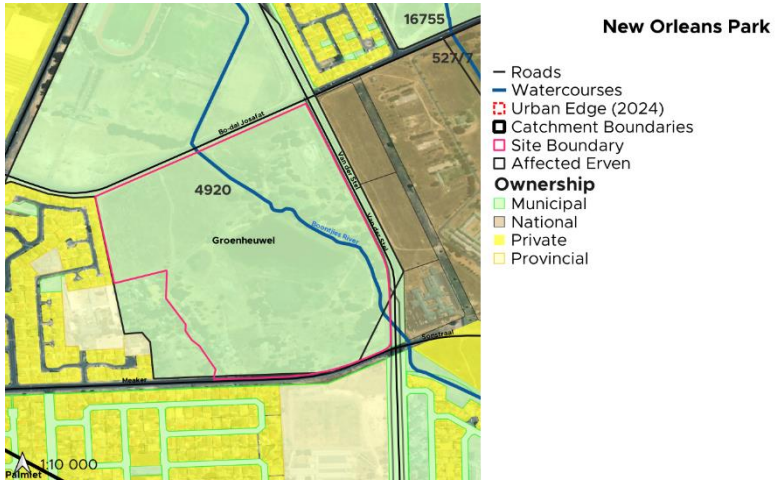
CRITERIA FOR PRIORITISATION		Y/N
	The project will improve the aesthetic appearance of the city. The project seeks to achieve an improved urban realm and placemaking to support the functionality and improvement of the urban environment, as it will improve the functionality, aesthetics and recreational opportunities of the New Orleans Park. This will be achieved through the development of a multi-purpose space for picnics/ kick-a-bout/ outdoor classroom/ amphitheatre/ events, the refurbishment of the existing play area, the development of a boardwalk and pedestrian pathway.	**Y**
10	Will the execution of this project **contribute to the social upliftment of the community?**	
	The New Orleans Park is already an existing recreational space in the DM, which is well-used by community members. The project aims to enhance the recreational potential of the area through the refurbishment of the play park and splash pond, the development of a multi-purpose space, the development of a timber boardwalk and pedestrian pathways, as well as the development of a picnic area. The enhancement of the site as a 'family-friendly' area with recreational benefits for both adults and children will contribute to social upliftment in the community and enhance community ownership. The activation of the site can offer educational benefits to schools and universities.	**Y**
11	Does this project comply with the **developmental directions of the municipality's spatial development framework?**	
	The New Orleans Park is currently a public open space designated in the SDF as a green space. The site includes recreational opportunities including a conservation area. Leveraging this site for further flood attenuation and maximising its education potential will serve to facilitate the optimisation of this green, open space.	**Y**
12	**Must this project be implemented now?**	
	The project is essential to achieve the required flood risk reduction outcomes necessary to alleviate flooding. See also Point 2 in this table.	**Y**
13	**Is there a time factor involved for this capital expenditure / project that will negatively influence any other capital expenditure / project or foreign investment in infrastructure?**	
	The project forms part of a broader Hybrid Flood Alleviation Programme, and this project was identified as part of the Stage 1 Priority/ Catalytic Projects.	

Urban Context

The mountainous landscape is of scenic value and partially visible because of existing established trees in the park's landscape. The landscape character differs from the recreational areas to the conservation area located in the north-western corner of the site. The recreational area has a typical park sense of place, with shade providing trees softening the open expanse of mown lawn, whereas the conservation area is exposed with a mosaic of low growing shrubs and grasses. The site is located in **Ward 22** (2021 Wards) on **Erf 4920 and Erf 17288** south of Bo-Dal Josaphat Road and is located on the same property as the Dal Josaphat Stadium. This property is municipal-owned and is approximately 51,20 ha in size. The site is identified as having an "**Enclosed Park Landscape**" character, and is designed in the SDF for **Green Space**, in keeping with its current use as a municipally managed park.



Part D Chapter 4 Map 1. Project Site in the context of the DM SDF



Part D Chapter 4 Map 2. Land Ownership

This enclosed park landscape is surrounded by Bo Dal Josaphat and the Dal Josaphat Athletics Stadium to the north, a residential neighbourhood and Sonstraal Hospital in the west, and Van der Stel Street on the east, with Paarl East Police Station and Allandale Correctional Facility on the east of Van der Stel Street. Meaker Street forms the southern boundary of the site, and the controlled entrance to the park is from Meaker Street. New Orleans Secondary School and a residential area are located South of Meaker Street.

Part D Chapter 4 Figure 1. New Orleans Park Infrastructure

Upon entering the park, there are residential facilities on the south-western section. The south-western section of the park was previously used as a Temporary Relocation Area (TRA) as part of an emergency response effort in 2016. While most households have since been relocated, there are still some households remaining on site, and at the time of writing, the municipality is in the process of resolving the relocation strategy for these households. The Municipality obtained a Court Order whereby the evictees were supposed to have relocated to the Municipality's emergency housing site at Schoongezicht. However, the order is currently being challenged in the Courts by the South African Human Rights Commission, hence these families are still in the Park. It is envisaged that the matter might be heard before Court before the end of the year (2024).

The internal vehicular route passes by the conservation area on the north-western section of the site. Due to the presence endangered Renosterveld, this area is considered a no-go zone for any proposed earthworks or construction. This vegetation type forms part of a fire-driven ecosystem and therefore needs periodic ecological burning at the correct fire interval to maintain its ecological functioning. The infestation of the Black wattle (*Acacia mearnsii*) is significant and will likely be exacerbated if there is soil disturbance from ecological burning.

Separated by the Boontjies River, the north-eastern section of the site includes municipal recreational facilities. A splash pad and other municipal infrastructure can be refurbished or repurposed as this presents an opportunity to enhance the recreational experience on site.

An existing attenuation dam is located on the site, to the east of the Boontjies River and just south of the conservation area. Flatter sections of grass surrounding the attenuation dam tend to become saturated during the rainy season. The Boontjies River flows over the internal roadway reducing walkability through the park when there has been rain. The Boontjies River waterway is overgrown with *Commelina sp*. There are

invasive species within the park – most notably Black wattle (*Acacia mearnsii*) (Part D Chapter 4 Image 7).

The park is well-utilised and is a key recreational space for surrounding communities. The user data for the park was provided by DM (24 Oct 2024):

Month of May, June, July and Aug 2024

Out of season

Total Adults and Children visitors

1,073

Month of Sept, Oct, Nov, Dec, Jan, Feb, Mar and Apr 2024

In Season time

Total Adults and Children visitors

15,387

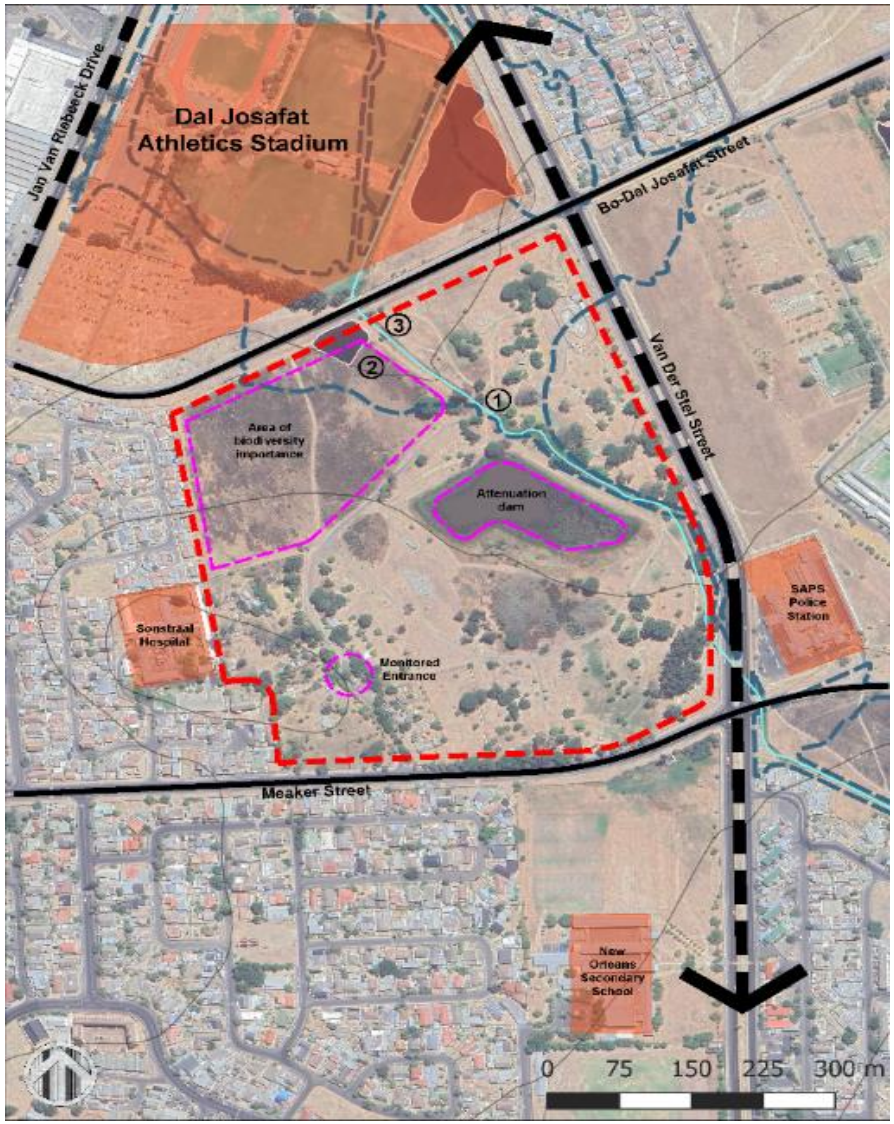
The public ablution facilities are located on the east of the entrance road at the access point and require upgrading as these facilities are currently required by users of the park.

Landscape Character

The DM HFA LCA identified this area as having an **"Enclosed Park Landscape"** character type.

Dominant landcover & Landscape elements:

1. Overgrown waterway of the Boontjies River
2. Existing attenuation pond
3. Park landscape for active and passive recreation
4. Mature trees providing shade
5. Highly sensitive conservation area



Part D Chapter 4 Map 3. LCA: Character Area Map

Part D Chapter 4 Image 1. This shows how the Boontjies River overtops the road that fragments the river after heavy rain.

Part D Chapter 4 Image 2. This area is of ecological importance with the last remaining remnant of a Renosterveld species.

Part D Chapter 4 Image 3. The Boontjies River exits a large culvert to flow beneath Bo-Dal Josafat Street before exposure in the Dal Josafat Stadium.

Part D Chapter 4 Image 4. ***Marasmodes undulata (Autumn aster).***

Part D Chapter 4 Image 5. ***Typha capensis (Bulrush).***

Part D Chapter 4 Image 6. ***Commelina sp. (Dayflower).***

Part D Chapter 4 Image 7. Acacia mearnsii (Black wattle).

The north-western quarter of the park is a protected area containing a highly threatened habitat type. It is home to the last remaining wild population of *Marasmodes undulata* (Autumn aster) (Part D Chapter 4 Image 4) as well as other threatened species. This plant is an indicator of fertile soils important for the continuous growth of indigenous vegetation and habitat provision, although it has become endangered because of development. There is an existing attenuation pond that is dominated by *Typha capensis* (Bulrush) **(**Part D Chapter 4 Image 5**)** that is not directly connected to the Boontjies River. The Boontjies River runs through the park in a fairly uniform trapezoidal channel that is dominantly covered by *Commelina sp*. **(**Part D Chapter 4 Image 6**).** This recreational park is accessible to the Paarl community with braai stands, play equipment and benches.

Watercourses, Wetlands and Flood Risk

Rivers and Stormwater Infrastructure

The Groenheuwel Catchment is drained by the Boontjies River and an unnamed watercourse. These rivers discharge into the Vosmaar and Van Der Stel canals west of Jan van Riebeek Drive into the Berg River.

The Boontjies River flows east to west passing through rural agricultural areas outside of the urban edge, and passes Spooky Square informal settlement as it enters the urban area of Drakenstein. The river then flows slightly north with a residential area to the south and the planned The Nederburg Residential Development to the north. The Boontjies River continues westward across Van der Stel Street where it then connects with the south-east of the New Orleans Park site moving north-west where it crosses Bo-dal Road to connect with the Dal Josaphat Stadium.

The PCSWMM modelling results (current)

The New Orleans Park status quo flood extents for the 100-year return period indicates that the areas downstream of New Orleans Park are exposed to flood depths of up to 0.5m. The flooding downstream is a result of overland flows that are being experienced in the area and the limited capacity of the Vosmaar Canal and the railway culvert.

Part D Chapter 4 Map 4. Groenheuwel catchment zoomed in (100-year flood)

Based on the modelling results, the upper reaches of the Van der Stel Canal have the capacity to convey the 5-year flood, with overtopping occurring only in the lower reaches. For the 5-year flood, overtopping and flooding associated with the flood event are lower than 0.5 m. Overtopping of the Vosmaar canal was observed for the 5-year flood with flood depths associated with this overtopping being less than 0.5 m. The Vosmaar and Van der Stel Canals do not have sufficient capacity to convey the 20- and 100-year flood. During the 20- and 100-year flood, these canals overtop and flood the adjacent industrial areas. Flood depths associated with this overtopping range from 0.1 to 2.1 m for the 20-year flood and 0.1 to 2.3 m for the 100-year flood.

The canal draining the central Groenheuwel area cannot contain the 5-, 20-, and 100-year flood (see Part D Chapter 4 Map 4), and overtops and floods the residential area west of the canal. It should be noted that the flood depths associated with this overtopping are shallow and are less than 0.5 m for all return periods considered.

Wetlands

Wetlands offer three flood alleviation ecosystem services (FAES) – namely Flood Attenuation, Streamflow Regulation, and Water Quality Enhancement, where the following ratings apply:

- 0= absence
- 1 = poor
- 2 = moderate
- 3 = high
- 4 = very high

These FAES differ in relation to the position of the wetland relative to the overall catchment. In the DM HFA Programme, the catchments were each divided into upper, middle and lower reaches. The FAES also differ depending on the type of wetland, as different wetland types are able to offer different levels for each respective FAES. The ability of a specific wetland to provide the three FAES in relation to their location in the catchment is detailed in the DM HFA Ecological Assessment (Ecological, Infrastructure and Infrastructure Assessment, AIVIA, 2024), where the rating of the potential for supply of ecosystem services by a wetland or river, based on hydrogeomorphic (HGM) type, and climatic setting (humid to sub-humid, and semi-arid) is further explained. For this study, all scores apply to wetlands and rivers in good condition and the process was adapted from WET-EcoServices Version 2 (Kotze et al., 2020). This provides guidance on the nature of intervention that might be required to rehabilitate, restore or protect the wetlands to enable them to offer the maximum FAES as they would if they were in good condition. The actual condition of the wetland is also known, based on the DM HFA Ecological Assessment, which used the rapid Level 1A WET-Health assessment protocol (MacFarlane et al., 2020) to determine the **Present Ecological State of the hydrology, geomorphology, water quality and vegetation of the wetlands in the three catchments forming part of the DM HFA**. The method is based on the hydrogeomorphic (HGM) approach to wetland typing, providing a PES score for a wetland within each of the four condition modules – hydrology, geomorphology, water quality, and vegetation - and a combined overall score for wetland health. The PES score provides a quantitative measure of the extent, magnitude and intensity of deviation from the reference or unimpacted condition, and places the wetland in a wetland health category, A – F. The Level 1A WET-Health assessment uses land cover as a surrogate for the severity or magnitude of an impact, where this is assumed to be linked to land use.

Part D Chapter 4 Table 1. Present Ecological State categories used to define the overall health or integrity of a wetland (from MacFarlane et al., 2020). Colour-coding is according to the River EcoStatus Monitoring Programme of DWS.

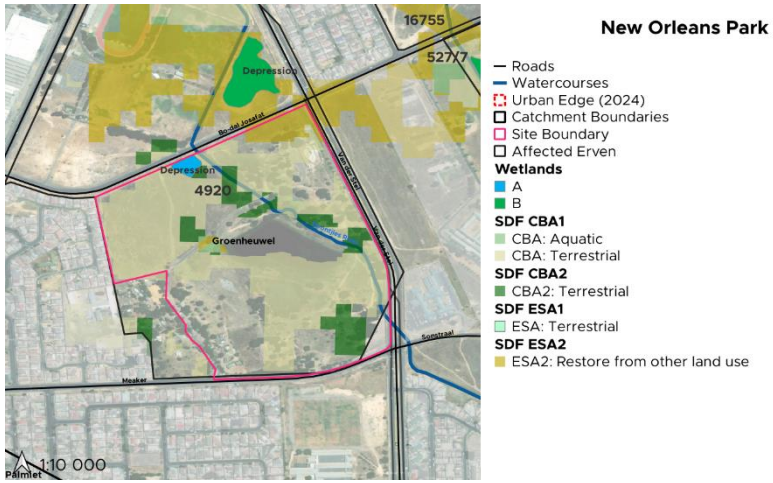
CATEGORY	PES SCORES (%)	DESCRIPTION
A	90 – 100	Unmodified, natural.
B	80 – 89	Largely natural with few modifications. A slight change in ecosystem processes is discernible and a small loss of natural habitats and biota may have taken place.
C	60 – 79	Moderately modified. A moderate change in ecosystem processes and loss of natural habitats and biota may have taken place.
D	40 – 59	Largely modified. A large change in ecosystem processes and loss of natural habitats and biota has occurred.
E	20 – 39	The change in ecosystem processes and loss of natural habitat and biota is great but some remaining natural habitat features are still recognisable.

CATEGORY	PES SCORES (%)	DESCRIPTION
F	**0 – 19**	Modifications have reached a critical level and the ecosystem processes have been modified completely with an almost complete loss of natural habitat and biota.

The site contains a wetland within the conservation area. This is a depression wetland with a Present Ecological State A, meaning that the wetland remains in its natural state. This indicates that FAES applicable to wetlands in good condition apply, where depression wetlands offer - Moderate to high flood attenuation (2.5); - Very poor streamflow regulation (0.5); - Poor to moderate water quality enhancement (1.5).

Part D Chapter 4 Table 2. Flood Alleviation Ecosystem Services Provided by wetlands in relation to the project site based on optimal condition. (Ecological, Infrastructure and Land Use Report, AIVIA, 2024)

HGM types:	Ecosystem services:		
	Flood attenuation	Streamflow regulation	Water quality regulation
Depression	2	1	2
	2.5	0.5	1.5



Part D Chapter 4 Map 5. Wetlands and Watercourses

Informants Summary

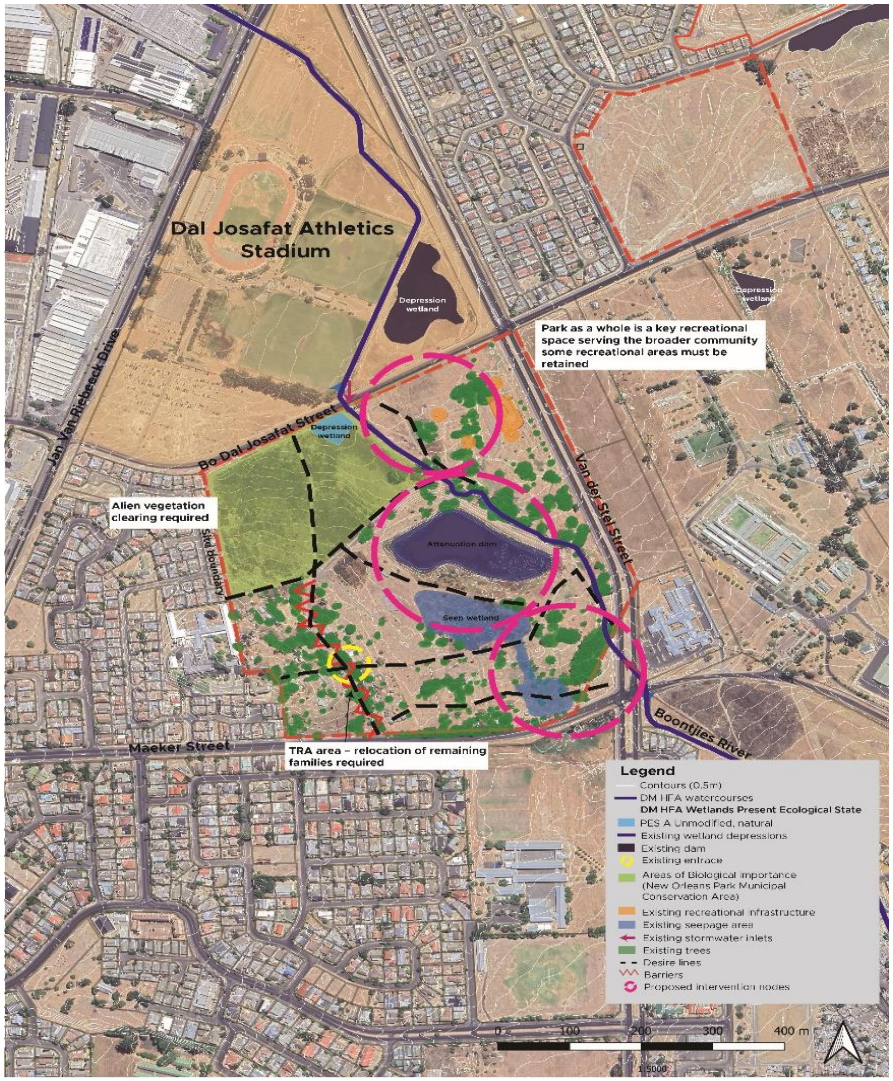
The site is located south of Bo-Dal Josaphat Road in Ward 22 (2021 Wards). The site also formed part of the LCA and was typed as a having an "**Enclosed Park Landscape**" character. The site was identified in the Stormwater Master Plan as an area for flood attenuation infrastructure, and while the need remains, the mechanism through which it should be achieved has shifted focus to be more inclusive of nature-based solutions. The site is earmarked as Green Space in the SDF, and the leveraging of this site for flood attenuation purposes is thus aligned with the SDF designation.

The Boontjies River flows through the site, and an existing attenuation dam is also located on the site. The site also includes a depression wetland located within the conservation area in the north-western area of the site, and the wetland is seen to be in its natural state based on the condition assessment. Therefore, this wetland provides FAES (Moderate to high flood attenuation (2.5); - Very poor streamflow regulation (0.5); - Poor to moderate water quality enhancement (1.5)) and thus continue to be protected to aid in retaining these functions. The conservation area must thus be preserved and integrated as part of the concept development for this site. During a previous disaster, households were relocated to the site, with the intention that the site would act as a temporary relocation area. There are, however, still five households that remain on the site, and there are discussions underway regarding the relocation of these families. The eviction order has been challenged by the South African Human Rights Commission, and the matter is to be heard in court in 2024.

Municipal infrastructure, including a splash pad is located in the north-eastern corner that could be refurbished or maintained as part of the development of the site. The existing ablution facilities should also be considered for upgrading as part of the site concept.

Key Opportunities

- Attenuation of floods
- Leveraging the existing dam
- Improving the utility of the site
- Leveraging a municipal-owned and actively managed site
- Incorporation of additional educational activities
- The continued protection of the conservation area including the depression wetland
- Retaining and optimising the site as an open space, in line with the Green Space designation in the SDF
- Improved management of the Boontjies River

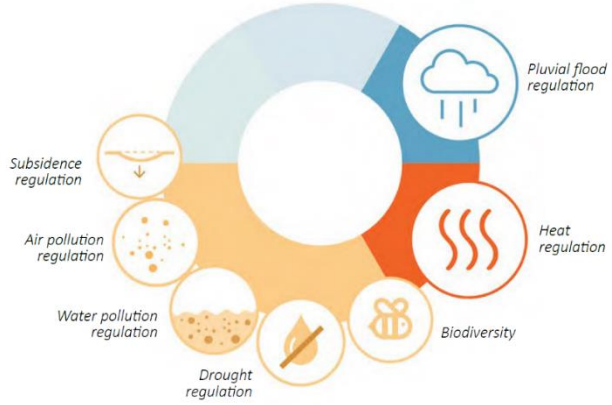


Part D Chapter 4 Map 6. Informants Map

D4.2. Concept Design: New Orleans Park Hybrid Flood Alleviation Project

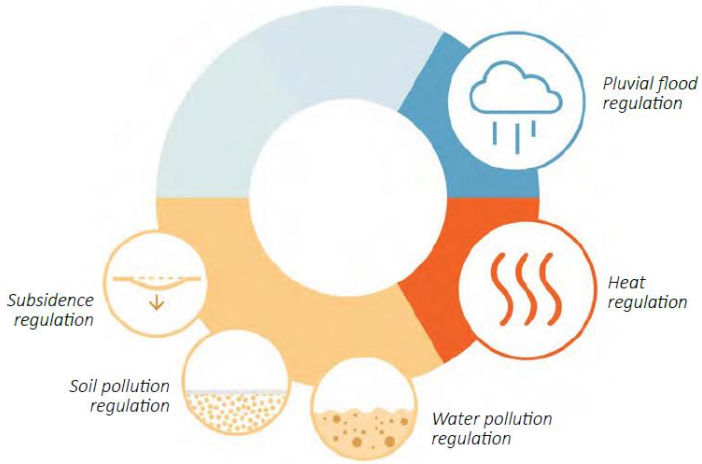
The project site is located on Erf 4920 and Erf 17288 and is situated south the Dal Josafat Stadium. The development of stormwater interventions at the Stadium (also located on Erf 4920) will augment the impact of the proposed interventions in support of flood risk reduction.

The New Orleans Park Hybrid Flood Alleviation Project focuses on combining flood management with ecological restoration and recreational infrastructure. As an existing and well utilised public open space, this site is a strategic open space and is designated as an open space in the Drakenstein Municipality's Spatial Development Framework (SDF). Key interventions such as terraces, river widening, and the creation of a wetland area enhance the park's ability to manage stormwater while improving its biodiversity and recreational value. The integration of existing natural features like the attenuation dam and damp areas ensures that the park remains a multifunctional space for both flood mitigation and community engagement.



Part D Chapter 4 Figure 1. Functions of Open Spaces (Source: World Bank, 2021)

There are several functions and benefits associated with the components of the concept. Part D Chapter 4 Figure 1 provides a summary of the functions associated with Open Green Spaces, given that the improvement and activation of existing green spaces to function as effective recreation spaces are the primary focus of the project.



Part D Chapter 4 Figure 2. Functions of bioretention areas including detention ponds/ stormwater attenuation facilities (Source: World Bank, 2021)

Part D Chapter 4 Figure 2 shows the functions of bioretention areas, which *'can be adapted to a variety of urban environments. It can take many forms and shapes for different functions and contexts. Bioretention basins, vegetated swales, rain gardens, retention ponds, infiltration trenches, and detention ponds are some examples of bioretention systems. Depending on the stormwater volume to be collected, a water retention area can be either dry or wet.' (World Bank, 2021: 141).*

Concept Design Community Workshops were held on 17 October and 18 October 2024, where community participants were given the opportunity to provide input to the concepts. The input is reflected in the discussion of the concepts in this section, and where possible, these have been reflected in the updated concept design or the description of the components linked thereto.

New Orleans Park Concept Plan

The Upgrading of the New Orleans Park includes:

- 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

The Concept Plan is shown in Part D Chapter 4 Map 7, and is attached in an appendix hereto.

Part D Chapter 4 Map 7: Concept Plan for New Orleans Park Hybrid Flood Alleviation Project

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

DRAKENSTEIN MUNISIPALITEIT • MUNICIPALITY • UMASIPALA

AVIA

giz Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH

C40 CITIES FINANCE FACILITY

ARLA Consulting Landscape Architects

Components of the Concept Layout Design

The Boontjies River requires additional capacity to convey the modelled flood peaks. The proposal focuses on enhancing attenuation capacity by creating a multistage channel with a lower terrace which will be allowed to flood during stormflows.

This will be incorporated in 2 sections - on the east of the river, and on the north-eastern corner of the site. The full concept includes the realignment of the internal road, the widening of the river, and the deepening of the existing stormwater attenuation dam. Other recreational components are also incorporated as described below.

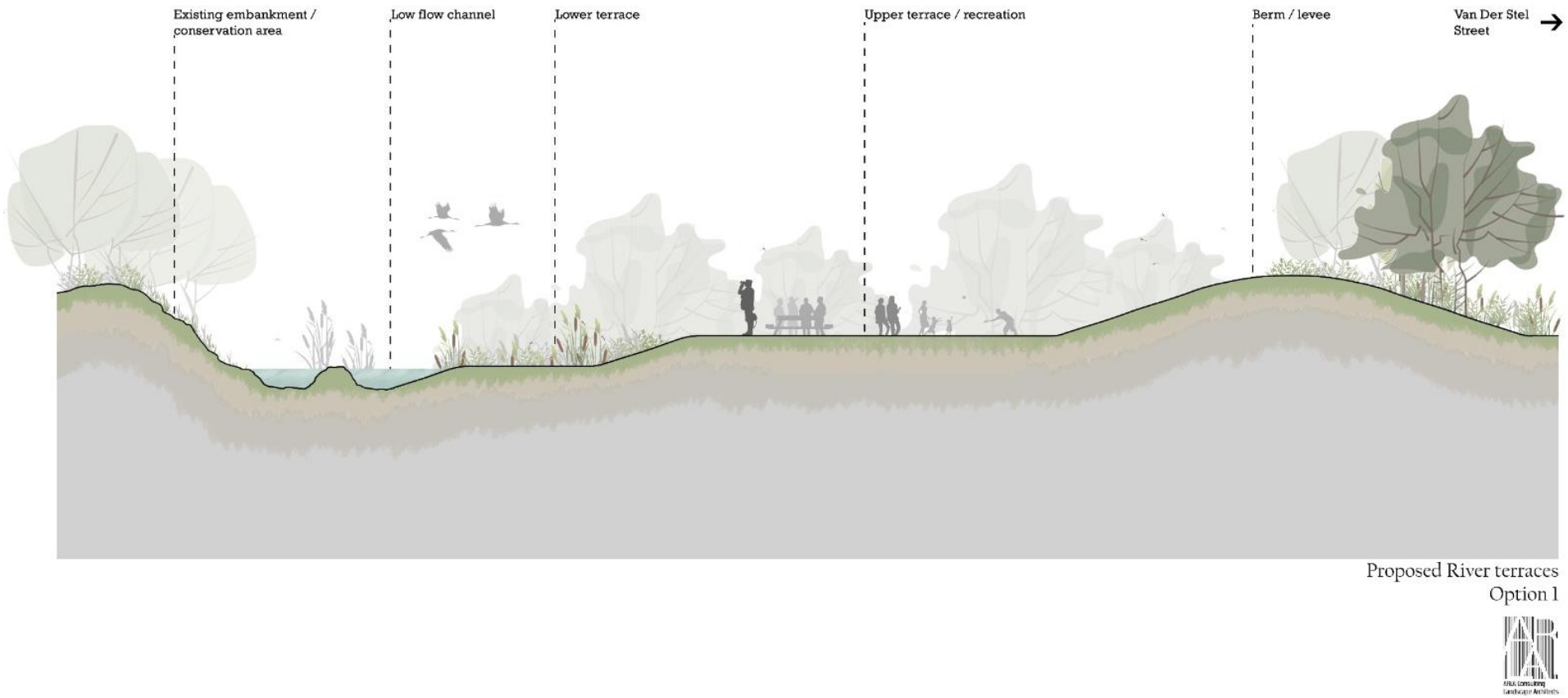
Widening of the Boontjies River and the creation of a multi-stage channel

The proposed design mimics the natural floodplain dynamics of rivers, creating different levels that allow water to flow and spread out during various flood events. Each stage of the channel plays a distinct role in managing water and supporting the surrounding environment. The existing natural channel is the main flow path of the Boontjies River, where water moves during normal conditions. The channel should be rehabilitated to a more natural state in order to create a braided river that can support a more diverse range of habitats. The low-flow channel will handle base flows and smaller floods, with adjacent terraces to accommodate a dynamic river system that is adaptable to change.

Adjacent to the low-flow channel, the implementation of a terrace is proposed. This will be a slightly elevated area that takes effect during moderate flood events. As water levels rise, the river overtops its natural banks and spreads across this lower terrace. The wider area helps to accommodate larger volumes of water by increasing the flood plain, reducing the risk of erosion and reducing the risk of flood damage to property and infrastructure. A terrace would aid in reducing the velocity of water flow and improving water quality; whilst providing crucial habitat for a variety of faunal and floral species. This terrace is critical in managing intermediate floods, as it increases the river's capacity to handle excess water while maintaining the stability of the low-flow channel.

An upper terrace may also be developed that serves to further expand the floodplain during extreme conditions. This terrace can offer additional space for water to spread out. When the upper terrace is dry, the area can function as a multi-functional space for the community for instance picnicking, events or markets, enhancing the park's usability and whilst maintaining its green space.

The final component entails a proposed berm, constructed along the outer edge of the upper terrace. This raised embankment will act as a barrier during extreme flood events, potentially preventing flood water from spilling into adjacent residential and public spaces. The berm should be stabilised with vegetation, blending into the park landscape while ensuring increased flood protection.



Part D Chapter 4 Figure 3. Multi-stage channel incorporating terraces to function as floodplains under high flow – Option 1

Part D Chapter 4 Figure 4. Multi-stage channel incorporating terraces to function as floodplains under high flow – Option 2

Realignment of internal circulation network

Together with the river, the existing vehicular and pedestrian routes provides structure to the site, and together functions to delineate the conservation area from the rest of the site. The realignment of a section of the internal road eastward toward Van der Stel will enable the creation of a lower terrace and create space for water storage during flood events.

Off-channel retention areas

The retention areas are located along the east of the river.

Off-channel retention between the river and the internal road (realigned)

The first is bounded on the east by the internal road, which will require realignment of the internal road to create a lower terrace supporting off-channel storage during flood events.

Off-channel retention between the river and the internal road (realigned)

A second off-channel storage area is located in the north-east of the site (Bo-dal Josafat and Van der Stel). The Boontjies river forms the western boundary of the retention area and separates the storage area from the conservation area in the north-west of the site. Water is also proposed to enter the park through the diversion of stormwater from existing catchpits on Van der Stel Street into New Orleans Park.

Upgrading and Recreation area and refurbishing the splash pad

An existing recreational area is situated between the two proposed retention areas in the north-eastern corner of the site along Van der Stel. The proposal is to retain these facilities and refurbish them to enhance the recreational value of the site.

Increasing the capacity of the Existing Stormwater Attenuation Facility (existing dam) and surrounding infiltration areas

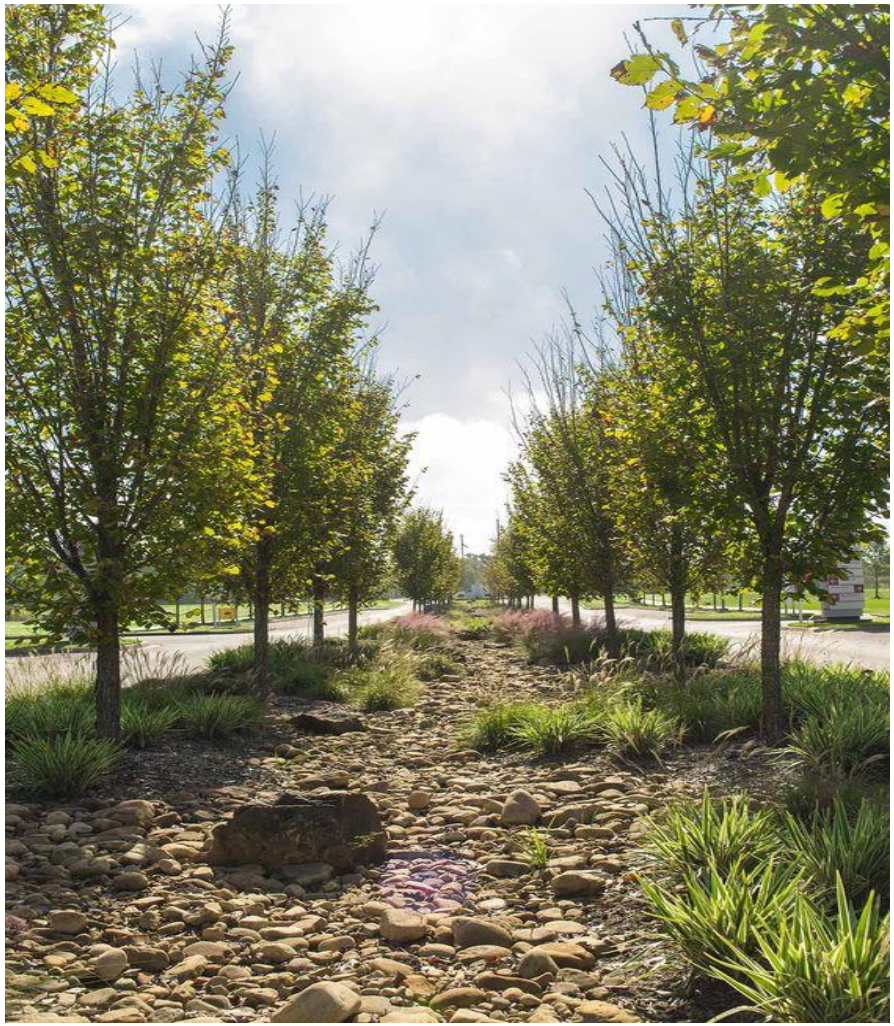
The existing attenuation dam is located west of the Boontjies river and is a critical feature in the park's flood management strategy. The dam's capacity will be utilised to store stormwater during heavy rainfall, preventing downstream flooding. The proposal therefore includes that **the dam is deepened and widened**. It is proposed that the dam be enhanced to better integrate with the surrounding landscape and support ecological functions. This can be achieved by creating naturalistic edges with native plants, which not only improve water quality, but attract local wildlife and create a more visually appealing landscape. Installing walking paths and/or a boardwalk, seating areas, and viewing platforms around the pond will encourage visitors to engage with the water feature while preserving its ecological function and making it a focal point for relaxation and environmental education within the park.

There is also a seep on the north-eastern part of the site which is extremely wet in winter and drains towards the dam. It is proposed that this be retained and integrated with SUDS solutions to direct stormwater from Meaker Street. The damp areas surrounding the dam will expand during periods of heavy rain, acting as additional

flood retention zones. These areas will allow water to collect temporarily and gradually seep into the ground, enhancing water infiltration and reducing surface runoff.

Swale

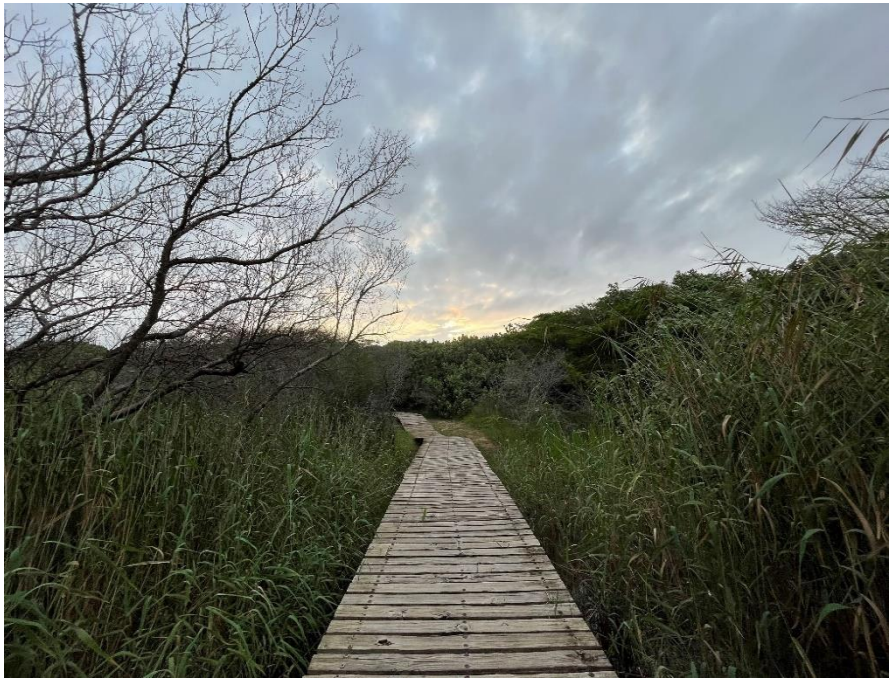
A swale is proposed, connecting the river with the existing attenuation facility and creating additional capacity during flood events.



Part D Chapter 4 Figure 5. Example of a swale

Recreational Pathways and timber boardwalk

New pedestrian pathways will be added to improve access throughout the park. These pathways will be designed to remain functional during wet conditions, ensuring continued public use of the park even during periods of rainfall. A timber boardwalk is proposed.



Part D Chapter 4 Figure 6. Timber boardwalk

Upgrade and Refurbish Play Park

The existing play park will remain a central feature of the site. In line with the park's recreational focus, there is also an opportunity to install information boards on biodiversity. These boards would educate the public on the ecological importance of the area and the various habitats present within the park. It was agreed that this should be included as a recommendation in the project plan to enhance public awareness and engagement with the site's natural features.

Part D Chapter 4 Figure 7. Current recreational areas in New Orleans Park.

Upgrading of the ablution facilities

Ablution facilities are located on the east of the entrance road upon entering the park from Meaker Street. To improve the quality and user-experience, these facilities should be upgraded.

Tree Planting and Survey

Given the proposals to support flood attenuation, it may be necessary to remove some of the trees from the site. The planting of additional trees in this area is also proposed to compensate for those to be removed where lower terraces are to be created.

Maintaining the Biodiversity Area

The north-western section of the park has been designated as a no-go area for development. This zone should be protected from development to ensure the preservation of critical habitats. The DM is in the process of establishing the stewardship process through Cape Nature. The site includes a depression wetland in the renosterveld patch which is situated north of the site to the west of the Boontjies River. This wetland serves as a critical ecological and biodiversity area, and the project aims to ensure that the flow of water into the wetland is preserved.

Part D Chapter 4 Figure 8. New Orleans Park: existing signage providing information on the conservation area.

Retaining existing operation and maintenance processes

The area is well maintained and existing maintenance and refuse removal strategies should remain in place.

Solid Waste Management

The site will include public refuse bins to be collected at regular intervals, particularly along pedestrian pathways, within the park. The cleaning of the site may make use of local labour through programmes such as the Expanded Public Works Programme (EPWP).

Litter traps have not been integrated into the concept design as litter traps are vulnerable to vandalism, which can compromise their effectiveness and require additional maintenance. People can intentionally dispose of trash into the trap and steal materials (e.g.metal) from the trap, damaging it.

Community Inputs and Ideas

(Summarised from community consultation held 18 October 2024)

The upgrading of the Park was supported by community members as this is a popular recreational site in the Municipality. The community members noted that organisations such as '**Friends of the Park**' can contribute to the improvement, maintenance, safety and further enhancement of the park.

Key community ideas and inputs:

- Consulting with organisations such as 'Friends of the Park' to contribute to park maintenance and safety

Existing attenuation dam and surrounding infiltration areas

The community supported the intervention. The community noted that the holding capacity of the dam is limited as large sections of the dam are filled with reed beds.

Key community ideas and inputs:

- Ensuring adequate lighting to promote safety
- Removal of reed beds
- The key risk of this intervention was noted to be the potential risk of drowning

Play Park and recreational pathways

The community members supported the development of a play park to create multi-purpose spaces for picnics; outdoor classrooms; an amphitheatre; and events (i.e. market, summer concerts or outdoor movies). The community also noted that they feel safe using the park and bringing their children to the park as long as they are under supervision.

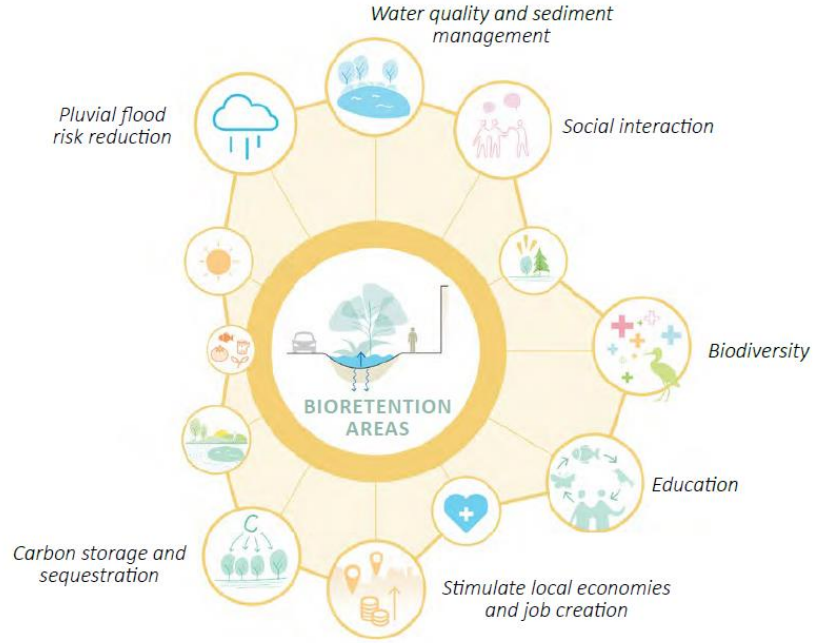
Key community ideas and inputs:

- Improved access control
- Security patrols
- Ensuring paved pathways
- Raised timber pathways over sensitive or wet areas

D4.3. Benefits and Impact Potential: New Orleans Park Hybrid Flood Alleviation Project:

The primary objective and benefit to be achieved from this project is Flood Risk Reduction, aligned to the overarching programme objective of building flood resilience. It is critical that flood risk reduction measures are not developed in isolation from the broader urban and natural environment and community context. As such, these four **interrelated** areas – **1) Flood Risk Reduction**, **2) Urban Management and Open Space Optimisation**, **3) Adaptation and Climate Resilience**, and **4) Community Empowerment and Participation** are identified as four broad groups of benefits that should be sought to give effect to the programme objectives at the project level.

Part D Chapter 4 Figure 9. Benefits of Open Green Spaces (Source: World Bank,



Part D Chapter 4 Figure 10. Benefits of Bioretention Areas (Source: World Bank, 2021)

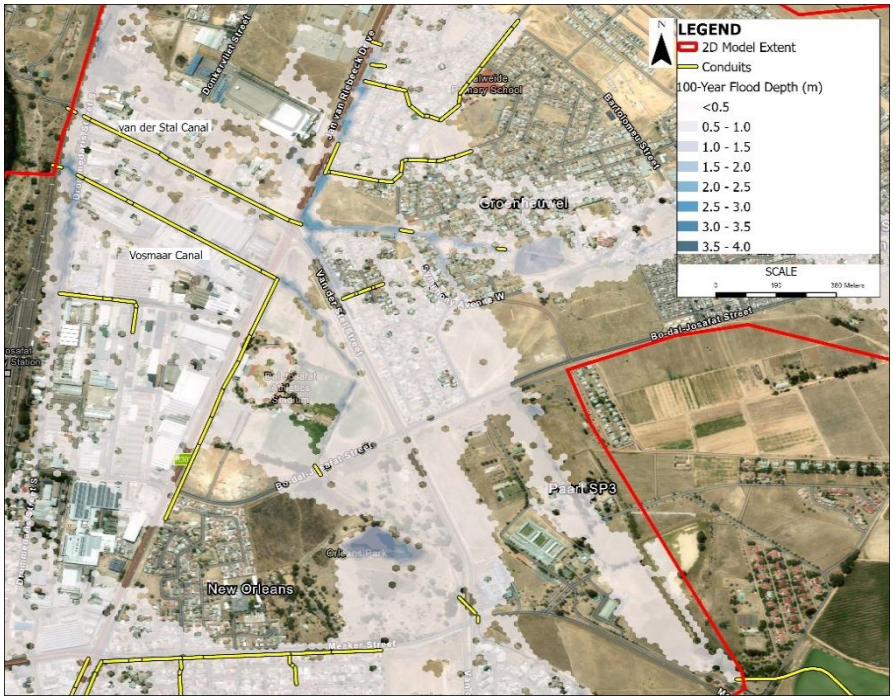
A multitude of benefits can be achieved via the creation and enhancement of open green spaces and bioretention areas. These are summarised in Part D Chapter 4 Figure 9 **and** Part D Chapter 4 Figure 10**, and are further explained in the context of this project.**

Improved Stormwater Management and Flood Risk Reduction Potential

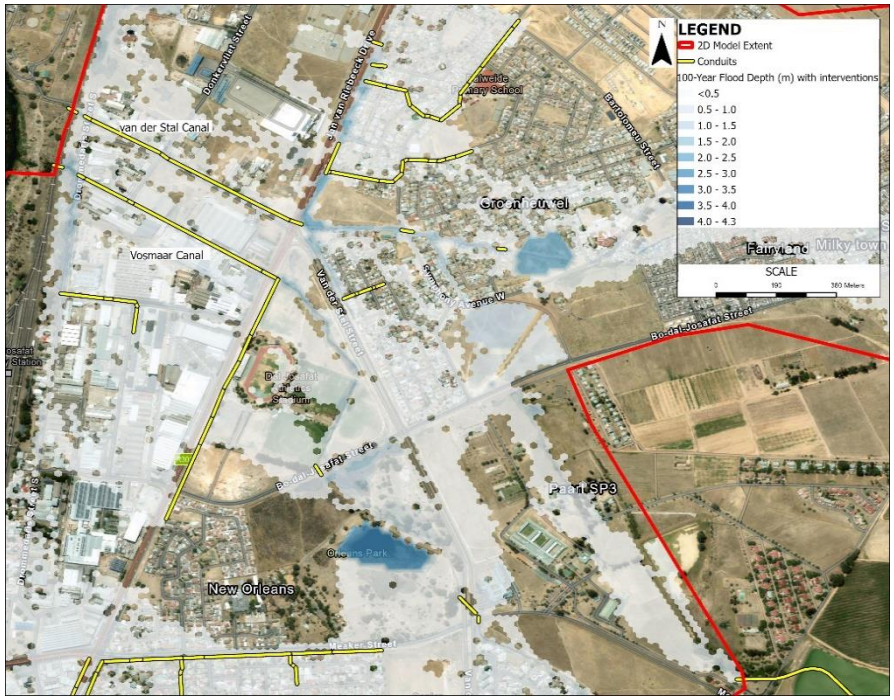
The New Orleans Park is currently a public recreational facility. As this is open space, there is potential for it to be retrofitted to include stormwater attenuation and treatment capabilities. The system downstream of New Orleans Park consists of an unlined canal which goes through the Dal Josafat Stadium and discharges into the Vosmaar Canal which ultimately discharges into the Berg River through a culvert beneath the existing railway. The overland flood depths downstream are generally less than 0.5m and increase in depth closer to the railway line. The use of New Orleans Park for attenuation would assist with reducing flood depths downstream. Additional benefit is that since the railway culverts do not have sufficient capacity for flows, the excess flow is conveyed in a northern direction adjacent to the railway line and towards the Drommedaris and Mbekweni areas therefore these areas will also benefit from New Orleans Park interventions.

Optioneering at the New Orleans Park could result in flood depth reduction downstream by further increasing the size of the existing dam, incorporating real-time control into the existing dam, inclusion of a flood wall along the perimeter of New Orleans Park to attenuate additional volume in larger floods, optimise the outlets from the dam and the culverts beneath Bo Dal Josafat Street for the purposes of increasing attenuation capabilities in New Orleans Park.

It should be noted that the watercourse upstream of New Orleans Park has limited capacity due to its left bank (southern bank) being relatively low at approximately 1m above the invert of the watercourse. When this left bank is overtopped, the flow continues in a westerly direction away from New Orleans Park and towards the industrial area to the north of Oosbosch Street. While this river isn't part of the New Orleans Park intervention, it should be assessed in future in terms of improving its capacity to protect the residents on the southern bank as well as the industrial area further west. Care needs to be taken not to further increase flooding downstream due to this additional flow i.e. downstream of New Orleans Park. The capacity of the existing culvert at Meaker and Van Der Stel Street will need to be assessed.



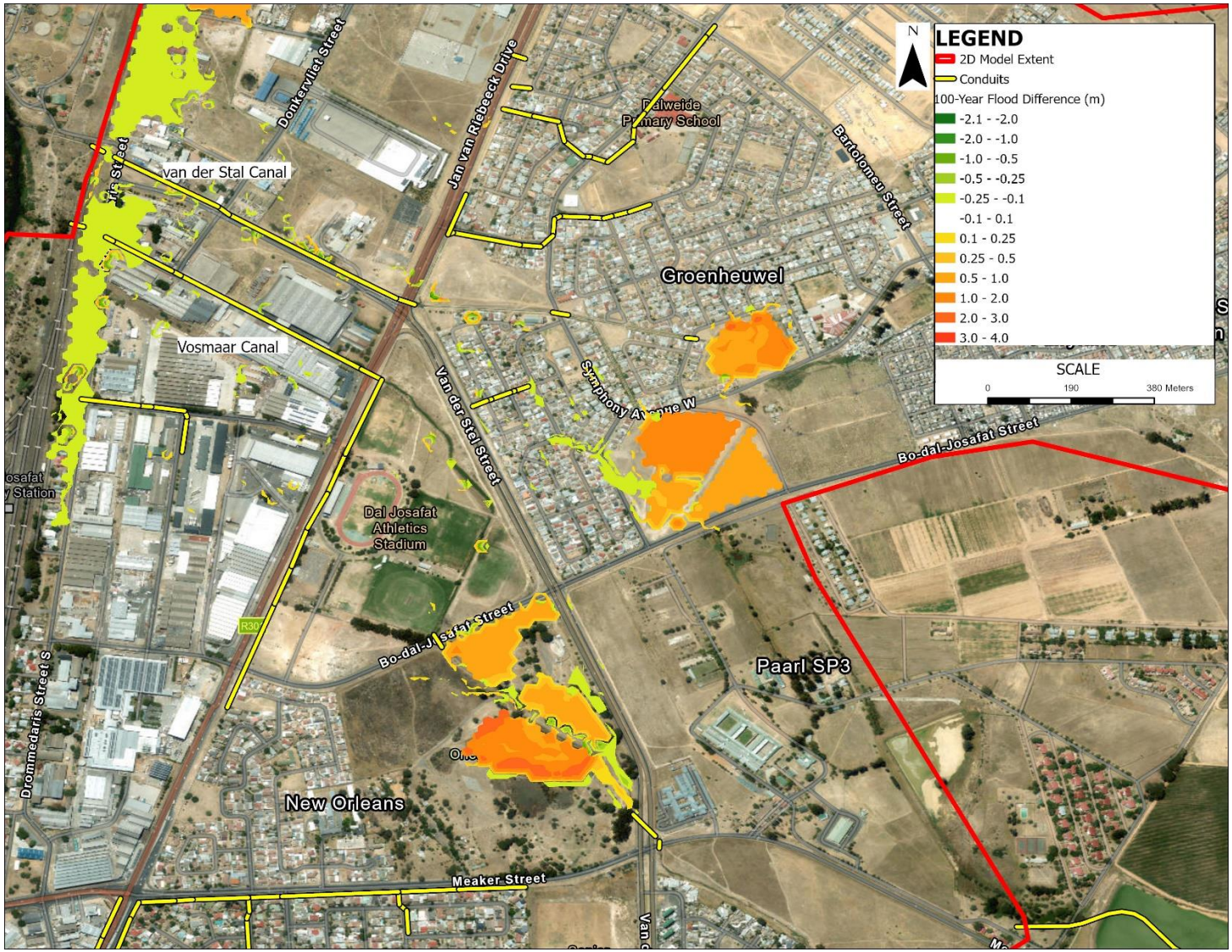
Part D Chapter 4 Map 8. Current Flood Extent (1:100yr)



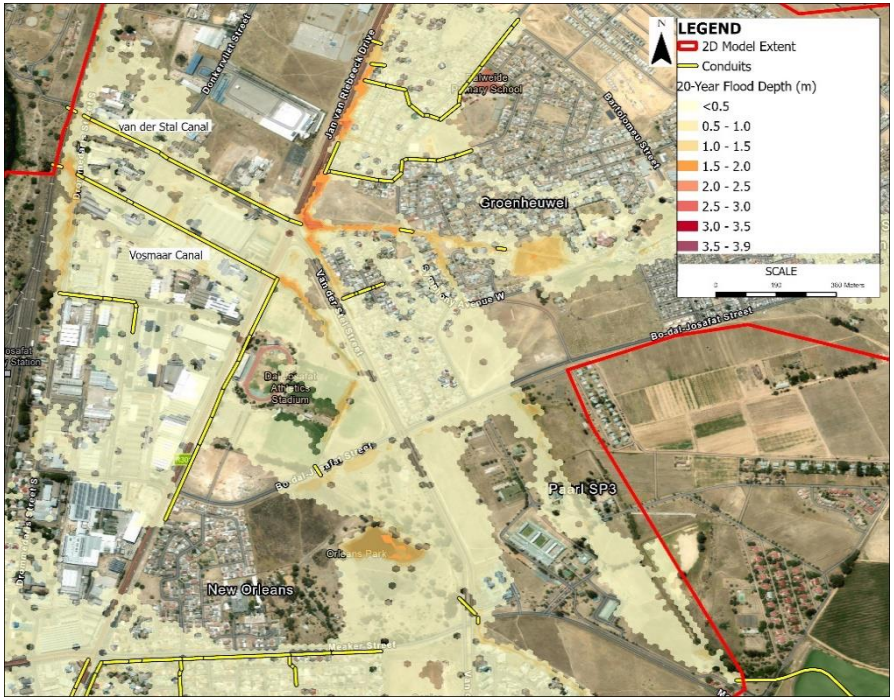
Part D Chapter 4 Map 9. Flood Extent (1:100yr) after intervention

The New Orleans Park status quo for the 100-year flood indicates that the areas downstream of New Orleans Park are exposed to flood depths of up to 0.5m. The flooding downstream is as a result of overland flows that are being experienced in the area and the limited capacity of the Vosmaar Canal and the railway culvert. **The impact of the proposed interventions at New Orleans Park for the 100-year flood is localised reduced flood depths in the Dal Josafat Stadium area**. This can be seen in Part D Chapter 4 Map 10, which shows the decrease in flood depth (*light* green to *dark* green) and increase in flood depth (*yellow* to red). Increases in flood depth within the attenuation interventions are anticipated due to increased water storage.

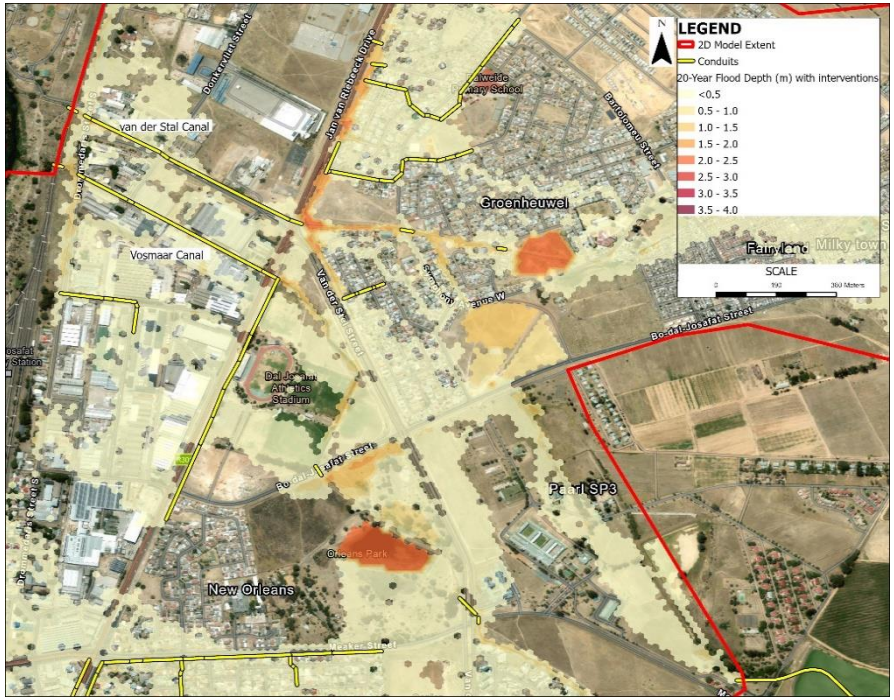
Further downstream there is a reduction in flow depths in the order of 0.25m in the 100-year flood near Drommedaris Street as seen in Part D Chapter 4 Map 10. There is an increase in flood depths in New Orleans Park but this is expected due to the lowering of the existing ground levels to provide additional storage in New Orleans Park. An increase in the attenuation within New Orleans Park could be explored to reduce flood depths downstream in the 100-year flood.



Part D Chapter 4 Map 10. Difference in Current Flood Extent vs After Intervention Flood Extent (1:100yr)



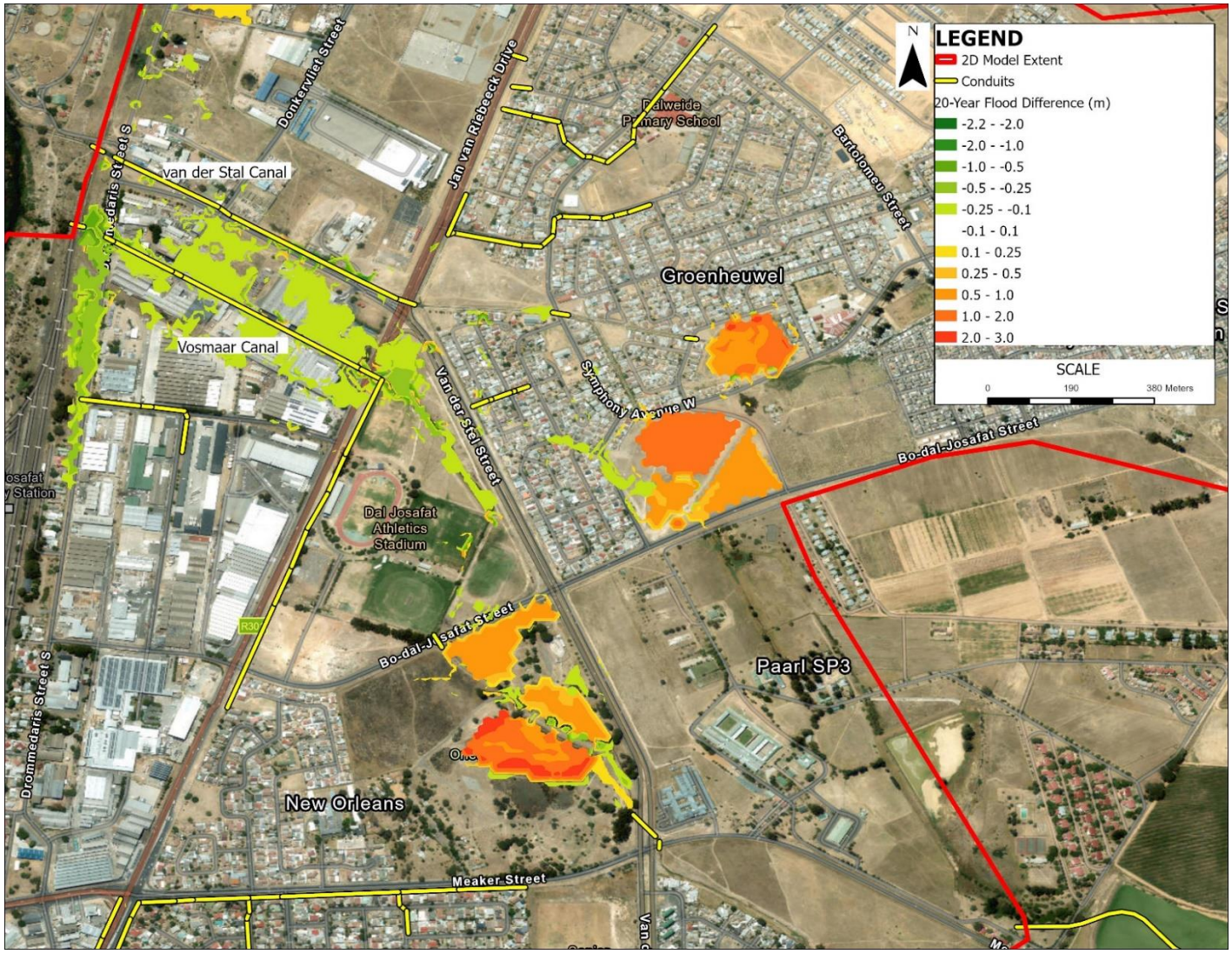
Part D Chapter 4 Map 11. Current Flood Extent (1:20yr)



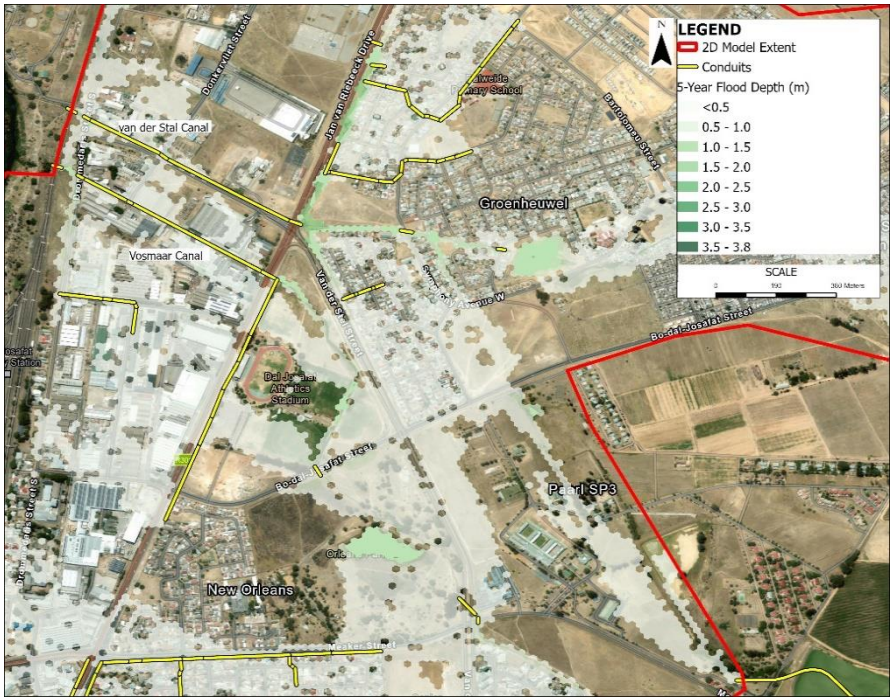
Part D Chapter 4 Map 12. Flood Extent (1:20yr) after intervention

The New Orleans Park status quo for the 20-year flood indicates that the areas downstream of New Orleans Park are exposed to flood depths of up to 0.5m. The flooding downstream is as a result of overland flows that are being experienced in the area and the limited capacity of the Vosmaar Canal and the railway culvert. **The impact of the proposed interventions at New Orleans Park for the 20-year flood is localised reduced flood depths in the Dal Josafat Stadium area.** This can be seen in the Part D Chapter 4 Map 13, which shows the decrease in flood depth (*light* green to *dark* green) and increase in flood depth (*yellow* to red). Increases in flood depth within the attenuation interventions are anticipated due to increased water storage

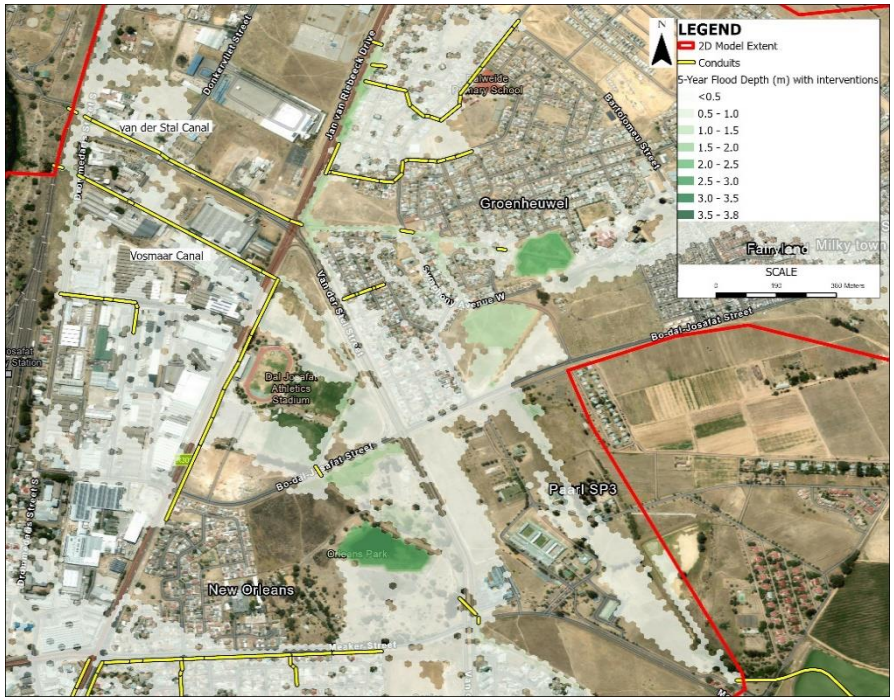
Further downstream there is a reduction in flow depths in the order of 0.5m in the 20-year flood near Drommedaris Street as seen in Part D Chapter 4 Map 13. There is an increase in flood depths in New Orleans Park but this is expected due to the lowering of the existing ground levels to provide additional storage in New Orleans Park. An increase in the attenuation within New Orleans Park could be explored to reduce flood depths downstream in the 20-year flood.



Part D Chapter 4 Map 13. Difference in Current Flood Extent vs After Intervention Flood Extent (1:20yr)



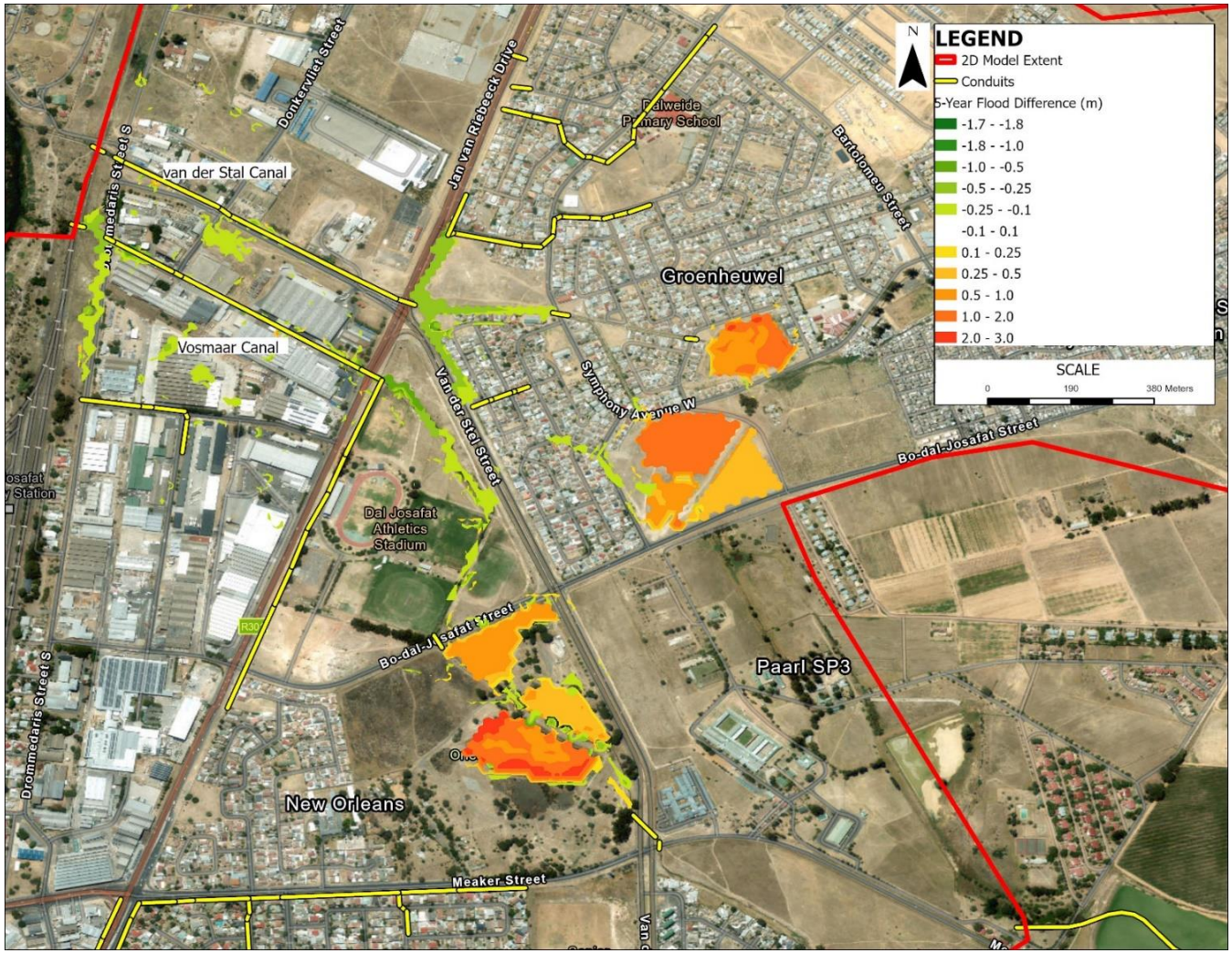
Part D Chapter 4 Map 14. Current Flood Extent (1:5yr)



Part D Chapter 4 Map 15. Flood Extent (1:5yr) after intervention

The New Orleans Park status quo for the 5-year flood indicates that the areas downstream of New Orleans Park are exposed to flood depths of less than 0.5m. The flooding downstream is as a result of overland flows that are being experienced in the area. The impact of the proposed interventions at New Orleans Park for the 5-year flood is reduced flood depths in the Dal Josafat Stadium area, specifically in the watercourse, where a reduction in depths of up to 1m could be experienced. This can be seen in the Part D Chapter 4 Map 16, which shows the decrease in flood depth (*light* green to *dark* green) and increase in flood depth (*yellow* to red). Increases in flood depth within the attenuation interventions are anticipated due to increased water storage

Further downstream there is a reduction in flow depths in the order of 0.5m in the 5-year flood near Drommedaris Street as seen in Part D Chapter 4 Map 16. There is an increase in flood depths in Orleans Park, but this is expected due to the lowering of the existing ground levels to provide additional storage in New Orleans Park. An increase in the attenuation within New Orleans Park could be explored to reduce flood depths downstream in the 5-year flood.



Part D Chapter 4 Map 16. Difference in Current Flood Extent vs After Intervention Flood Extent (1:5yr)

Urban Management and Open Space Optimisation

The following key benefits can be achieved in this project:

Recreation and Accessibility for all users

Recreational benefits are currently being achieved at New Orleans Park, as this is an existing park currently being utilised by the community. The park's recreational benefits will be enhanced through the creation of a multi-purpose space, the incorporation of improved pedestrian routes, a timber boardwalk, and the refurbishment and upgrade of existing municipal facilities such as the splash pad and play area. The entrance to the park is through a controlled access route from Meaker Street. The controlled access aids with management of the park and is aimed at maintaining safety and security. The Park is available to the public (with controlled entrance and an entrance fee) and the concept aims to **upgrade the park to improve the experience of the community** and provide access to recreational opportunities in **safe and accessible manner**. Universal design principles have been applied to ensure that the site accommodates all non-motorised transport users and people with physical disabilities as far as possible, and thus further planning and design should demonstrate the detail of how of these principles can be achieved, which will require participatory planning and meaningful engagement with intended end-users in surrounding communities.

National Strategic Framework on Universal Design and Access - Principles of Universal Design:

- **Equitable use -** Design that is useful and marketable to persons with diverse access needs
- **Flexibility in use** - Design that accommodates a wide range of individual preferences and access needs
- **Simple and intuitive use** - Design that is easy to understand regardless of the users experience, knowledge, language, skills or concentration level (in loco use)
- **Perceptible information** - Design that communicates necessary information effectively to the user regardless of ambient conditions or the users sensory access needs
- **Tolerance for error** - Design that minimises hazards and adverse consequences of accidental or unintended actions
- **Low physical effort** - Design that can be used efficiently and comfortably and with a minimum of fatigue or struggle
- **Size and space for approach and use** - Design that provides appropriate size and space for approach, reach, manipulation and use regardless of the users body size, posture or mobility

RSA GOVERNMENT GAZETTE No. 45328, 15 October 2021: 176

Improved Spatial Alignment and Land Use Management:

The New Orleans Park is currently a public open space designated in the SDF as a green space. The site includes recreational opportunities including a conservation area. Leveraging this site for further flood attenuation and maximising its education potential will serve to facilitate the optimisation of this green, open space.

Placemaking and the improvement to the aesthetic appearance of the city

The project seeks to achieve an improved urban realm and placemaking to support the functionality and improvement of the urban environment. It will improve the functionality, aesthetics, and recreational opportunities of the Park through the development of a multi-purpose space for picnics/ kick-a-bout/ outdoor classroom/ amphitheatre/ events, the refurbishment of the existing play area, and the development of a boardwalk and pedestrian pathway.

Ecological Restoration and Rehabilitation and Water Quality Improvement

The concept incorporates the **protection of the existing wetland area** and leveraging of the **existing dam** and will aim to achieve the optimal condition of these waterbodies to achieve the optimal flood alleviation ecosystem potential. The proposed concept also includes the rehabilitation of the riparian zone to enhance its functioning and capacity for the provision of ecosystem services. The protection of the Biodiversity Area will also promote ecological restoration and encourage the formation of new habitats.

Education and awareness

The incorporation of additional signage and information boards, particularly around the Biodiversity Conservation Area aims to provide information to Park Users. There is also an opportunity for schools and universities to become involved in conservation activities around the Biodiversity Conservation Area.

Service delivery through stormwater management incorporating nature-based solutions

The project seeks to achieve flood risk reduction benefits through the development of hybrid flood alleviation interventions by leveraging nature-based solutions as complementary to more conventional 'grey' service delivery approaches. The project therefore serves to facilitate more resilient stormwater management services, and to protect communities and municipal and private infrastructure through flood risk reduction.

Urban Cooling and Air Quality

In urban areas, green infrastructure such as parks and urban wetlands help to cool surrounding areas by providing shade and reducing the urban heat island effect. This improves air quality and liveability, creating more pleasant environments for residents while also reducing energy demand for cooling.

Carbon Sequestration

Nature-based solutions, particularly those involving reforestation and wetland restoration, act as carbon sinks, helping to mitigate climate change by sequestering carbon dioxide from the atmosphere. This not only supports local climate goals, but also contributes to global efforts to reduce greenhouse gas emissions.

Adaptation and Climate Resilience - Toward a Climate Resilient Pathway

Drakenstein's Climate Change Action Plan (CCAP) includes a series of climate change objectives. The New Orleans Park Hybrid Flood Alleviation Project will support the following DM climate change objectives:

- **Water security and efficiency**
- **Climate resilient and low carbon development**
- **Biodiversity and ecosystem management**
- **Public health**
- **Disaster management**
- **Building response capacity through improved coordination and awareness**

In addition, the DM HFA identified the following core requirements for responsiveness to projected climate change:

- **Responsiveness to the changing catchment hydrology**
- **Responsiveness to more extreme drought and flood cycles**
- **Responsible land use management to protect ecological infrastructure and enhance urban permeable surfaces**

Lower terraces and berms to improve resilience to flooding and droughts: Lower terraces are created next to the river by lowering the area next to the river to allow it to flood during a storm. Berms are placed to create natural barriers that slow down water flow, providing temporary water retention during significant flood events. Both lower terraces and berms provide climate change adaptation benefits through the absorption of excess water and the slowing down of stormwater runoff, reducing flood risk. Berms also help regulate water flow, reducing pressure on downstream infrastructure. Additionally, **increasing the capacity of the existing attenuation dam will reduce flood risk** through increased storage capacity during heavy rainfall events, as well as provide a water storage facility at times of drought.

The widening of the river and development of surrounding infiltration areas, to improve resilience to address changing catchment hydrology: At the New Orleans Park site, river widening will improve resilience to the changing catchment hydrology and provide climate change adaptation benefits by allowing the river to carry more water, reducing flood peaks, decreasing water velocity, and increasing storage, which will reduce downstream flooding.

The Biodiversity Conservation Area will promote responsible land use management to protect ecological infrastructure, and infiltration trenches surrounding the dam will enhance urban permeable surfaces: The Biodiversity Conservation Area and infiltration trenches surrounding the dam will slow down stormwater runoff, increase the absorption of excess water, and promote soil stability while preserving natural ecosystems. Biodiversity Conservation Areas also provide significant carbon sequestration benefits.

Sustainable Development Goals

The New Orleans Park interventions align with the following Sustainable Development Goals (SDGs):

- SDG 3: Good Health and Wellbeing – through the development of recreational spaces, promoting recreational activities, improving physical and mental wellbeing
- SDG 11: Sustainable Cities and Communities – through green infrastructure, increased climate resilience and the development of community recreational spaces
- SDG 13: Climate Action – Climate change adaptation through flood risk reduction
- SDG 14: Life below Water – Protection of aquatic habitats through the improvement of water quality
- SDG 15: Life on Land – Ecological restoration through the biodiversity conservation area

Illustrated through the above-listed SDGs, the site has high sustainable development potential that promotes climate change adaptation through a reduction in flood risk in the Groenheuwel Catchment, while also providing downstream benefits.

Community empowerment, participation and governance

The project will offer direct benefits to the local community given its strategic location within Groenheuwel The project offers the opportunity for meaningful engagement across a range of stakeholders.

- **Ward Councillor and Ward Committees:** These municipal structures should be leveraged as intermediaries with local communities and to support the attainment of community accountability. The community noted the importance of the ward councillor as a facilitator of the interventions and mobilisation of the community.

- **NGOs and NPOs:** The NGO and NPO sectors should be mobilised to support the project, and consideration should be given to the establishment of a community programme to facilitate 'eyes on the street'. **Friends of the Park** have been identified as a civil society organisation that can be mobilised to support the upkeep of the Park.

- **Youth and adult education and awareness** should be facilitated. Schools and other educational institutions could be encouraged to visit the site for educational purposes, supported by appropriate signage with educational materials. Schools in proximity to the site include **New Orleans Secondary School.**

- **Job Creation Potential:** Project implementation will provide opportunities for job creation for local communities during the construction phases and operation and maintenance phases.

While the construction phase job creation is set to be applicable only in the short term, the operation and maintenance in relation to the open spaces, landscaping, solid waste management, play area equipment and the stormwater ponds will require on-going human resource contributions. This may include the involvement of community members in voluntary project stewardship, the leveraging of the enhanced public works programme (EPWP), as well as other job creation opportunities. See also the Job Creation Potential Section.

D4.4. Project Lifecycle Stages and Duration: New Orleans Park Hybrid Flood Alleviation Project

The following sections provide an overview the typical phases of a project including:

- **Planning and Design of the Project**
- **Construction and implementation**
- **Operation and Maintenance**

This Section also provide an overview of the typical studies that may be required in relation to the New Orleans Park project.

The typical phases of a project lifecycle include:

Planning and Design of the project

This includes detailed feasibility studies, and the detailed design of the project. Importantly, this phase in the project lifecycle should see the meaningful engagement of potential project beneficiaries (local communities) and ensure that they are adequately engaged in the ideation of solutions and ensure that the stakeholder input is a key informant to the project components.

The following activities typically form part of this Phase:

Feasibility Study and Initial Assessments

A **Basic Assessment** or full **Environmental Impact Assessment**. This may also include other specialist studies across a range of disciplines. The final list of specialist studies required should be determined during the feasibility study process, and can be guided by the Department of Forestry, Fisheries and Environment's (DFFE) Screening Tool. **The results of the screening tool are contained in Appendix: New Orleans Park DFFE Screening Tool Results.**

The environmental application (BA or EIA) as well as the Land Use Application forming part of the Permitting and Regulatory Approvals) will include a legally required public participation process. In order to maximise the opportunity for participatory planning, it is proposed that the project include additional stakeholder engagement (beyond the legally required public participation processes) to engage community members on a continuous basis in order to continue to the engagement process that has commenced in the design of the DM HFA Programme though the Community Flood Risk Perception Study (July 2024), and the Concept Design Community Workshop (October 2024).

Engineering design and planning

This will include the detailed design of the proposed hybrid flood alleviation infrastructure and other elements of the site layout.

Landscape Design and planning

Landscape design and planning of hard and soft surfaces and river rehabilitation components of the site layout will be designed as part of this process.

Permitting and Regulatory Approvals

This refers to the relevant approvals necessary to proceed with the development. This will typically include **Land Use Applications (See Land Use Appendix) –** The details

of the land use application can be determined during the preapplication meeting with the municipality, and the land use approval is typically contingent upon the completion of all specialist studies. The regulatory approvals will also include a **Water Use License Application (WULA).** The nature of the project is likely to trigger a full Water Use License (WULA) (as opposed to a General Authorisation). From time to time, the WULA process triggers additional specialist studies.

Additional approvals could be required throughout various phases, and specifically highlighted at this point in the sequence due to the development and environmental approvals that will likely be necessary from with the municipality and from the relevant competent authorities.

Part D Chapter 4 Table 3. Specialist studies required for the Project (subject to refinement) as part of the Planning and Design Phase of the Project

Feasibility Study and Assessment	
Environmental Authorisation (EA) (Basic Assessment or Environmental Impact Assessment)	Assumes a Basic Assessment. Detailed requirements to be determined by the competent authority. Full EIA will incur a greater cost. Specialist studies may include those listed below. The specialist studies will require confirmation from the local authority.
Geotech Investigation	
Topographical Surveys	
Urban Planning and Landscape Architecture	
Traffic Impact Assessment or Statement	Not applicable
Heritage Impact Assessment	
Visual Impact Assessment (Level 3)	
Terrestrial Biodiversity Assessment	
Freshwater Impact Assessment (Aquatic Biodiversity Assessment Report)	
Ichthyology/Fish Ecology Studies	Typically incorporated into the Aquatic Biodiversity Assessment Report
Constructed wetland technical assessment and planning (Treatment Wetland Specialist)	Will inform the Aquatic Biodiversity Assessment Report
Botanical Assessment	
Waste Management Impact Assessment	
Detailed Flood Study	
Stakeholder Engagement/Consultation Services	Mobilisation and community meetings. Excludes the engagements forming part of the EA or Land Use Application Process. Assumes 80-120 days of professional time.

Feasibility Study and Assessment	
Project Management (Feasibility Studies and Assessments)	
Engineering and Design	
Stakeholder Engagement/Consultation Services and Socio-economic Assessment	Mobilisation and community meetings. Excludes the engagements forming part of the EA or Land Use Application Process. Socio-economic Assessment can also be included.
Project Management (Engineering and Design)	
Water Use License (WULA)	A full WULA is assumed.
Land Use Application(s)	Detailed requirements (and therefore cost) to be determined based on requirements set out by the local authority
Project Management (Permitting and Regulatory Approvals)	
Detailed Design (Landscape Architectural Design)	
Tender Documentation (Landscape Architectural Design)	
Project Management (Landscape Architecture)	

Construction and implementation

This refers to the on-site construction of infrastructure and the delineation of space through landscaping, planting and movement corridors.

The following activities typically form part of this Phase:

- Site Preparation
- Construction of Infrastructure (e.g., levees, storm drains)
- Installation of Nature-Based Solutions (e.g., wetlands, green infrastructure)
- Planting and Vegetation
- Materials and Equipment
- Transport and Logistics
- Construction Supervision and Oversight

For this project, the following components were incorporated into the cost estimates:

- Earthworks
- Earthworks
- Erosion protection
- Flood walls / dykes
- Culverts and outlets
- Landscaping
- Site establishment
- Professional fees (Site staff)
- Contingencies

Operation and Maintenance

Critical to the long-term success of the project, operation and maintenance efforts will be required from a wide range of stakeholders. This may include the involvement of community members through voluntary project stewardship, the leveraging of the enhanced public works programme (EPWP), as well as other job creation opportunities.

The following activities typically form part of this Phase:

- Post-Implementation Monitoring
- Maintenance of Infrastructure (e.g. stormwater systems)
- Maintenance of Nature-Based Solutions (e.g. replanting, erosion control)
- Reporting and Evaluation
- Labour (Monitoring & Maintenance)

This also includes:

- Legal and Insurance Costs
- Administrative and Overhead Costs

Project Duration

The project location is within an existing municipal-owned and managed public open space. It is therefore critical that operation and maintenance of the park be maintained on an on-going basis. Given the relatively low barriers to entry due to land ownership and the presence of an existing management strategy, it is estimated that the project construction and implementation can be completed by year 3. It is recommended that a detailed phasing plan be developed during the detailed design of the project.

Project Phase	Y1	Y2	Y3	Y4	Y5
Planning and Design:					
Construction and Implementation					
Operation and Maintenance (on-going)					
Stakeholder Engagement and Community Participation					

The starting year will be dependent upon the prioritisation of the DM HFA Stage 1 projects to be undertaken by the Drakenstein Municipality.

D4.5. Institutional Capacity, Alignment and Resource Requirements: New Orleans Park Hybrid Flood Alleviation Project

Projects related to transformative adaptation and integrated planning are multi-disciplinary – requiring the buy-in and investment from a wide range of municipal and other stakeholders to achieve successful implementation and long-term project sustainability. The following table sets out the typical resources required during each phase of the project. This list is not exhaustive.

Part D Chapter 4 Table 4. Anticipated specialist inputs during the project lifecycle phases.

Resource	Typical Role	Planning and Design	Construction and Implementation	Operation and Maintenance
Project Manager (Professionally registered engineer/ Professionally registered urban planner / Professionally registered construction project manager	Oversee the delivery of the project, may require professionally registered engineer or urban planner (Detailed Design); Professionally Registered Engineer or Construction Project Manager (Construction and Implementation)			
Professionally Registered Environmental Impact Assessment Practitioner (EAP)	Undertake EIA or BA; coordination of relevant specialist studies; Undertake and oversee the WULA process.			
Environmental Control Officer (ECO)	An EAP may also be required for Environmental Compliance during construction and operation phases.			

Resource	Typical Role	Planning and Design	Construction and Implementation	Operation and Maintenance
Professionally Registered Geotechnical Engineer (ECSA)	Geotechnical investigations			
Professionally Registered Land Surveyor (SACG)	Conduct topographical survey			
Professionally Registered Town Planner (SACPLAN)	Oversee site design, provide urban planning specialist input, conduct the land use application, provide project management or support services to the project manager.			
Professional Registered Engineers (ECSA)	Detailed flood study (stormwater engineer); Roads Engineer (Traffic Impact Assessment			
GIS Specialist	Undertake mapping and spatial analysis			
Heritage Practitioner	Heritage Impact Assessment and associated studies			
Professionally Registered Landscape Architect	Visual Impact Assessment			
Ecologist	Terrestrial Biodiversity Impact Assessment; Freshwater Impact Assessment			
Ichthyologist	Specialist study in relation to fish			

Resource	Typical Role	Planning and Design	Construction and Implementation	Operation and Maintenance
Treatment Wetland Specialist	Provision of technical details of the design of treatment wetlands			
Botanist	Botanical Assessment			
Waste Management Specialist	Waste Management Impact Assessment			
Public Participation Professional	Mobilisation and community meetings. Excludes the engagements forming part of the EA or Land Use Application Process. Socio-economic Assessment can also be included.			

In addition to the requirements listed in Part D Chapter 4 Table 4, which will typically be supplied by specialists, the DM will require the internal institutional capacity to support the successful delivery of the project through its lifecycle phases. The recommendation is therefore that this team be formed on the basis of the Departments, Divisions, and Sections that formed part of the DM HFA Programme design. This will therefore include, but not be limited to, the following:

Part D Chapter 4 Table 5. Recommended Municipal representation and roles

Municipal Representation	Typical Role
Environmental Manager/ EAP	Programme Co-ordinator; Environmental Expertise, Guidance on Land Use Application
Roads and Stormwater Engineer	Municipal Project Manager, Rodas and Stormwater Division, Guidance on Land Use Application, Construction Project Management

Municipal Representation	Typical Role
Spatial Planner	Spatial planning inputs, Guidance on Land Use Application
Land Use Planner	Land Use Planning inputs, Guidance on Land Use Application
Supply Chain Management Practitioner	Support with Supply Chain related activities in the procurement of services and materials
Water and Sanitation Engineer	Provide inputs on water and sanitation related matters
Parks section representative	Guidance and support in relation to the establishment of public parks and sport facilities, input and oversight of operation and maintenance of planting and fields.
Solid Waste Management	Responsible for the planning and operation of a site-based solid waste management strategy
EPWP, Projects, Programmes and Funding	
Portfolio Councillors	
Ward Councillors and Committee Members	Support to mobilise the community.

Part D Chapter 4 Table 6. Suggested Stakeholders and Roles

Other stakeholders	Typical Role
Provincial Government	Competent Authority for relevant permitting and approvals

Other stakeholders	Typical Role
National Government	Department of Water and Strategy
NGOs	Intermediary Support

In order to achieve the mainstreaming and integration of this project, the following additional recommendations are offered:

- Programme Coordination role should be fulfilled by the Environmental Section;
- Project Management for each of the Stage 1 DM HFA Priority Project should be championed by Stormwater Management and be situated within the stormwater management plan.

The coordinator and Project Manager should also develop project specific operation plan to develop detailed roles and responsibilities for each of the identified stakeholders. The way forward should include:

- Adopting the DM HFA Programme as part of the Stormwater Master Plan
- Assigning the programme to a KPA 4 and PDO 23
- Development of a detailed Implementation Plan for each of the Stage 1 DM HFA Projects, and aligning the project with additional PDOs
- Development of a detailed Scheule of responsibilities per stakeholder at all stages of the project lifecycle
- Ensuring on-going community engagement and participatory planning

Alignment With Municipal Objectives:

The project aligns will all municipal objectives. It is particularly relevant to Strategic Objective 4, given the strong alignment with infrastructure provision.

Part D Chapter 4 Table 7. Project Alignment with Municipal Strategic Objectives

Municipal Strategic Objective	Alignment
To ensure good governance and compliance.	X
To ensure financial sustainability to meet statutory requirements.	X
To ensure an efficient and effective organisation supported by a competent and skilled workforce.	X
To provide and maintain the required physical infrastructure and to ensure sustainable and affordable services	X
To plan, promote investment and facilitate economic growth.	X
To facilitate, support and promote social and community development.	X

Key Performance Areas (KPAs) and Pre-Determined Objectives (PDOs)

KPAs refer to the areas within the business unit for which an individual or group is logically responsible. PDOs are the areas identified as important or crucial, where a result will assist in the achievement of the set objectives or goal (DM IDP, 2024:67).

It is recommended that this project be located within **KPA 4: Infrastructure and Services**, under **PDO 23: Transport, Roads, and Stormwater. This is directly aligned with the Strategic Objective *to provide and maintain the required physical infrastructure and to ensure sustainable and affordable services.***

D4.6. Cost Estimates: New Orleans Park Hybrid Flood Alleviation Project

This section provides cost estimates for the Upgrades to the Orleans Park. These estimates are based on the draft concepts and are indicative fees only. The construction and implementation costs are dependent on the outcomes of the Design and Planning process. The detailed costing of the Design and Planning process will be dependent upon the outcomes of the preapplication meeting and the requirements for feasibility studies, approvals and licences as set out by the relevant competent authorities. *It is important to note that a Quantity Surveyor / Cost Estimating Consultant should be appointed to determine more accurate Construction and Implementation Costs. This would take into account local and context specific considerations for the various items. As the engineering design development progresses, refined estimates can be prepared by the Quantity Surveyor / Cost Estimating Consultant.*

Part D Chapter 4 Table 8. Estimated project costing

NEW ORLEANS PARK COSTING		
Design and Planning Costs		
Item Description	**Estimated Cost (ZAR)**	**Comments (if any)**
Feasibility Study and Initial Assessments	2 439 751,60	
Detailed Engineering Designs and Tender Documentation	3 364 353,86	No complexity factor has been applied
Detailed Landscape Architectural Design and Tender Documentation	546 023,51	
Permitting and Regulatory Approvals	297 000,00	
Subtotal	**6 647 128,97**	

Construction and Implementation Costs

NEW ORLEANS PARK COSTING		
Item Description	**Estimated Cost (ZAR)**	**Comments (if any)**
Earthworks	12 006 000,00	1m imported fill over entire site area
Erosion protection	3 187 500,00	
Flood walls/dykes	-	
Culverts and outlets	3 000 000,00	
Hard Landscape works	1 241 250,00	Re-align circulation route, Timber boardwalk and birdhide or platform, Refurbish existing playground
Soft Landscape Works	7 715 250,00	Lawn river terrace, Meadow grasses/ perimeter berm
Riverine rehabilitation	6 089 600,00	Rehabilitate riverine areas, Terrestrial vegetation
Total (1)	33 239 600,00	
Site establishment	6 647 920,00	20% of Total (1)
Total (2)	39 887 520,00	
Professional fees	7 977 504,00	20% of Total (2)
Contingencies	7 977 504,00	20 %
Subtotal	**55 842 528,00**	

NEW ORLEANS PARK COSTING

Operation and Maintenance Costs

Item Description	Estimated Cost (ZAR)	Comments (if any)
Maintenance of Infrastructure (e.g., stormwater systems)	1 116 850,56	Recurring maintenance costs (Annual)
Maintenance of Nature-Based Solutions (e.g., replanting, erosion control)	360 000,00	Cost for the first year. The first year of maintenance would be the most intensive, thereafter (especially once 80% plant cover has been achieved) maintenance cost should reduce by one third.
Reporting and Evaluation	150 000,00	Annual reviews, audits
Subtotal	**1 626 850,56**	

Other Miscellaneous Costs

Item Description	Estimated Cost (ZAR)	Comments (if any)
Community Awareness, Skills Transfer and Education Campaigns	**350 000,00**	Detail of scope/cost to be defined at the discretion of the local authority
Subtotal	**350 000,00**	

Grand Total	64 466 507,53	

Total Estimated Cost (Summary)

TOTAL ESTIMATED COST (SUMMARY) – NEW ORLEANS PARK		
Cost Category	**Total Amount (ZAR)**	**CAPEX vs OPEX**
Planning and Design Cost	6 647 128,97	CAPEX
Construction and Implementation Costs	55 842 528,00	CAPEX
Operation and Maintenance Cost	1 626 850,56	OPEX
Miscellaneous Costs	**350 000,00**	CAPEX/OPEX
Grand Total	**64 466 507,53**	

Additional notes

The Design and Planning costs for the engineering design and tender documents can be split according to the ECSA guideline on Civil engineering projects (here): refer to Table 1 in the document.

Cost of the Works		**Basis of Fee Calculation**		**Total (Primary fee plus secondary fee)**
For projects up to R850 000		**Lump Sum or Time Basis**		
Where the cost of the works:		**Primary fee**	**Secondary fee**	
Exceeds	**But does not exceed**			
850 000	1 899 000	106 300	15%	
1 899 000	9 347 000	237 400	12%	
9 347 000	19 066 000	982 400	10.5%	
19 066 000	47 372 000	1 857 000	9.5%	
47 372 000	94 960 000	4 121 400	7%	
94 960 000	572 000 000	7 065 000	6.5%	
572 000 000		33 233 200	6%	

The portion of what is included in the design stage and what is included in the construction stage can be determined by using ECSA guidelines again (here) for civil engineering projects. These are as follows in terms of the engineering design split. Stage 1-4 could be classified as engineering design, and Stage 5 and 6 are the construction monitoring and close-out of the project.

Stage	Stage of Services Civil: Engineering Projects:	Typical percentage points for each stage
1	**Inception**	5
2	**Concept and Viability**	25
3	**Design Development**	25
4	**Documentation and Procurement**	25
5	**Contract Administration and Inspection**	15
6	**Close-Out**	5
		100%

D4.7. Job Creation Potential: New Orleans Park Hybrid Flood Alleviation Project

This section of the report provides an analysis of the Job Creation Potential for the Project.

The table shows the temporary and permanent jobs created by the project, temporary jobs are measured in job years, which are defined in the table, while permanent jobs are counted as jobs. An assessment is made of the jobs created as to how many constitute green jobs, in terms of the DFFE's definition. The table also provides an estimate of **direct jobs per skill level, as well as indirect and induced jobs,** for the given level of investment estimated**.** The job seekers are based on the Drakenstein Municipality's database of job seekers dated to October 2024.

Part D Chapter 4 Table 9. Job Creation Potential.

NEW ORLEANS PARK DM HFA PROJECT										
Site: New Orleans Park			**Total direct jobs**	**Direct Jobs per skill level** *Direct jobs are the extra jobs created in the delivery (design, construction/development) of an output and the operation of that output for the duration of its expected life. These direct jobs can be both temporary and permanent.*						**Estimated investment**
	Component	**Disciplines**		**Skilled (PSOC Level 3 and 4)**	**Semi-skilled (PSOC Level 2)**	**Low-skilled (PSOC level 1)**	**Green skilled**	**Green semi-skilled**	**Green low-skilled**	
Temporary *A temporary job means an employment opportunity created, for a limited time span, typically during the design and development of the infrastructure, project of program***.** **(Job years)** *A job-year is a measure of the proportion of time a job is created for. One*	Planning and design	Civil engineering (multiple disciplines), Landscape architects, Planner, EIA practitioner, Technical environmental specialists, Lawyer, Geotechnical engineer, Surveyor,	8	8	0	0	8	0	0	R6 647 128.97

NEW ORLEANS PARK DM HFA PROJECT										
job year means one job for one year.		Electrical engineer, Quantity surveyor								
Temporary (Job years)	Construction and implementation	Civil engineer, Landscape architect, Planner, Scientific specialist, OHSA officer, EC officer, Quantity surveyor, Site manager, Foreman, Site agent, Excavator operator, TLB Operator, Dump truck operator, Planter, Gabion basket maker, Carpenter, Security,	17	3	9	5	3	2	5	R55 842 528.00

NEW ORLEANS PARK DM HFA PROJECT										
		General worker								
Permanent *Means a full-time equivalent position which endures beyond the development phase of the intervention, through the expected useful life of the infrastructure, plan or program.*	Maintenance and miscellaneous	Foreman, Mower operators, Planters, Driver, General worker	2	0	1	1	0	1	1	R1 976 850.56
Total			27	11	10	6	11	3	6	R64 466 507.53
Jobseekers in ward			218							
Jobseekers in ward and adjacent ward			218							
Indirect jobs *Indirect jobs are the jobs created to supply inputs into the output creation to provide inputs that the project requires.*			113							
Induced jobs *Induced jobs are the jobs created in all sectors by the increase in household spending created by the wages paid in the direct jobs and indirect jobs created, following the initial increase in demand in the given sector.*			184							
Discussion	• The proposed intervention at New Orleans Park will likely create an estimated 25 job years in the design and construction phase and an estimated 2 permanent jobs in maintenance. In the design phase the eight temporary job-years created will nearly all be highly skilled jobs in professional									

NEW ORLEANS PARK DM HFA PROJECT	
	firms (Engineering, Landscape Architecture, Planning, Scientific Services). All these will be green jobs. In the construction phase, the 17 job years created will include three highly skilled job-years, nine semi-skilled job years and 5 low-skilled job-years. All of these will be green jobs except seven semi-skilled jobs, consisting of guards for 24-hour site security. All maintenance jobs are green jobs. Other semi-skilled jobs will be excavator operators, TLB operators, dump truck operators, planter, gabion basket makers and carpenters. • There is a smaller job seekers database for the ward (22) than in other wards with only about 218 job seekers, however the low skilled jobs could be sourced entirely from the ward or adjacent wards, with the potential to upskill these workers into the roles of security guard, planter and gabion basket maker and carpenters. • The level of investment estimated in the planning, design, and construction phase of this project will create approximately 113 indirect jobs in the national economy, from the supply of inputs required for the project. Estimated expenditure is expected to induce 184 jobs in the economy as project workers spend their wages. Many of these will be in Drakenstein if local suppliers are used. • It is estimated that this investment will yield 1.68 times the initial amount in income for the national economy amounting to an income contribution of about R107 million. Upgrading this site increase the potential to raise the value of the surrounding properties and attract further investment in the area. • This infrastructure does not fall under any of the trading services departments and is therefore not a direct revenue generator. Some elements may have access or hire charges (such as braai facilities). Some maintenance and rehabilitation costs for infrastructure will be reduced.

D4.8. Barriers and Risks: New Orleans Park Hybrid Flood Alleviation Project

The following register summarises the risks identified across the various phases of the project. The risks and mitigation measures should be refined as part of further design phases.

Part D Chapter 4 Table 10. Barriers and Risks.

Phase of project lifecycle	Risk	Mitigation Measures
Planning and Design	**Community:** Lack of community buy-in and support.	• Community participation during all phases of the project. • Consideration of the development of social compact.
Planning and Design	During a previous disaster, households were relocated to this site, and 5 households remain on the site, which may pose a project risk.	• An eviction order has been issued to the families; however, this is being challenged in the courts by the South African Human Rights Commission. • Planning the intervention excluding the section occupied by the 5 households.
Planning and Design	**Political:** Political acceptance	• Regular reporting to the political steering committee.
Planning and Design	**Institutional:** Lack of transversal collaboration.	• Defining roles within each department for undertaking the project, and development Key Performance Indicators (KPIs) to create accountability for these responsibilities. • Development of Standard Operating Procedures (SOPs) for each of the relevant department to provide a clear overview of their roles and responsibilities.
Construction and Implementation	Cutting down of trees to construct the intervention.	• Replant trees in area where it is suitable.

Phase of project lifecycle	Risk	Mitigation Measures
Operation and Maintenance	Negative influence on the conservation area when people visit as people might walk across the conservation area.	• Limited access to the conservation area through the development of dedicated footpaths and information boards explaining the importance of the conservation area.
Operation and Maintenance	Maintenance of the conservation area.	• Partnerships with universities, Cape Nature and private organisations to maintain the conservation area. • The site can be declared as a stewardship site. • Involvement of schools in conservation activities. • Involvement of community organisations such as 'Friends of the Park' to contribute to maintaining the area.
Operation and Maintenance	Safety and Security: Community members may not feel safe at the site.	• Ensuring the presence of law enforcement at the site. • Patrols at the site to be undertaken by law enforcement officers. • Mobilising community/ neighbourhood watches at the site. • Access control to the park.
Operation and Maintenance	Safety and security: Potential risk of drowning.	• Ensuring adequate lighting. • Ensuring the presence of law enforcement at the site. • Mobilising community/ neighbourhood watches at the site. • Patrols at the site to be undertaken by law enforcement officers.
Funding	Cost of implementation and ongoing maintenance.	• Integration of the project into the Service Delivery and Budget Implementation Plan (SDBIP) to receive priority funding allocation and increased visibility to potential funders. • Integration of the project into the IDP.

Reference List

AIVIA. 2024. Drakenstein Municipality Hybrid Flood Alleviation Programme - Community Flood Risk Perception Study Report (Phase 2).

AIVIA. 2024. Drakenstein Municipality Hybrid Flood Alleviation Programme - Ecological, Infrastructure and Infrastructure Assessment.

AIVIA. 2024. Drakenstein Municipality Hybrid Flood Alleviation Programme - Flood Risk Assessment.

AIVIA. 2024. Drakenstein Municipality Hybrid Flood Alleviation Programme – PCSWMM Modelling.

AIVIA. 2024. Drakenstein Municipality Hybrid Flood Alleviation Programme – Site Visit.

Department of Human Settlements. 2019. The Neighbourhood Planning and Design Guide.

Drakenstein Municipality – Lindsay Lewis (24 October 2024), Email to A-aishah Modack.

Jongman, B., Osmanoglou, D., Van Zanten, B.T., Gonzalez Reguero, B., Macfarlane, D.M., Duma, L.J., Carrion, S.A. and Rubinyi, S.L. 2021. A Catalogue of Nature-based Solutions for Urban Resilience.

Kotze, D., Macfarlane, D., Edwards, R., Mander, M., Collins, N., Texeira-Leite, A., Lagesse, J., Pringle, C., Marneweck, G., Batchelor, A. and Lindley, D. 2020. WET-EcoServices (Version 2). *A technique for rapidly* assessing *ecosystem services supplied by wetlands and riparian areas.*

Macfarlane, D.M., Ollis, D.J., and Kotze, D.C. 2020. WET-Health Version 2.0: A refined suite of tools for assessing the present ecological state of wetland ecosystems- technical guide. Water Research Commission. Report No. TT820/20.

Republic of South Africa. 2021. National Strategic Framework on Universal Design and Access.

World Bank. 2021. Urban Flood Risk Management: A Tool for Urban Planning and Design.