

Isiolo Sponge City – Request for funding

April 2023



This concept note focuses on promoting sustainable, climate-resilient infrastructure in Isiolo municipality that addresses flooding, heat stress and environmental degradation through the implementation of the Isiolo Sponge City. This concept note has been prepared by MetaMeta in collaboration with Open Capital under the Sustainable Urban Economic Development (SUED) Program

TABLE OF CONTENTS

Isiolo Sponge City – Request for funding	Error! Bookmark not defined.
Abbreviations and Acronyms.....	3
Isiolo Sponge City– Request for funding.....	4
A. Overview	4
B. Project Context	6
C. Project Description	9
D. Project finance	13
E. Project Sustainability	15
F. Project Impact	20
G. Risk analysis	21
Appendix 1: Location and design of project components	31
Package 2: Upstream areas	31
Typical infiltration trench design	31
Package 3: Isiolo city	33
Typical infiltration trench design	33
Merire river training.....	34
Proposed design for the initial section.....	34
Isiolo bio-park and demonstration farm	35
Appendix 2: Sources of floodwater and direction of flow	37
Appendix 4: Path of floodwater affecting Isiolo city	38
Appendix 5: Floodwater along Airport Road	39
Appendix 6: Floodwater emanating from Muriri - Miciimikuru road	40

Abbreviations and Acronyms

ASAL	Arid and Semi-Arid Land
CAPEX	Capital expenditure
CBD	Central Business District
CFA	Community Forest Association
CIDP	County Integrated Development Plan
EMU SACCO	Ewaso Maji User Savings and Credit Cooperative
EBA	Ecosystem-Based Approach
EMU SACCO	Ewaso Maji User Savings and Credit Cooperative
ENNDA	Ewaso Ng'iro North River Basin Development Authority
IWASCO	Isiolo Water and Sewerage Company
JICA	Japan International Cooperation Agency
KeNHA	Kenya National Highways Authority
KeRRA	Kenya Rural Roads Authority
KURA	Kenya Urban Roads Authority
NEMA	National Environment Management Authority
O&M	Operation and maintenance
PWD	People with Disability
SuDS	Sustainable Drainage Systems
SUED	Sustainable Urban Economic Development programme
UEP	Urban Economic Plan
UNEP	United Nations Environment Program
WRA	Water Resources Authority
WRUA	Water Resource Users Association

Isiolo Sponge City– Request for funding

A. Overview

Isiolo town experiences annual floods due to its topography, urban planning issues, and population pressure on the existing drainage systems. The flood water originates from its rural watershed area (Mt. Kenya and Meru County) and impervious surfaces within the urban area. At the same time, Isiolo suffers from recurrent droughts, which have devastating effects on livelihoods¹.

Climate change is increasing the frequency, intensity and damage of both droughts and floods. The town and its watershed are less capable of absorbing excess water due to uncontrolled water management, lack of green areas, and land degradation in the rural hinterland. The lack of urban green spaces not only deprives the city of water buffering opportunities, but also exposes citizens to soaring temperatures without any relief from the heat island effect. Furthermore, Isiolo town's current population of 80,000 residents is projected to almost double to 159,770 by 2030.¹ The anticipated population growth will further exacerbate the pressure on the outdated urban infrastructure, and economical and social losses are expected to grow.

Isiolo is in a strategic position at the crossing of two key highways; the A2 and B9 connecting the country to the Horn of Africa and linking the northern counties to Nairobi. It is also the centre of the "Lamu Port-South Sudan-Ethiopia Transport Corridor" (LAPPSET). Isiolo's strategic position and economic potential are also recognized in Kenya Vision 2030 and the Isiolo County Integrated Development Plan (CIPD). Thus, the development and protection of Isiolo's infrastructure go well beyond the municipality and are a critical priority to national economic interests.

Isiolo municipality has worked with the Sustainable Urban Economic Development (SUED) Program over the last two years to develop a comprehensive Sponge City project and address these challenges.

Turning Isiolo in a Sponge city is an innovative and practical way for Isiolo to keep up with the rising demand of water, and the need to protect people and assets from flooding. Sponge cities focus on sustainable and functional water management in an urban and peri-urban setting. It is a city that can 'hold, clean and drain water in a natural way'. This is done by combining landscape-based and water buffering methods, implementing innovative technologies such as water-filled barriers, engaging partners and communities to work together on making their city a nicer place to live. To achieve this, a project needs to focus on the Urban areas, but also on the rural areas that are hydrologically linked to it.

While the flooding challenge largely affects Isiolo town, floodwater originates from the Mount Kenya region and rural areas in Meru County. The Isiolo Sponge City project therefore identifies critical investments in Isiolo and Meru counties that are required to address the flooding issue, improve water availability, safeguard lives and livelihoods, mitigate the effects of climate change, and create income-generating opportunities.

As such, the proposed Sponge City project includes four funding opportunities (intervention packages):

1. **Package 1:** Detailed studies to understand how Isiolo town and its watershed will become a sponge city. The studies include hydrological investigations, technical designs, socio-economic investigations, delineation of an intervention portfolio to be implemented under package 2, 3 and 4.
2. **Package 2:** Interventions that address flooding and drought throughout the rural watershed that from Isiolo town reaches the foothill of Mt Kenya. This package includes landscape wide interventions, that need concerted efforts by all stakeholders, a change in farming practices and a shift in infrastructure design processes (e.g. road drainage, watershed interventions). This package furthermore includes the implementation of a water-filled barrier technology to prevent damage from floods as well as harness flood- / rainwater.
3. **Package 3:** Improvement of Isiolo town infrastructures to better handle flooding and drought events. It entails (Green-Gray) infrastructural improvements stretching beyond what is achievable by individual citizens (e.g. stormwater drainage, dams / barriers, sponge park, riverbed training). These interventions need close cooperation with responsible institutions.
4. **Package 4:** Establish a cross-county financing mechanism with Ewaso Maji User Savings and Credit Cooperative (EMU SACCO) to finance identified grassroots interventions. Through a revolving fund, this mechanism will enable individual citizens and small groups to access financing for small scale water

¹ County Government of Isiolo. (2018). Isiolo County Integrated Development Plan, CIPD 2018-2022

harvesting and sustainable farming interventions in Isiolo town and in its rural watershed (e.g. roofwater harvesting, pond lining, drip irrigation).

With this concept note the consortium aims to secure funding for the implementation of the Isiolo Sponge town project over a period of three years. The estimated budget to cover all intervention packages is 870 million Kenyan Shillings and is put forth by MetaMeta, Isiolo municipality, and the Sustainable Urban Economic Development (SUED) Programme. The consortium seeks to involve a variety of actors willing to engage and fund one or more intervention packages.

The Develop2Build (D2B) programme has been identified as a suitable project development partner based on its objective to provide technical assistance (incl. funding feasibility and other relevant studies) during the development phase of public infrastructure projects. We believe that the proposed feasibility study (intervention package 1), with a funding request of around EUR 0.6 million (KES 88 million), to be of most interest to the programme. Additional partners are sought to cover the remaining components.

The following sections provide further details on:

- i) the project context;
- ii) the project description;
- iii) the high-level assessment of the project costs and sustainability and;
- iv) the project's expected impact.

B. Project Context

Isiolo town is very susceptible to the effect of climate change, resulting in recurring floods, which effects have gotten worse over the last decades. In 1982 significant floods destroyed the Food and Agriculture Organisation (FAO) Irrigation Schemes.² In 2005 and 2006, floods displaced 500 people and caused the deaths of 10 and 8 people, respectively. Between 2009 and 2019, floods led to the displacement of over 1,320 households and destroyed property worth KES 800 million.^{3,4} At the same time Isiolo is particularly vulnerable to droughts as shown by the monthly bulletin released by the National Drought Management Authority⁵ and by the County Development Plan². Both flooding and drought are triggered by unpredictable rainfall events, with extended dry spells, followed by intense storms.

These challenges have been confirmed by Isiolo municipality, Isiolo and Meru Counties, and other stakeholders such as the Water Resources Authority (WRA), the Water Resources Users Association (WRUA), Isiolo Water and Sewerage Company (IWASCO) and National Environment Management Authority (NEMA) during multiple site visits and consultations undertaken by SUED in 2020, 2021 and 2022.

Isiolo Town, is located at the receiving end of a watershed that stretches through Meru, reaches Mt. Kenya and covers more than 160 km² (left map, Figure 1). As a result, runoff water, particularly destructive during intense storms, is not only generated within the city limits, but is instead also flowing from upstream rural areas. Some portions of the watershed (critical sub-watersheds, Figure 1), are expected to be particularly critical to the generation of runoff that causes recurrent flooding in the city. The water runoff generated across the watershed during heavy rainfall events is too large to be adequately handled by the existing drainage system (see Figure 3 and Figure 5).

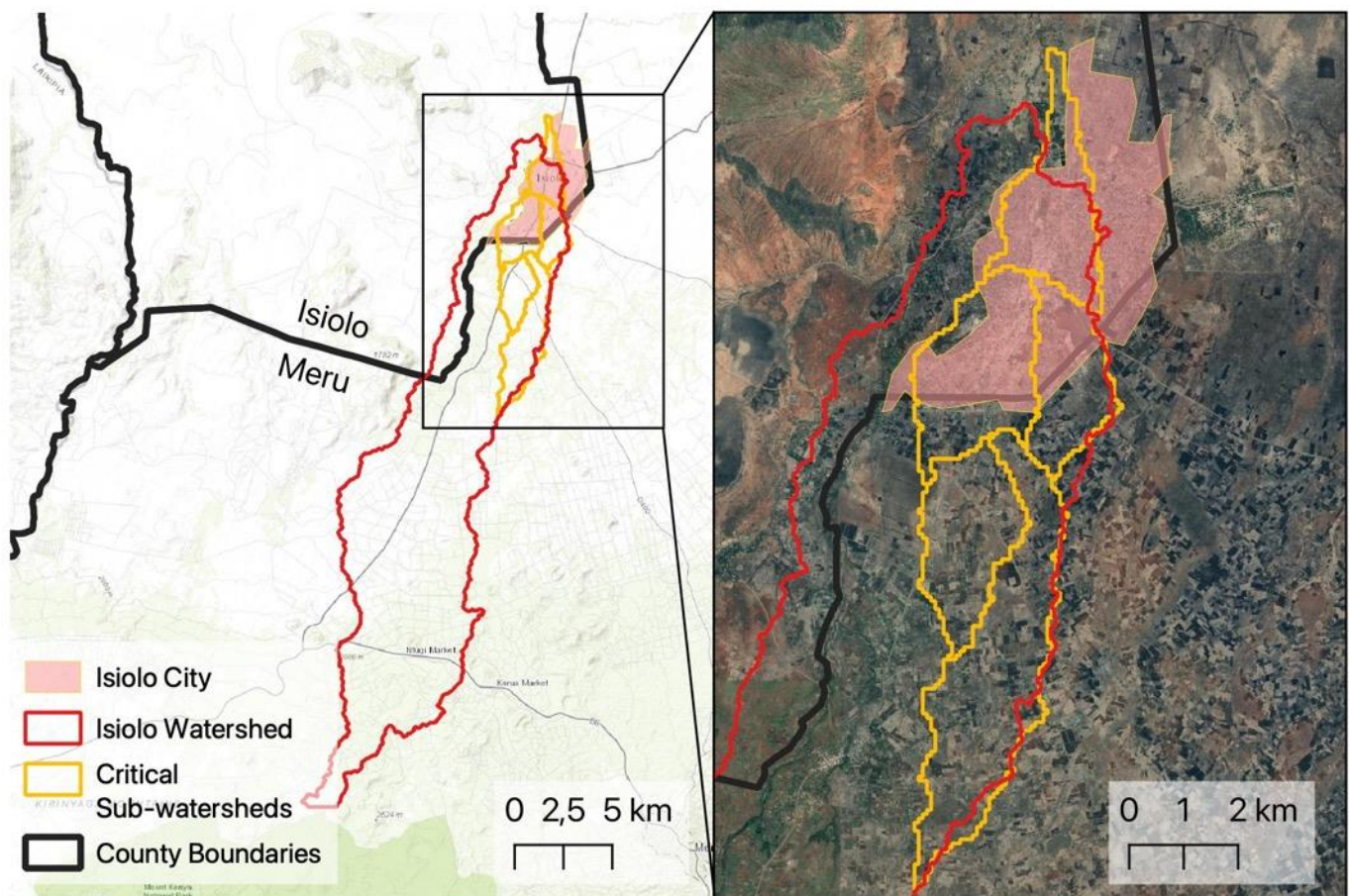


Figure 1: Isiolo city watershed (red) and critical sub-watersheds (yellow)

² County Government of Isiolo. (2018). Isiolo County Integrated Development Plan, CIDP 2018-2022

³ Japan International Cooperation Agency (JICA). (2014). Isiolo River Basin Flood Management Plan

⁴ OCHA Services Reliefweb. (2019). State distributes relief food to flood victims in Isiolo. Retrieved from <https://reliefweb.int/report/kenya>

⁵ <https://www.ndma.go.ke/index.php/resource-center/category/15-isiolo?start=0>

Isiolo's urban area has grown rapidly in recent years. The town's built-up area grew from 7.5 km² in 2004 to 16.3 km² in 2020 (see Figure 2) and is set to grow at a similar pace in the coming years⁶. This growth dynamic, and the lack of adequate infrastructure and green space will worsen the impact of floods in Isiolo.

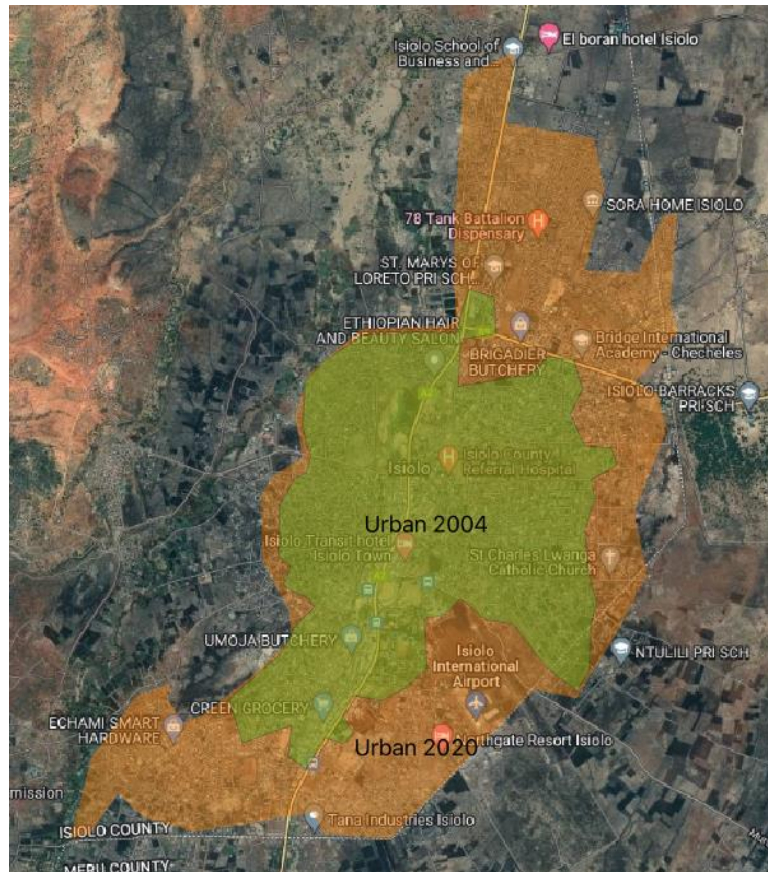


Figure 2: Urban area expansion



Figure 3: Flood situation in Isiolo town during the Oct-Dec 2021 rainy season

Communities in the upstream areas are also affected by stormwater. As a result of farming practices and poor vegetation cover, the soil is degrading at an alarming pace. It is not capable of absorbing water during heavy storms, and larger runoff volumes are generated. The runoff water erodes fertile topsoil and transports it downstream, clogging the town drainage system. This can be easily witnessed by looking at silt deposits on the land surface, silted drains, and in the Merire River bed (see Figure 4). As a result, farmers in upstream communities are experiencing lower soil fertility and farm productivity.

⁶ County Government of Isiolo. (2018). Isiolo County Integrated Development Plan, CIDP 2018-2022



Figure 4: Silt carried by floodwater blocking drainage channels



Figure 5: Floodwater crossing Airport Road

There is a clear opportunity for Isiolo town and communities living in the Ewaso Ngi'ro River Basin to proactively address these challenges and make Isiolo a resilient sponge city.

Isiolo Municipality recognizes the importance of an integrated approach to stormwater management spanning short-term and long-term solutions in both downstream and upstream watershed areas. The municipality has therefore engaged different stakeholders to assist with the development of the sponge city and flood control measures, including:

- In 2020, Isiolo Municipality worked with the World Bank, ENNDA and JICA to develop stormwater management designs, but are yet to implement these designs due to insufficient financing
- In 2021, SUED supported the development of a detailed pre-feasibility study building on previous stormwater management designs and focused on operationalizing the project
- Isiolo County has held informal discussions with Meru County on comprehensively addressing the flooding through upstream interventions in Meru County. This joint approach is supported in principle by WRA. WRA oversees cross-border water management in both counties
- Meru County identified land degradation as a challenge in the Meru County Integrated Development Plan (CIDP), 2018-2022 and highlighted the need to conserve topsoil to boost soil fertility and, therefore agricultural productivity

The Isiolo Sponge City project thus presents an opportunity to fund the holistic implementation of the municipality's urban development plan while creating opportunities for upstream communities.

C. Project Description

The proposed Isiolo Sponge City project is structured in four intervention packages. Package 1 calls for further technical studies to inform the final design of the project. Packages 2, 3 and 4 detail the proposed interventions and can be implemented in a phased or parallel approach as detailed below:

Package 1 – Technical studies and stakeholders' engagement

This package is key to better define the interventions in package 2, 3 and 4 for Meru and Isiolo Counties. It entails building a deep understanding of the intervention areas (urban and rural), refining technical designs, identifying small scale sponge city opportunities and linked funding mechanisms. The detailed studies will be coupled with in depth community engagement to ensure that interventions are aligned with communities' needs and aspirations.

Detailed studies and stakeholder outreach activities under this component include:

- Stakeholder mapping and partner identification;
- Community engagement through convenings, workshops and grassroots barazas;
- Data collection to support hydrological studies;
- Topographic and hydrological studies to understand surface runoff flows and upstream/downstream interactions;
- Adaptation benefits analyses to assess the anticipated impact of interventions;
- Identification of measures to buffer peak runoff in upstream rural areas;
- GIS mapping of the watershed to identify land-use patterns and areas of landscape degradation;
- Environmental and Social Impact Studies (ESIA) for all the interventions outlined in the intervention package in the upstream and urban areas;
- Detailed design of the training of the Merire River;
- Detailed design of the proposed drainage system improvements;
- Detailed design of water-filled barriers to prevent floods and harness flood- / rainwater;
- Detailed design of the proposed sponge park, development of the business model and operational plan for Isiolo Municipality;
- Identification of measures for individual household uptake to be funded through EMU SACCO (package 4).

Package 2 – Upstream interventions

This package addresses the watershed that from Isiolo city stretches across Meru County, all the way to Mt Kenya. The interventions are focused on an area of more than 160 km² and require leveraging existing mechanisms (e.g. WRMAs, Road authorities, conservancies etc) and stimulate farming practices that improves water retention while curbing damaging runoff generation. The envisioned activities in this package are:

- Work with community groups to implement greening and sustainable farming activities including:
 - Support residents to undertake landscape restoration to remedy land degradation caused by floods, soil erosion and unsustainable farming practices through the construction of nature-based solutions including semi-circular bunds, infiltration trenches, bio-gullies, and road runoff harvesting;
 - Promotion of agroforestry, in collaboration with KFS and CFAs, through the plantation of trees with the potential to generate revenue for farmers and community groups (e.g. fruit trees, bamboo, vetiver grass, and *melia volkensii*);
 - Strengthening extension services to promote sustainable farming methods such as conservation agriculture and soil and water conservation;
 - Controlling water availability through the implementation of water-filled barriers;
 - Establish tree nurseries and identify a viable business model to support them;
 - Bio-gully control using vetiver grass;
 - Semi-circular bunds for landscape restoration and water infiltration;
 - On-farm water harvesting -on farm ponds/water pans.
- In high risk areas, identified in package 1, implement landscape restoration through the construction of measures such as infiltration trenches and retention ponds;
- Establish collaborations with existing institutions (e.g. WRMA, road authorities, conservancies), initiatives (development programs) to ensure complementarity and avoid overlaps. Under this activity we envision:

- Work with road authorities to ensure that roads are designed/implemented in a way that ensures safe water retention and reduction of damaging stormwater flows;
- Provide technical support to WRMAs in maximizing the buffering capacity of the watersheds under their mandate;
- Provide technical support to NGOs', conservancies and governmental institutions on watershed planning, water harvesting and landscape greening.

Package 3 – Isiolo Urban area interventions

This package addresses the urban areas of Isiolo city and includes both mitigating and adaptive measures to create a resilient sponge city. These interventions aim to safely channel the amount of water runoff flowing through Isiolo and to increase its water storage and conservation capacity. This package includes:

- Training of 6 Km long stretch of the Merire River. This intervention aims to ensure that stormwater is contained and safely channelled away from the city centre. Training the Merire River will include:
 - Strengthening of riverbanks with mesh-wire gabions;
 - Excavating soil to deepen the river channel;
 - Regreening the riverbed by planting trees and other vegetation, such as bamboo and vetiver grass;
 - Creating recreational spaces and facilities along the riverbank;
 - Community sensitization and participation in the implementation of the activity, including training groups on the economic value of the planted species to create attractive opportunities.
- Upgrading the stormwater drainage system in Isiolo city:
 - Sensitization and outreach to community members living or working near the affected drainage channels;
 - Construction of drainage channels for urban roads managed by KeNHA, KURA and KeRRA;
 - Rehabilitation of drainage channels and implementation of two new culverts on the A2 road, managed by KeNHA;
 - Promoting soak pits, bioswales and rain gardens- Bioswales can hold a lot of runoff water which later is released slowly to the environment.
- Implementation of a flood and drought resilience system centred around water-filled barrier:
 - Field visits and consultations with stakeholder groups to comprehend the water system and how best to implement water-filled barriers to support the water system in reducing floods and harnessing water;
 - Development of the water-filled barrier system in accordance with the agreed specifications;
 - Design process on how and when to deploy water-filled barriers supported by IT-solutions such as an Early Warning System (EWS);
 - Training of people and institutions on how to respond to flood and drought events using the water-filled barrier system.
- Setting up a sponge park within Isiolo municipality in line with the CIPD and UEP. The sponge-park is a green area (bio-park) designed to allow storage of stormwater during the rainy season, and it will be used as a public recreation ground for the residents of Isiolo and visitors. Isiolo county government envisions to provide the site as an in-kind contribution to the project. Activities under this component include:
 - Grading, decking, landscaping, and construction of pavements to create a comfortable environment and alleviate the heat island effect;
 - Encouraging attenuation of floodwater by constructing swales and infiltration structures. The water can then be productively used in the bio-park;
 - Utilising a section of the bio-park to demonstrate innovative farming techniques;
 - Supporting sustainable regreening efforts throughout the municipality through the establishment of a plant nurseries;
 - Sinking boreholes to support agricultural activities during the dry season;
 - Sinking borehole to supplement water supply and to act as recharge zones for Isiolo municipality.
- Promote and construct water soaking structures such as:
 - Bio-swales to strategically placed across town, to adsorb excess stormwater;
 - Rain gardens and regreened neighbourhoods to increase water retention (including water harvesting for tree growing).

Package 4: Financing citizens' initiatives

This package includes the funding mechanism to finance the implementation of water buffering measures by citizens of Isiolo city and individual farmers in the rural watershed (Isiolo and Meru Counties) through a revolving fund. The fund will stimulate the uptake of single-household or small group interventions, identified as suitable through the technical studies (package 1).

Activities under this component include:

- a) Supporting EMU SACCO to structure and establish a revolving fund, including the development of financial products incentivising the uptake of water storage and infiltration measures and assets as identified by the feasibility study (package 1).
- b) Work with EMU SACCO and other stakeholders to:
 - i. Advertise the funding mechanism to communities to stimulate the purchase of systems such as rooftop water harvesting tanks, pond liners, drip kits, and other assets relevant to increasing water harvesting and conservation;
 - ii. Provide technical support to SACCO members on the maintenance of the water harvesting and conservation products and commercial farming activities;
 - iii. Improve market access for farmers adopting conservation measures.

Project organisation and implementation

The project implementation will be coordinated by MetaMeta, who has a long track record managing multi-stakeholder projects in water management, landscape rehabilitation, flood-based livelihoods, regenerative agriculture, and urban water resilience. MetaMeta is currently undertaking similar projects in Kitui, Nakuru, and Kajiado counties and will draw on its extensive local and international experience to guide the project.

In addition to the MetaMeta Nairobi Office, a project field office will be set up in Isiolo to ensure that activities are codeveloped and jointly implemented with local authorities.

The implementation of the project will require a different set of skills, resources, and expertise. With this understanding, the proposed consortium includes several organizations and institutions.

Included below are the thematic roles for each identified partner:

- MetaMeta – Implementation oversight, landscape restoration, water management, community sensitization and extension services
- EMU SACCO – Management of the revolving fund and disbursement of funds to members of the SACCO for water harvesting features. Technical assistance in the installation and maintenance of water harvesting and irrigation
- Kenya Forestry Service (KFS): Technical support and oversight of agroforestry extension services proposed for the upstream areas
- Community Forest Associations (CFAs): oversee grassroots project implementation. In addition, Community Environmental volunteers will be identified to champion environmental restoration and conservation within their respective communities
- Water Resource Authority (WRA): Oversight of water management across the entire watershed area in Isiolo and Meru Counties. Provide technical input on project designs for the training of the Merire River.
- Ewaso Ngi'ro River Basin WRUAs – Potentially work with land management entities on community outreach and sensitization. Provide additional community support in training the Merire River by first demarcating and beaconing the riparian land and sensitizing the community not to encroach on it. In Meru, the WRUA could work to promote household water harvesting (farm ponds) for irrigation of high-value crops
- Isiolo municipality government – Oversight of the Isiolo city bio-park together with key community groups. The government will ensure the upkeep of the bio-park and training facilities and will explore the possibility of charging a small entrance fee for maintenance and upkeep
- KeNHA – Funding of drainage channels and oversight of the design, construction, and maintenance of these elements on the roads managed by the authority

- KURA - Oversight of the design, construction, and maintenance of drainage channels on the roads managed by the authority
- KeRRA - Oversight of the design, construction, and maintenance of drainage channels on the roads managed by the authority.
- Vitens Evides International (VEI) B.V -work closely with water service providers and utilities through knowledge and skills sharing to make the utilities stronger, healthier, and more resilient . utilities stronger, healthier, and more resilient, stakeholder mapping and mobilization and technical backstopping and support.
- Open Capital Access- Funds mobilization and business cases development.
- Zephyr Consulting – Implementation of projects in the water sector, expertise with regards to design and implementation of flood and drought resilient adaptation measures including analyses using hydrodynamic modelling software.

Project finance

Implementers, funders, and asset owners

With OCA's support, MetaMeta and SUED are engaging potential funders for financing amounting to KES 830 million. The allocation of funds across intervention packages is: KES ~88 million to facilitate technical studies in Package 1 including detailed designs and stakeholder sensitisation, KES ~158 million for the implementation of Package 2, KES ~490 million for Package 3, KES 85 million for Package 4. The project will be coordinated from a local office, which will require funding for an estimated KES 7,5 million.

The proposed activities have a combined CAPEX cost of KES 648 million and ongoing annual operation and maintenance costs of KES 39 million. Isiolo county government and implementing government organisations have already indicated their willingness to cover part of the project costs by covering O&M and in-kind contributions. Another contribution is likely to come from the Kenyan road authority KeNHA. The cost of the 3 packages is summarised in the table below including relevant annual maintenance costs and asset owners and implementors.

Table 1: Project cost summary

Package	Activity	Amount (KES)	Amount (Euro)
Package 1: Technical studies	Technical studies and detailed intervention designs	81.000.000	565.600
	Stakeholder sensitisation to understand community needs and gain buy-in	7.300.000	50.000
	Subtotal	88.300.000	615.600
Package 2: Upstream areas	Landscape restoration through construction of infiltration trenches, regreening, gully treatment, agroforestry, soil erosion control, water pans	146.000.000	1.168.000
	Contingencies	12.500.000	100.000
	Subtotal	158.500.000	1.268.000
Package 3: Isiolo city	Upgrading of culverts and drainage in Isiolo	176.000.000	1.408.000
	Merire River training and regreening activities	120.000.000	960.000
	Development of spongepark (bio-park)	106.000.000	848.000
	Develop and operationalize 4 boreholes	20.000.000	160.000
	Soak pits, bioswales and rain gardens	24.000.000	192.000
	Contingencies	44.600.000	356.800
	Subtotal	490.600.000	3.924.800
Package 4: Financing citizens' initiatives	Establishment of revolving fund with EMU SACCO to fund water harvesting and conservation products incl. ponds, tanks, and irrigation systems	80.000.000	640.000
	Technical support to EMU Sacco	5.000.000	40.000
	Subtotal	85.000.000	680.000
General costs	Office establishment in Isiolo	7.500.000	60.000
	Subtotal	7.500.000	60.000
TOTAL			

	829.900.000	6.548.400
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D. Project Sustainability

This section looks at the sustainability of our sponge city initiative and its ability to continue independently in the long term. The proposed Isiolo Sponge City project is an important priority for both Isiolo and Meru counties. Isiolo county has identified the interventions as a priority in addressing flooding in the city caused by poor drainage infrastructure and increased rainfall intensity due to climate change. This is echoed by the administration in Meru County, whose community is affected by floods occurring in the upper watershed area, and who see this as a valuable project to prevent loss of lives and livelihoods in the region and improve agricultural productivity for local communities. In Isiolo, the project is aligned with the objectives of the Urban Economic Plan (UEP) and the various drainage plans developed by Isiolo in conjunction with development partners. In Meru County, this project reflects key initiatives of the Integrated Development Plan (CIDP) 2018-2022 that seeks to boost agricultural productivity and address climate change while implementing solutions to reduce the erosion of nutrient-rich soil, improve the vegetation cover and increase the infiltration of water to reduce downstream flooding.

To ensure the communities and urban/peri-urban residents will feel the positive long-term effects after the project ends, environmental, technological, institutional, social and cultural and financial sustainability aspects have been considered-

Environmental Sustainability

One of the root causes why Isiolo Sponge City is needed are the negative environmental impacts due to climate change, drought and flooding. Sponge City is fully geared to counter this negative impact and turn it around into opportunities for citizens to thrive in a safe, sustainable and secure city, see below.

Measure	(Climate) impact
Rain and roof water harvesting	Sustaining natural resources and preventing loss of land through erosion. Reduced flooding Increases water availability at household level. Decreased depletion of the water resources
Investment in sustainable technologies through the EMU-SACCO	Increased supply of green technologies such as water harvesting tanks Increased income generation and creation of more green jobs
Groundwater/ wellfield recharge	Increased ground water recharge Reduced flooding Reduced depletion of water resources
Regreening (trees, shrubs, grasses), bio-swales and soak pits , Permeable roads and walkways ('Green roads and green walkways')	Cooling down of city-heat Reduced air pollution from moto-vehicles Soaking more water- reduced flooding
Urban farming	Increased green areas and beautification Less solid waste disposed to the environment Boost in food supply within the city Productive reuse of biodegradable household waste and waste water
Rehabilitating degraded lands through upstream interventions	Reduced land and water pollution within the city Reduced flooding

Sponge city is the embodiment of 3R (Retention, Recharge, Reuse) measures in the context of a city, aiming to secure the water base, reduce flooding, improve public health and create a more attractive urban environment for people and business).

W package 2 will incorporate a community-driven management approach. Before implementation, the community will be engaged through participatory mapping exercises to identify the main challenges, propose solutions, and augment project ownership⁷. Gaining community support and buy-in through community sensitization efforts will also help to ensure that projects are sustainable in the long term. The project partners will work with EMU SACCO and their network of technicians to provide technical assistance on water harvesting and conservation activities. In addition, the project will partner with entities such as Kenya Forestry Service (KFS), WRA, WRUAs etc., to provide expertise and extension services to residents living within the watershed area through Training of Trainer programs to ensure

⁷ A mapathon is a community-driven mapping exercises where residents are invited to propose improvements to their local area

project sustainability. In addition, an effort will be made to generate revenue from the greening project by selecting plant species with commercial value, therefore, improving the livelihoods of individual community members while improving the ecosystem. The feasibility studies to be done under package 1 will help determine which environmental friendly Initiatives are well suited in the project area and any associated impacts/needed actions.

We will adopt 3R in the activities set for implementation. The environment and the residents will benefit from these interventions either directly or indirectly. The interventions are envisioned to (i) Improve the water quality and quantity in the city; (ii) contribute to the restoration of degraded/abandoned landscapes and water sources, while increasing economic goods and services such as urban farming through the utilization of the harvested stormwater; (iii) increase urban community awareness on environmental issues such as climate change and waste management and their well being.



Figure 6: Examples of Bio-swales for water infiltration and beatification



Figure 7: examples of permeable paving

Technological sustainability

The design of the Isiolo Sponge City project is intended to be comprehensive to ensure that the drainage infrastructure incorporated into the A2, and urban roads will continue to be functional in the long term while considering the effects of climate change. It is therefore vital to ensure that the culverts on A2 and drainage channels on urban roads do not get clogged with silt and solid waste by developing Isiolo's drainage infrastructure.

- Isiolo municipality will work with road authorities, including the KeNHA, the KURA and the KeRRA, to align on final designs and have the culverts and drainage systems formally adopted by the road authorities. This will allow the drainage structures to be included as part of the authorities' maintenance plans, being a departure from the past when poor design and poor maintenance have increased flooding in the city during the rainy season.
- WRA would oversee the management of the Merire River in conjunction with local groups such as the Isiolo River WRUA and any existing Community Forest Association (CFA) and the County government by restricting dumping and further encroachment of the river by residents. Additional oversight and enforcement will be

provided by the National Environmental Management Authority (NEMA), which is mandated to investigate and prosecute the dumping of waste

- The implementation of the biopark will be driven by community consultations, and the Isiolo municipality government will manage it. Extensive community engagement will help identify the communities' needs as well as develop the activities that will take place within the bio park and thus ensure buy-in from the communities. The project activities will be implemented using an integrated and participatory approach for the achievement of good results and ease in upscaling to other places. The project intends to adopt the 3R approach (Retain, Recharge, Reduce) in selecting the activities for implementation.
- The implementation of water-filled barriers requires a durable technology that can last decades. A key advantage of these barriers is that these have the capability to adapt to hydrological changes including water flow directions, flow velocities, and flood depth. The barriers can also adapt to changes in landscape e.g., due to urbanisation. This technology can easily be dismantled and deployed elsewhere, therewith adapting to a changing environment.

We aim to strengthen the capacity of key stakeholders to make informed technology choices. In order to avoid white elephants, the project team will strike a balance between necessary safety and quality standards on the one hand and local resources and management capacity on the other hand. We also aim to strengthen the production, construction and maintenance capacities of local providers as to be capable to respond to demands, opportunities and ideas from consumers and investors. Blended in local building style, using local available material and skills, meeting the need of women, children, elderly and handicapped, sponge city service delivery will be simple and affordable, and first of all adequate, linked to what is practiced and available. In short, appropriate to the local setting. The activities that the sponge project team will undertake is to facilitate this process: strengthening capacity of local stakeholders, ensuring inclusive multi-stakeholder co-design and fine-tuning to local needs, demands and markets.

Furthermore, we will engage in a dialogue on appropriate local standards with experts, policy makers and (educational) knowledge institutes in order to:

- Review national standards and eventually lobby for revision;
- Keep an eye on trends (change of standards based on international discussions);
- Offer a range of appropriate sponge city options to stakeholders;
- Show progress on basic improvement through targets (set with beneficiaries);
- Train local artisans and operational managers (youth);
- Ensure that poor people, women, elderly, handicapped and children are included in the technology choice.

Institutional sustainability

Through package 1, the project team will map and identify the main key different stakeholders to be engaged in the project. Some of the already engaged main stakeholders include EMU-SACCO, WRA, Ewaso Ngi'ro River Basin WRUAs, Isiolo municipality government, , KeNHA and VEI B.V. In addition to working closely with different stakeholders at the government and community level, this project will build on existing policies, legal frameworks, institutions in Isiolo and Meru counties, and the National Government. Which include but are not limited to:

- The Isiolo County Water and Sanitation Services Bill 2020
- The Water Resources Regulations, 2021 Arrangement of Regulations
- The Water Act (No. 43 Of 2016) The Water Harvesting and Storage Regulations, 2021
- Special Issue 881 Kenya Gazette Supplement No. 153 Water Services Regulations, 2021
- The Meru County water and Sanitation Services Act, 2004
- Isiolo County Integrated Development Plan, CIDP 2018-2022
- Updated Nationally Determined Contributions (NDCs)
- The Constitution of Kenya
- Kenya National Adaptation Plan (NAP) 2015-2030
- National Climate Change Action Plan (NCCAP) 2018 to 2022
- National Policy for Disaster Management in Kenya, 2009

- The Big Four Agenda (2017-2022)
- Environmental Management and Coordination Cap 387 And (Amendment) Act, 2015.
- Kenya Vision 2030

Social and cultural sustainability

Social sustainability is based on making Isiolo Sponge City a broad-based, stakeholder-driven movement. With this, we expect that local location-specific solutions are identified with communities and institutional actors and replicated in other areas. The specific needs of the target groups are: 1) to be heard, 2) to improve their living conditions. 3) to become responsible citizens We will empower women, the poor, youth, and people with disability (PWDs) through the following approach:

- Giving community members a voice through the planned community consultations
- Fill knowledge gaps to ensure community members have the technical capital to leverage their ideas and to effectively co-design solutions in a transdisciplinary setting
- Empower community members to monitor the progress and hold the public sector accountable through WRUA's
- Support community members to be able to oversee the implementation of various project components at a community level through WRUAs
- Establish Community Environmental Volunteers (CEVs) who are based in the community, who know the neighbourhood well and can be focal persons to guide fellow neighbours on Sponge City measures.
- Gender and pro-poor planning and stakeholder consultation
- Make explicit recognition to women, youth, poor and people with disabilities, in urban plans and flood management
- Develop a gender action plan addressing vulnerabilities in all the objectives of the project to achieve gender and social inclusion outcomes

Financial Sustainability

Financial Sustainability refers to the establishment of local financial potential for the strengthening of sponge city initiatives. Financing is required to provide and sustain sponge city investments at city, private, public, community and business level.

We use a rights-based approach. Through local lobby, advocacy and budget tracking, communities will be empowered to express their needs and demands to the authorities for adequate budget allocation and use. EMU-SACCO will be supported through a revolving fund enhance community access to financial resources and skills as a way of incentivising the uptake of water storage and infiltration measured measures and assets as identified by the feasibility study and those developed during the project.

Promotion of small-scale interventions such as urban farming



Figure 8: Example of a kitchen/urban garden

E. Project Impact

The Isiolo city components will improve the resilience of the municipality's economy by reducing the damage caused by floods to infrastructures and assets. Floods in Isiolo County contribute to the systematic destruction of property, with losses estimated at KES 870 million incurred in 2015 alone. The recurrent floods are estimated to destroy property worth KES 1.08 billion annually compared to Isiolo County's gross county product of KES 15.9 billion as of 2019. The project will furthermore contribute to improving the livelihood of farmers living in the area by reducing soil erosion, providing an additional source of income, and helping to climate-proof their livelihoods through land conservation and being exposed to new farming techniques and technologies.

In addition, the regreening efforts on the project will help reduce land degradation due to deforestation, which is increasingly becoming a concern in Kenya. Land degradation primarily results from human and natural factors, including farming, extreme weather, steep slopes, loss of natural vegetation and the presence of highly erodible soils. According to the Land Degradation Assessment in Kenya report, high land degradation is likely to occur in 61.4% of the country's land area. Areas in and adjacent to Arid and Semi-Arid Lands (ASALs) such as Meru are expected to see the highest impact of land degradation due to high levels of soil erosion.⁸ The benefits of improving the land through regreening include:⁹

- Reduction of wind speed and erosion
- Reduction of ambient soil temperature and evapotranspiration leading to the creation of favourable microclimates
- Soil moisture increase
- Soil quality improvement
- Carbon storage- Reduced air pollution from moto-vehicles
- Income generation from vegetables and the tree products
- Cooling down of city-heat
- Soaking more water- reduced flooding

The increased vegetative cover along the river and in upstream areas and Isiolo city will also reduce extreme weather conditions such as intense heat and strong winds. Isiolo city is vulnerable to increasing temperatures because of its location, while the northern portion of Meru County suffers from water scarcity due to its relatively dry climate. Shade from the vegetation would lower heat stress on residents allowing them to continue in their farming, commercial and residential activities in conducive environments. The water stored in ponds will create a household microclimate, which will contribute to low temperatures within the households and increase access to domestic water use. The tree branches and leaves would also serve as interceptors, slowing down strong winds and reducing their potential for soil erosion and property damage.

The positive direct impact for target users will be real and manifold, amongst others resulting in improvement of water supply and regular availability, sanitation hygiene, safety, green living and cooling climate, local (green) economy, job creation, and reduced flooding. The overall living conditions of this vulnerable group will be improved, by taking their issues serious, and including them in design and execution of solutions.

Other impacts associated with different initiatives include:

- Rain and roof water harvesting- sustained natural resources and preventing loss of land through erosion, reduced flooding, increased water availability at household level and decreased depletion of the water resources
- Investment in sustainable technologies through the EMU-SACCO- Improved financial options for public/private and blended finance, Increased supply of green technologies such as water harvesting tanks, Increased income generation and creation of more green jobs, groundwater/ wellfield recharge, increased ground water recharge, Reduced flooding and Reduced depletion of water resources
- Urban farming- increased green areas and beautification, boost in food supply within the city, Productive reuse of biodegradable household waste and wastewater
- Rehabilitating degraded lands-Reduced land and water pollution within the city, Reduced flooding.

⁸ Ministry of Land and Natural Resources. 2016. [Land degradation assessment in Kenya](#).

⁹ World Resources Institute. 2015. [Scaling Up Regreening: Six Steps to Success: A Practical Approach to Forest and Landscape Restoration](#)

F. Risk analysis

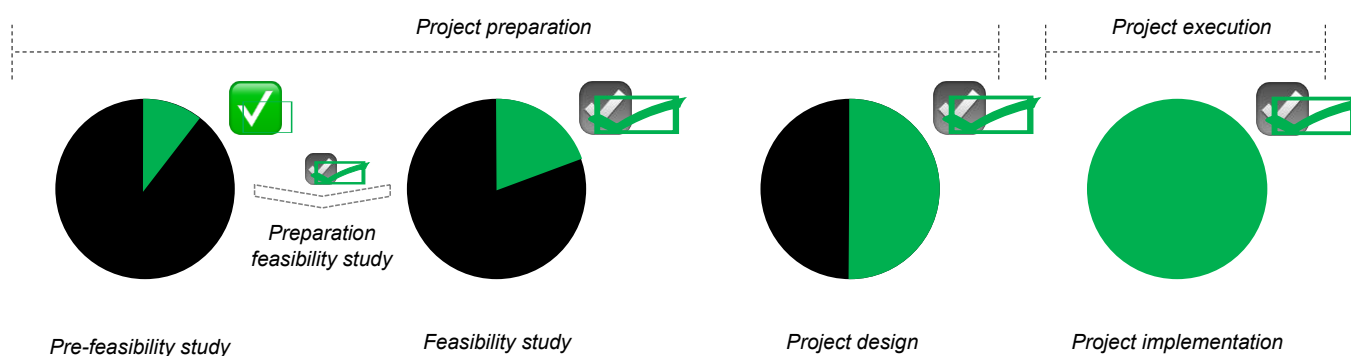
In this section, key risks and appropriate mitigation measures have been identified for the successful implementation of the project.

Risk category	Risk description	Risk level	Mitigation strategies
Operational risk	Inability to obtain stakeholder buy-in due to the lack of an existing common framework on construction	Moderate	<ul style="list-style-type: none"> MetaMeta and the municipality will accelerate engagement with key stakeholder organizations and define the collaboration framework between the parties at an early stage
Implementation risk	Lack of technical capacity to oversee the design and construction of the drainage systems	Moderate	<ul style="list-style-type: none"> The municipality will work to ensure that KeNHA and KURA appoint best-in-class contractors to undertake the construction of the road drainage system, in addition to providing quality assurance through the implementation phase For the other project components, the municipality will work together with MetaMeta to execute the project using best-practice standards and to incorporate robust monitoring and evaluation mechanisms
Limited tangible short-term effects of the measures.	If the community of Nakuru do not see 'quick' results, they might lose interest.	Moderate	<ul style="list-style-type: none"> Dissemination and education of the community, e.g., focus on income earning activities such as farming; focus on activities that beautify the city; aid in awareness and visibility activities
Reputational risk	Community living along the watershed areas may lose interest if they do not see 'quick' results,	Moderate	<ul style="list-style-type: none"> The planned measures will be adapted to provide quick benefits to implementing farmers and livestock keepers Through capacity-building activities, MetaMeta will ensure that the community capitalize benefits Highly visible projects such as upgrading the drainage system and greening will be advertised to build excitement about the project
External	<p>Programme delays and interference due to elections could lead to changes in municipality leadership or priorities</p> <p>We may lose the support we have and need to build up new relationships.</p>	Severe	<ul style="list-style-type: none"> Records will be kept of the critical decisions and agreements made. This will be presented to the new administration when they enter the office. Work through partners, authorities, utilities and social enterprises so that political interference is minimized. Use the elections in our advantage and make Sponge City a key deliverable for the political leaders.
Delivery	Lack of necessary documentation, such as land title deeds or necessary authorization documents, halts or delays project implementation.	Severe	<ul style="list-style-type: none"> The project implementation partner will carry out additional checks to ensure that the necessary documentation required for project implementation is in place
Delivery	Lack of project ownership at the county or municipal level creates uncertainty regarding which entities are implementing and overseeing infrastructure building activities	Moderate	<ul style="list-style-type: none"> Ensure stakeholder participation and alignment at each stage of the process to ensure project ownership Written agreements

Environmental risk	Construction of the various project components may lead to instances of environmental degradation	Low	<ul style="list-style-type: none"> • Overall, the project is expected to improve the quality of the environment within the watershed areas. • Procedures will be put in place to ensure that construction waste is carefully managed and disposed of during the construction phase. • In the upper watershed intervention package, care will be taken to promote tree species that suit the environment and are not invasive.
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G. Planning

A project typically goes through several phases from inception to completion, each of which is critical to the success of the project. The different phases of this project comprise of: a pre-feasibility study, preparation feasibility study, feasibility study, project design, and project implementation. The different phases are described below in detail.



1. Pre-feasibility study:

The first phase of a project is the pre-feasibility study, which has been completed and was conducted to determine the viability of the project idea. The purpose of this phase was to assess whether the Isiolo Sponge City project is worth pursuing and if it can be completed within the estimated budget and timeframe. During this phase, the project team conducted a preliminary analysis of the project, including its scope, objectives, and potential risks. The team has also evaluated the market demand, competition, and regulatory environment to determine if the project is feasible. The timeline of activities that went into developing the Sponge City pre-feasibility study:

- In April 2021, OCA finalised a pre-feasibility study outlining proposed improvements to Isiolo's drainage and flood management infrastructure and identified potential partners that could support Isiolo in sustainably upgrading its drainage system. The pre-feasibility study drew on Isiolo's [Urban Economic Plan](#) (UEP) published in January 2020 which identified the town's lack of drainage as a key constraint to its development and proposed making upgrading the drainage system in the town centre as a flood management strategy
- In order to operationalise the activities identified in the pre-feasibility study and approach funders, OCA formed a partnership with MetaMeta, a Dutch social enterprise, which specializes in floodwater management to create a Sponge City concept note for Isiolo municipality in early 2022. The pre-feasibility study drew on site visits to Isiolo and consultations with stakeholders. This collaboration resulted in a concept note which outlines 4 investment packages designed to transform Isiolo into a Sponge City

Attached is the pre-feasibility study for reference; note that the activities and approach described in the report evolved as we began to work with MetaMeta on the Isiolo Sponge City Concept Note. Nevertheless, the outcome of the pre-feasibility study is still applicable for the project, albeit with some additionalities to be further explored as part of the feasibility study. The pre-feasibility study draws from further on-the-ground research and further consultation with a wide range of stakeholders in Isiolo and MetaMeta's expertise.

2. Preparation feasibility study:

Now that the pre-feasibility study has been completed and the Isiolo Sponge City project idea has been deemed viable, the next phase is the preparation of the feasibility study. A communication framework shall be established to ensure adequate sharing of information on the progress of the submitted pre-feasibility study and the subsequent phases. The next steps shall be discussed and planned with relevant members of the programme organisation. Finally, a funding process for the feasibility phase shall be addressed.

- a) **Consultation with local authorities:** A round of meetings with local stakeholders shall be organised, aiming to present the outcome of the pre-feasibility study. These meetings shall also function as consultation sessions to obtain their feedback on the study. Their feedback shall be considered in the next phases. The target audience shall be identified by key members of the programme organisation such as MetaMeta.

- b) Meeting with competent authorities: Following (or in parallel to) the previous step, meetings with national and subnational authorities shall be pursued to urge for support of the proposed interventions by the central government and competent authorities.
- c) Funding process defined and executed: The funding/financing process for implementing the feasibility phase of the Sponge City project shall be defined and all necessary actions (identification of the beneficiary, preparing the contract, etc.) shall be made.

3. Feasibility study:

In this phase, the project team will conduct a comprehensive analysis of the project to determine its feasibility. This includes analyzing the technical, economic, social, and environmental factors that could affect the project's success. The team will also develop a detailed project plan and identify any potential risks that could impact the project's success.

- a) Project scope and objectives: This activity involves defining and refining the project scope and objectives, including identifying the project requirements and deliverables. It is imperative to refine the scope and objectives following a participatory approach. Various stakeholders including the proposed beneficiaries shall be consulted to understand their vision of what the objectives and scope ought to be.
- b) Stakeholder mapping: Appropriate governance processes are critical in determining the successful outcomes of the proposed adaptation measures. A stakeholder analysis must be carried out to identify and engage the full range of people and institutions that may be affected by the proposed interventions. The process also needs to identify stakeholders who may be negatively affected and afford opportunities for their empowerment. The rights to use of and access to land and resources, along with the responsibilities of different stakeholders, must be mapped.
- c) Consultation with ultimate beneficiaries: A first round of meetings with the ultimate beneficiaries shall be organized. During this first meeting, the societal challenge(s) addressed must be clearly understood and documented, while significant input will be acquired regarding risk identification and management. Finally, this process will set the basis for an inclusive, transparent and empowering governance process. Note that the project will focus on adding value for vulnerable and marginalized groups such as women and youth.
- d) Technical analysis: This activity involves conducting a detailed technical analysis of the project, including evaluating the design, materials, and construction methods to be used. The analysis predominantly focuses on the interventions such as the “upgrading stormwater drainage system in Isiolo city”. Adjustment to the technical specifications shall be made when certain interventions are deemed not feasible.
- e) Financial analysis: This activity involves conducting a more detailed financial analysis of the project, including estimating the project's costs, revenues, and potential return on investment. When the benefits don't outweigh the costs from a qualitative or quantitative perspective, it puts in question the validity of implementing the project.
- f) Risk analysis: This activity involves identifying and analyzing potential risks associated with the project, including risks related to technical, economic, social, and environmental factors. This analysis will serve as a basis of the Environmental and Social Impact Assessment (ESIA) that shall be conducted in the project design phase.
- g) Project plan: This activity involves developing a high-level project plan that outlines the project schedule, budget, resources required, and milestones. This plan shall be worked out in more detail as part of the project design phase. The high-level plan shall be used to inform stakeholders and get their initial feedback.
- h) Environmental self-assessment: This activity involves evaluating the potential environmental impacts of the project and identifying strategies to mitigate any negative impacts. This self-assessment provides insight in the classification of the project.
- i) Legal and regulatory analysis: This activity involves evaluating the legal and regulatory requirements associated with the project and identifying any permits or approvals required. As part of this activity, national and subnational laws and regulations shall be assessed in relation to the envisioned interventions and activities of the Sponge City project.

- j) **Grievance or dispute settlement mechanism:** A grievance or dispute settlement mechanism shall be adopted early on, whether it be a formal legal process or an informal non-legal system. This mechanism shall have agreed procedures, roles and rules for receiving and adjudicating such disputes. The grievance mechanism shall be legitimate, accessible, predictable, equitable, transparent, rights-compatible, adaptively managed and based on engagement and dialogue.
- k) **Social analysis:** This activity involves evaluating the social impact of the project, including its effects on the local community, stakeholders, and cultural heritage. Much like the risk assessment and the environmental assessment, this initial analysis shall be built upon during the project design phase.

The feasibility study is a critical phase of the project, as it provides a detailed analysis of the project's feasibility and identifies any potential issues or risks that may impact the project's success. The results of the feasibility study are used to make informed decisions about whether to proceed with the project and to develop a more detailed project plan.

4. Project design:

In this phase, the project team will develop the detailed design of the project. This includes creating detailed plans, specifications, and drawings that will be used to build the project. The team will establish clear associated governance and financing arrangements. Furthermore, this phase shall formalize ownership of the interventions and roles and responsibilities throughout the project and after project completion. This phase is critical to ensure that the project is designed and built to meet the project objectives and requirements. The project design phase involves several activities, some of which are described below:

- a) **Establish project objectives:** This activity involves defining the project objectives and goals, including identifying the project scope, deliverables, and success criteria. This activity is to confirm that the project objectives as defined during the feasibility study remain intact or whether refined is requires. It is imperative that this is confirmed with different stakeholders including the ultimate beneficiaries.
- b) **Develop project plan including governance structure:** This activity involves developing a detailed project plan that outlines the project schedule, budget, resources required, and milestones. The project plan should also identify the roles and responsibilities of each team member. The roles and responsibilities of the project team members have to be formally agreed upon with authorities / individuals with the appropriate mandates. The project plan shall follow the approach in accordance with the "Prince 2" project methodology.
- c) **Develop project schedule:** This activity involves creating a detailed project schedule that outlines the timeline for completing each project activity, including the start and end dates, duration, and dependencies between tasks, deliverables and milestones.
- d) **Develop project budget and funding scheme:** This activity involves estimating the costs associated with each project activity, including labor, materials, equipment, and other expenses. This activity furthermore defines the funding of the project. Extended meetings with relevant national and international stakeholders shall be organized to decide on the most appropriate funding scheme.
- e) **Develop procurement plan:** Once an agreement has been reached on the budget and funding scheme, a procurement plan shall be developed that outlines the process for procuring goods and services required for the project. Suppliers shall be selected and MOUs / agreements will be established.
- f) **Consultation with ultimate beneficiaries:** As a part of the inclusive, transparent and empowering governance processes, meetings with the ultimate beneficiaries shall be organised again in the design phase. The local stakeholders shall be made aware of the feasibility phase results and informed on the specific steps of the concept design phase.
- g) **Develop quality plan:** This activity involves developing a quality plan that outlines the quality standards and processes that will be used to ensure the project deliverables meet the required quality standards. The quality plan reflects the agreed requirements based on the input of the various stakeholders. There will be a distinct focus creating value for vulnerable and marginalized groups such as women.

- h) Conduct ESIA and develop risk management plan: This activity involves the development of a multidisciplinary ESIA as well as developing a risk management plan that outlines strategies for mitigating and managing these risks throughout the project.
- i) Develop communication plan: This activity involves developing a communication plan that outlines how project information will be shared with stakeholders, including team members, sponsors, and customers. It is essential that relevant stakeholders are aware of the project details to garner support and prevent unexpected resistance by authorities or individuals.
- j) Develop change management plan: This activity involves developing a change management plan that outlines how changes to the project scope, schedule, or budget will be managed and communicated. The governance structure shall be in place to monitor exceptions and take the necessary response measures.

The project design phase is critical to the success of the project, as it ensures that the project plan is comprehensive, feasible, and achievable within the defined timeline and budget. The project plan developed during this phase serves as a blueprint for the project implementation, and any changes made to the plan during this phase should be carefully considered to minimize the impact on project objectives and goals.

5. Project implementation:

The final phase of the project is the implementation phase. During this phase, the project team will execute the project plan, which includes building the project, testing the project, and commissioning the project. The team will also monitor the progress of the project to ensure that it is on track and that any issues are addressed promptly. This phase is critical to ensure that the project is completed on time, within budget, and to the satisfaction of the stakeholders.

The project implementation phase involves several activities, some of which are described below. Note that the activities might be refined following the completion of the project design phase.

- a) Execute project plan: This activity involves executing the project plan by completing each activity as scheduled, using the resources allocated in the project plan.
- b) Monitor and control project activities: This activity involves monitoring project progress and controlling project activities to ensure they are completed according to the project plan. Any deviations from the project plan should be identified, and corrective actions should be taken to bring the project back on track. Project delivery team meetings and steering committee meetings shall be scheduled to conduct monitoring and control activities.
- c) Manage project resources: This activity involves managing project resources, including people, materials, equipment, and finances, to ensure they are used efficiently and effectively. The project management office will have a prominent role in managing resources. It will be their responsibilities to report any deviations to the project manager.
- d) Manage project stakeholders: This activity involves managing project stakeholders, including team members, sponsors, customers, and other stakeholders, to ensure their needs and expectations are met. A local organization or individual shall be responsible for communicating with local stakeholders and ensure their feedback is incorporated in the project execution.
- e) Manage project risks and issues: This activity involves managing project risks by implementing risk mitigation and management strategies identified in the risk management plan developed during the project design phase. Project risks and issues shall be discussed during project team meetings including the corresponding mitigating measures to risk levels to an acceptable level.
- f) Manage project changes: This activity involves managing changes to the project plan, including assessing the impact of any proposed changes on project objectives, and making changes to the project plan as necessary. Changes with regards to project timelines, features, costs, and quality shall follow the agreed processes and governance structure. It is essential that changes are communicated well to all stakeholder to ensure acceptance and prevent resistance.

- g) **Manage project communication:** This activity involves managing project communication by keeping stakeholders. The project shall establish a feedback mechanism to ensure that stakeholders are heard by the project team. The communication furthermore entails promoting project progress and accomplishments.
- h) **Close project:** This activity involves closing the project by obtaining acceptance of the project deliverables, conducting a final project review, and archiving project documents. The project will also implement a monitoring and evaluation system to assess accomplishment after project completion.

The project implementation phase is critical to the success of the project, as it ensures the project plan is executed efficiently and effectively to meet project objectives and goals. The activities of the project implementation phase should be closely monitored to ensure the project stays on track and any issues are identified and resolved as quickly as possible.

Table: Planning project phases

Phase	Actions	Week number																																			
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	
1. Pre-feasibility study	1.1 Initial design of interventions for Isiolo Sponge City project																																				
	1.2 Situation analysis																																				
	1.3 Consultation with authorities																																				
	1.4 Capacity building workshop																																				
	1.5 Pre-feasibility report																																				
2. Preparation feasibility study	2.1 Consultation with authorities																																				
	2.2 Meeting with authorities																																				
	2.3 Funding process defined																																				
3. Feasibility study	3.1 Define project objectives																																				
	3.2 Stakeholder mapping																																				
	3.3 Consultation with beneficiaries																																				
	3.4 Technical analysis																																				
	3.5 Financial analysis																																				
	3.6 Risk analysis																																				
	3.7 Project plan development																																				
	3.8 Environmental self-assessment																																				
	3.9 Legal and regulatory assessment																																				
	3.10 Grievance or dispute settlement mechanism																																				
	3.11 Social analysis																																				
	3.12 Prepare a detailed communication plan																																				
	3.13 Map of existing policies, plans, laws and regulations																																				
	3.14 Mapping of global targets and relevant stakeholders responsible																																				
	3.15 Prepare final feasibility report for																																				

Phase	Actions		Week number																																		
			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35
	submission																																				
4. Programme design	4.1	Project objectives																																			
	4.2	Develop project plan including governance structure																																			
	4.3	Develop project schedule																																			
	4.4	Develop project budget and funding scheme																																			
	4.5	Develop procurement plan																																			
	4.6	Consultation with beneficiaries																																			
	4.7	Develop quality plan																																			
	4.8	Conduct ESIA and develop risk management plan																																			
	4.9	Develop communication plan																																			
	4.10	Develop change management plan																																			
5. Programme execution	5.1	To be defined at a later stage																																			

H. Breakdown Budget Feasibility Study i.e. Component 1

The next phase is to develop a feasibility study that helps to decide whether to move forward with the Isiolo Sponge City project. The feasibility shall consider elements such as (i) technological barriers, (ii) political and legal barriers, (iii) resource requirements and availability, and (iv) economic viability. An in-depth and reliable feasibility study provides insight in the anticipated costs and benefits of the programme. This helps in deciding which interventions to implement at what locations to realise the biggest return. The feasibility study therewith enables a cost-efficient implementation of the project. The amount of investment in the feasibility study can be saved during the programme implementation or can increase the amount benefits realised from implementing the programme.

Table: Budget summary feasibility study

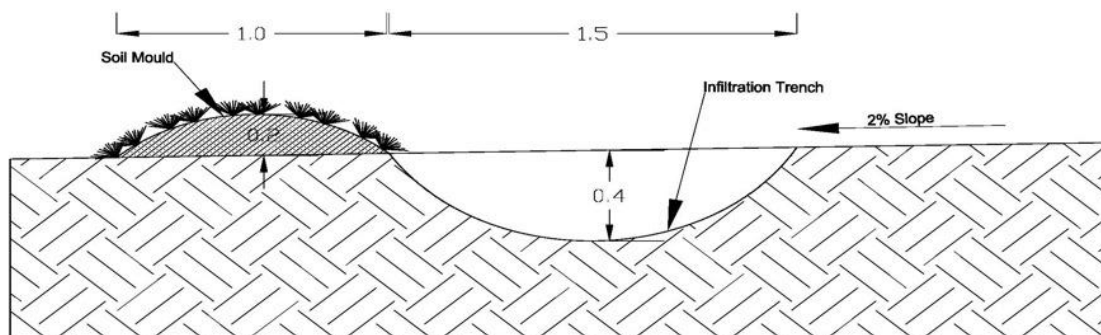
Ref.	Expected Outputs	Amount (€)
3.1	Define project objectives	20.000
3.2	Stakeholder mapping and social analysis	50.000
3.3	Consultation with beneficiaries	50.000
3.4	Technical analysis	100.000
3.5	Financial analysis	50.000
3.6	Risk analysis	20.000
3.7	Project plan development	40.000
3.8	Environmental self-assessment	25.000
3.9	Legal and regulatory assessment	25.000
3.10	Grievance or dispute settlement mechanism	30.000
3.11	Prepare a detailed communication plan	50.000
3.12	Map of existing policies, plans, laws and regulations	30.000
3.13	Mapping of global targets and relevant stakeholders responsible	50.000
3.14	Prepare final feasibility report for submission	30.000
Subtotal		570.000
Project Execution cost (8%)		45.600
Total Programme Cost		615.600
Amount of Financing Requested		615.600

Appendix 1: Location and design of project components

In this appendix, high-level designs for Packages 2 and 3 are presented. Note that the designs and technical specifications are preliminary in nature and will be confirmed through additional technical assessments and detailed designs

Package 2: Upstream areas

Typical infiltration trench design



TYPICAL INFILTRATION TRENCH

Figure 1: Typical infiltration trench design

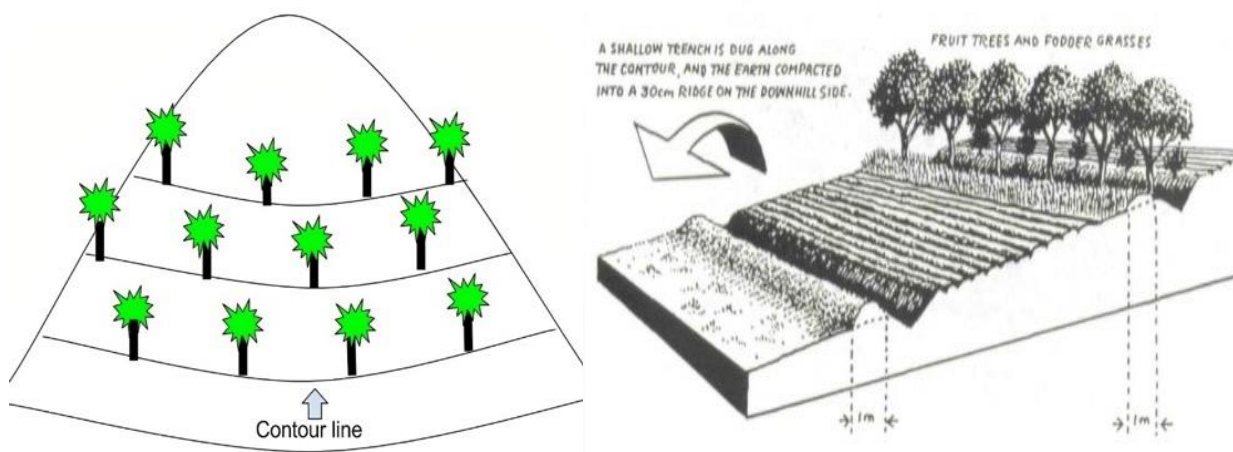


Figure 2: Planting of trees along the ridge line to stabilise soil

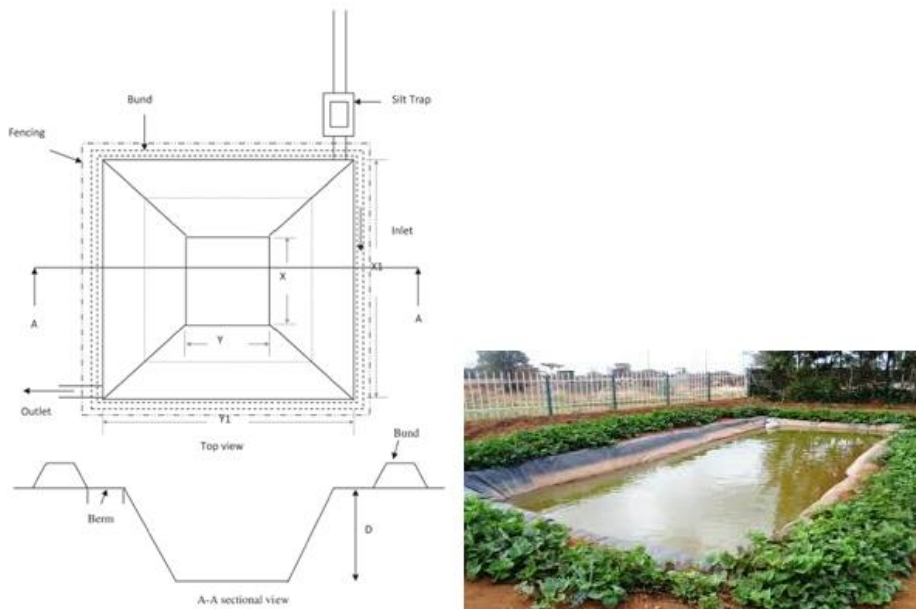


Figure 3: Pond layout design and a fully constructed pond

Package 3: Isiolo city

Typical infiltration trench design



Figure 4: Isiolo drainage system

The location of stormwater drainage structures is in such a way as to divert stormwater from converging in the CBD and safely channelling it onto the river.

Merire river training

The below image highlights the total of 6km of the Merire river that requires to be trained.

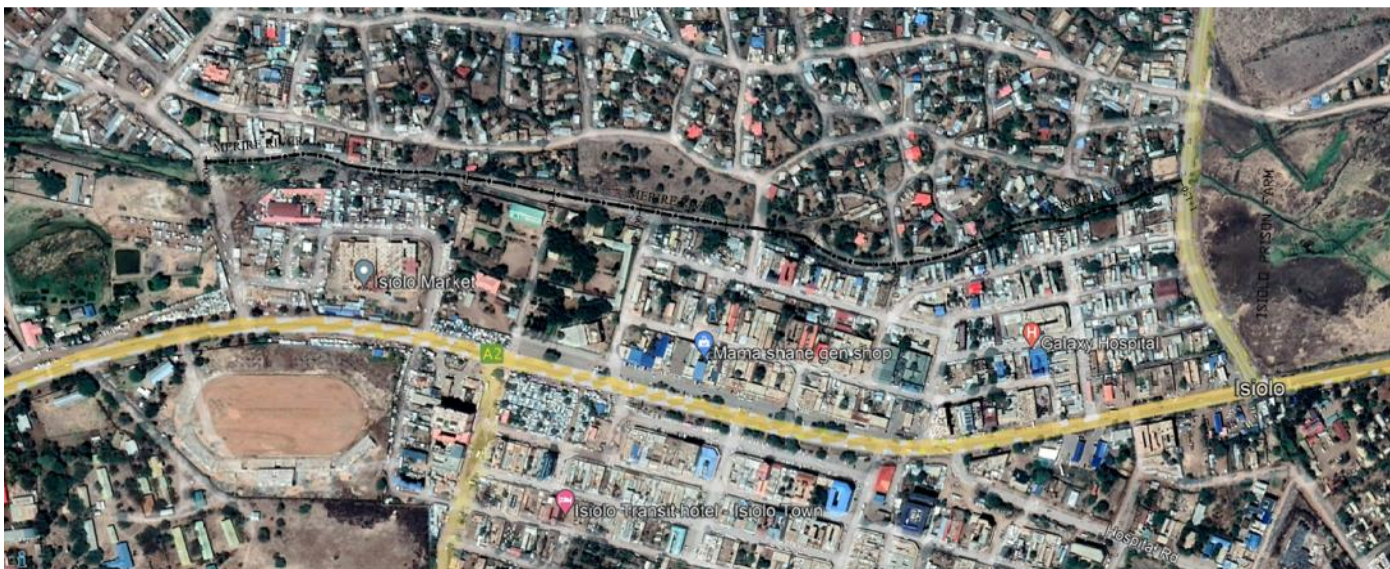


Figure 5: Proposed river-training section in Isiolo city

Proposed design for the initial section

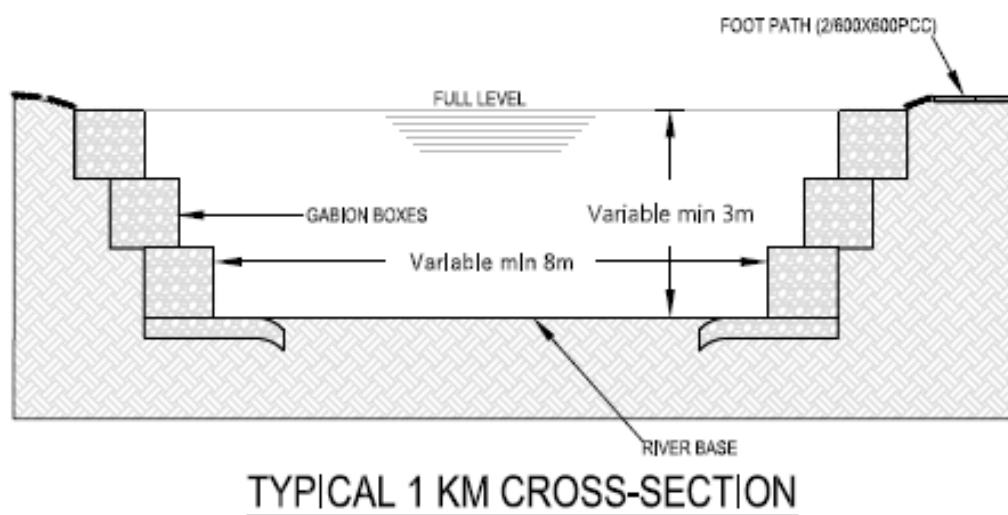


Figure 6: Typical cross-section within the case study area

Isiolo bio-park and demonstration farm



Figure 7: Illustrative design showing the bio-park during the dry season



Figure 8: Illustrative design showing the bio-park during the rainy season



Figure 9: Example deployment of a water-filled barrier to prevent floods



Figure 10: Example deployment of a water-filled barrier to harness water

Appendix 2: Sources of floodwater and direction of flow

This map in this appendix gives an overview of the flow of surface runoff across 3 sub-watersheds of the Merrie River in Isiolo. The sub-watershed modelled here are indicative and subject to detailed hydrological assessments



Appendix 4: Path of floodwater affecting Isiolo city

The images in this appendix illustrate the extent of flooding in selected areas in Isiolo city during the Oct-Nov 2021 rainy season



Appendix 5: Floodwater along Airport Road

The images in this appendix illustrate the extent of flooding in the Airport Road area of Isiolo city during the Oct-Nov 2021 rainy season



Appendix 6: Floodwater emanating from Muriri - Miciimikuru road

The images in this appendix illustrate the extent of flooding in the Muriri - Miciimikuru road area of Isiolo city during the Oct-Nov 2021 rainy season

