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Building Urban Climate Resilience in South-Eastern Africa

~ Mozambique ~

Baseline Review Report

Oxfam in Mozambique

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Contents

List of figures

List of tables

Acronyms

AF	Adaptation Fund
CityRAP	City Resilience Action Planning
CM EI	Carlos Menezes Individual Company
CMCC	City Council of Chokwe
COE	Emergency Operating Committee
CPCT	City Project Coordination Team
DDSAS	District Administration for Environmental Services
DRM	Disaster Risk Management
EIA	Environmental impact assessment
EWS	Early warning system
GL	Gender link
INGD	National Institute for Disaster Risk Management and Reduction
PDUL	Local Urban Development Programme
SAC	Limpopo flood warning system
SADC	Southern African Development Community
SEA	South-Eastern Africa
SPA	Environment Provincial Services
SWTC	Solid waste treatment centre
UGBL	Limpopo Basin Management Unit

Executive summary

The overall objective of the baseline review is to establish the initial conditions for the implementation of the Building Urban Climate Resilience in South-Eastern Africa (SEA) project.

The SEA Building Urban Climate Resilience project is being implemented in the city of Chokwe by UN-Habitat supported by Oxfam Italy. It is an integrated project to enhance urban resilience through reducing the vulnerability to floods of highly exposed people in four neighbourhoods and communities. Funded by the Adaptation Fund (AF), UN-Habitat is providing guidance and technical support to implement the project. Oxfam in Mozambique is working as the executing partner of the local component of the project at city level and the Ministry of Land and Environment, and the National Disaster Risk Reduction and Management Institute are the executing partners of the national component of the project.

The goal of the project is to strengthen governments and community resilience for effective and efficient response to climate-related hazards and risks of the targeted community people. The objectives of the project are 1. To develop capacities and establish conditions to adapt to the adverse effects of climate change in vulnerable cities in Madagascar, Malawi, Mozambique and the Union of the Comoros and 2. To promote inter-country experience sharing and cross-fertilization regarding the adaptation to transboundary climate-related natural hazards and disseminate lessons learned for progressively building urban climate resilience in south-eastern Africa. The project approach ensures participation of local communities and stakeholders in every aspect of the project management cycle including planning, implementation, monitoring and evaluation.

The components of the baseline review were to identify and document the existing situation of communities in Chokwe regarding climate resilience, early warning systems (EWS), land use, disaster risk management (DRM) and climate change; and to identify the current practices and needs of targeted communities in order to implement project activities effectively and efficiently, and establish a reference point for the project implementation from which to assess and monitor project results.

This included surveying implementation sites, interviewing municipality staff and communities and communities' representatives. Fundamentally, the exercises aimed to verify the relevance of the approved interventions at municipality level, justify possible change requests, map existing similar work at the municipality level and assess the initial level of compliance to upholding principles: AF, gender approach and human rights.

The baseline review applied eight main methods to collect primary and secondary, quantitative and qualitative data from different sources: 1. Desk/documentary review and analysis of all relevant documents and reports concerning the project, DRM and climate resilience; 2. Interventions relevance review – modifications check and justification; 3. Mapping of existing/upcoming complementary/similar initiatives/projects; 4. Compliance with upholding principles 5. Social and environmental analysis; 6. Hydraulic analysis; 7. Budgeting of the interventions resulting in the elaboration of a bill of quantities for each planned intervention; and 8. Architecture and project design for each planned intervention according to the site conditions and needs for resilience building.

During the baseline review process, focus was made on two further objectives: 1. Establishing baseline data against the project's activities, output and outcome; and 2. Identifying and recommending appropriate results of key project output and outcomes, and key approaches for the implementation of the planned activities as well as key performance indicators that serve as a baseline to compare the progress and success of the project in relation to its relevance, effectiveness, efficiency, impact, opportunity cost/core values and sustainability.

Oxfam conducted the baseline review in collaboration with the municipality of Chokwe and with vital support from UN-Habitat. Approximately 100 people from 4 target neighbourhoods and municipal officials were interviewed by using a structured questionnaire and consultation sessions. Technical studies and financial assessments concerning the target interventions and sites were also conducted. The review identified overall project site status following the goals, objectives, expected results and planned activities of the project.

From a technical design point of view, the report discusses the methodologies and assumptions on which the project designs were originally developed. The whole discussion around the environmental impact and the main action points for mitigation are also presented.

The results of the review will remain helpful for the existing situation of communities regarding DRM, climate change and resilience as identified by data collection and technical evaluation on the ground. The review also identified the socio-economic and environmental condition of the project sites and target communities.

The review revealed that the most prominent disaster is floods which occur every year in neighbourhoods 2, 3, 4 and 5 reaffirming the selection of these areas for the majority of the project interventions.

Drainage system

Interventions on the drainage system comprise three sub-components: a. rehabilitation; b. construction; and c. maintenance. Results revealed that poor and deteriorated drainage systems, the later characterized by siltation and loss of discharge and retention capacity downstream, are one of the biggest causes of the city's vulnerability to floods, impacted in the majority of cases by human activity contributing a negative impact on drainage functionality such as the agriculture practices on the drainage channels. The disposal of waste in the drainage channels affects the environment as well as public health by enhancing frequent flash-floods and spreading diseases within the locality. A detailed soil and hydraulic survey was made prior to technical designs being created for the layout of the drainage system. As climatic conditions are changing and affecting precipitation patterns, the survey revealed that the current core parameters of drainage construction are not adequate for current or future needs, hence the technical designs need to be adjusted to respond accordingly.

Early warning system and safe havens

EWS is comprised of: a. the radio station; b. signage on the evacuation route; and c. visual and auditory warning devices (siren and megaphones).

Suggested changes include rehabilitating the radio building as well as equipping it with basic functional furniture since the building has been looted/vandalized (see annex 2) and now has broken windows, little sanitary ware, compromised electrics, and expired power and water supply services. Challenges remain on integrating the local system into a wider one as governance mechanisms still lack clear guidance and approaches at local level, however, the project will trigger action at city level and policy discussion with other actors at district and provincial level to leverage the existing system and promote effective and efficient disaster and emergency preparedness at city level.

The system is reinforced by evacuation roads and safe havens (one existing and two new) for improved disaster preparedness and emergency response. The safe havens must be flood adapted infrastructures that serve as emergency shelters during a disaster and as community centres during normal periods, all connected through local radio. The three infrastructures should be connected by an evacuation route which should be maintained in viable condition with clear signage so that people can evacuate safely. The survey revealed that the evacuation road does not have a drainage system to collect rainwater. Reinstatement of the evacuation road elevated the level of the road so rainwater drains across the surrounding terrain and causes floods. This is not a substantial risk due to the decline in land, however, it important to bear in mind that the soil tends to become muddy when it rains which might compromise the ability of local communities to access the evacuation route and reach a safe haven.

Solid waste management

The review revealed that a high percentage of Chokwe's population disposes of waste inadequately – 73 per cent of the total population does not benefit from municipal collection services. Despite efforts made by the local authorities to invest in improving management of solid waste, Chokwe is finding it increasingly difficult to collect, process and dispose of waste in a cost effective and environmentally friendly manner. There is no central collection site in the city so the survey suggests the three solid waste treatment centres should also be used as waste sorting and packing facilities. The current approach to solid waste management is based on collection and disposal of waste in a waste bin, with no attention paid to the reduce, re-use and recycle principles of waste management. In addition to facing increasing costs for waste collection and disposal, public health and the environment suffer due to poor waste collection and disposal.

The review confirmed the need to strengthen the city's capacity for dealing with solid waste by upgrading facilities for waste collection and treatment with focus on investment in waste treatment centres to ensure environmental sustainability.

Relevance of interventions and project modifications

Overall, the review found that the project interventions remain relevant in their integrated approaches as planned in both qualitative and quantitative perspectives. Tackling waste management, EWS, safe havens and drainage in the selected locations will significantly reduce the vulnerability of the city to floods, as emphasized in particular by the review's approaches and methodologies.

The project is subject to minor and quantitative adjustments/modifications, mostly focusing on the initial number of infrastructures to be built such as the safe havens and the solid waste treatment centres. The drainage system intervention will be subject to a reduced extent. All proposed modifications are mostly due to the budget assessment made in order to accommodate the current situation considering the socio-economic as well as environmental evolution that has occurred since the development of the project proposal to the current stage.

Recommendations

Many significant recommendations were identified during the review. The team can now make the decisions necessary to implement the project effectively and efficiently to achieve the desired goals and outcomes. Major recommendations are: 1. To comply with the national standards and environmental and social safeguards for the construction of planned buildings; 2. To carry out training for the conservation, maintenance and management of the structural interventions with the participation of community groups; 3. To engage in community participation to allow ownership and management of the interventions at local level; 4. All actors must be communicative, maintaining dialogue as a means for the resolution of any conflicts that arise; and 5. Respect the cultural norms of each area without discrimination.

Introduction

Project background

Mozambique ranks third among the African countries most exposed to multiple weather-related hazards suffering from periodic cyclones, drought, floods and related epidemics. Drought occurs primarily in the southern region, with a frequency of 7 droughts for every 10 years. Floods occur every two to three years with higher levels of risk in the central and southern regions.[1] In particular, the city of Chokwe located in the lower Limpopo River basin, has been severely flooded over the years (especially in 2000 and 2013) because of the high level of water discharge observed upstream.

UN-Habitat and the Sub-Regional Technical Centre for Disaster Risk Management, Sustainability and Urban Resilience developed the City Resilience Action Planning (CityRAP) tool. The main objective of the tool is to enable local governments of small to intermediate sized cities (or urban districts of bigger cities), that have limited experience in urban risk reduction and resilience action planning to understand risks, prioritize and plan practical key actions to progressively build urban resilience.

CityRAP is a set of training exercises and activities. The main output is a City Resilience Framework for Action based on local government self-assessments, participatory risk mapping exercises and cross-sectorial action planning by the local government engaging relevant stakeholders – most importantly, communities themselves. CityRAP involves a bottom-up consultative process and has been designed as an enabling rather than prescriptive tool.

Chokwe, with the support of UN-Habitat, implemented the CityRAP tool in 2015 which enabled the city to embark on a community driven city planning process to produce a City Resilience Action Plan. City officials and local communities were engaged in the process through a number of activities including: workshops on urban resilience building; participatory risk mapping; participatory prioritization of issues; creation of the city's vision; and a city assessment to evaluate the state of resilience through the five urban resilience pillars (Urban Governance, Urban Planning and Environment, Urban Economy and Society, Urban Disaster Risk Management, and Resilient Infrastructures and Basic Services) all assessed through three guiding principles: 1. Climate Change Adaptation and Mitigation; 2. Sustainable Urban Growth and 3. Inclusive and Safer Cities.

Chokwe's approach to this planning process was distinct in the way that they merged their Municipal Five-Year Plan with the City Resilience Action Plan, as a result of implementing the CityRAP tool. The five-year Municipal Plan (2015–2019) also incorporates the City Vision and the Framework for Action which clearly identifies actions the community is committed to engaging in to reduce their vulnerability towards floods as the process was participatory and leveraged the community's role in the planning for a resilient city.

The City Resilience Action Plan contains strategies to engage in multiple community improvement projects. As a result of this plan the city has:

[1] GFDRR country profile for Mozambique, https://www.gfdrr.org/sites/gfdrr/files/region/MZ.pdf, accessed on 29 December 2016.

- Resettled a community located in a flood risk area;
- Improved two neighbourhoods by opening and widening streets which will also serve as evacuation routes during an emergency;
- Mapped out and opened natural drainage channels; and
- Applied for an Adaptation Fund (AF) grant to rehabilitate the main drainage system, build elevated infrastructures to serve as safe havens and open more streets to serve as evacuation routes while also improving the urban design of the neighbourhood and solid waste management practices.

Having adopted the City Resilience Action Plan as the city's five-year plan, the CityRAP tool resulted in the city saving MZN 50,000 or approximately 20 per cent of its 2016 annual budget (which would otherwise have been invested in resettling around 23 people; opening new roads which required the land readjustment of 5 families and opening natural drainage channels) due to voluntary manpower from community members.

With regard to the resettlement, no funds were used from the municipal budget as people from the risk zone (a seasonal lake) voluntarily reallocated themselves to a safe area already identified in the city structure plan and emphasized by the participatory risk mapping exercises. The City Resilience Action Plan was adopted incorporating community enhancement projects such as the improvement and rehabilitation of the drainage system merged with the improvement of solid waste management systems to enable a clean environment and a reduction in waterborne diseases such as malaria and cholera caused by stagnant water and household waste. From a health perspective, the city anticipates that the City Resilience Action Plan will contribute to a shift towards a clean and healthy city by investing in on-going maintenance of the drainage channels and frequent collection and appropriate treatment of solid waste.

Chokwe was one of the four cities selected for the AF project in Eastern Africa. It successfully underwent the CityRap methodology in 2018 and had some of its priorities approved from the City Resilience Action Plan including the critical drainage system strengthening initiative. The exercise involved UN-Habitat, Arcadis technicians and the Chokwe municipality including respective neighbourhood representatives and communities.

The city is targeted to receive USD 2 million from AF for the implementation of activities within the Building Urban Climate Resilience project demonstrating the power of the CityRAP tool in supporting cities to plan for resilience with few resources, leveraging bottom-up approaches though participation.

Chokwe has won the Gender Link (GL) award for Climate Change and Sustainable Development Best Practices Prize in 2017, 2018 and 2019. GL is an international organization committed to an inclusive, equal and just society in the public and private space in accordance with Southern African Development Community (SADC) protocol on gender and development. GL achieves its vision through a people-centred approach guided

by SADC Protocol on Gender and Development that is aligned to the Sustainable Development Goals, Beijing Plus Twenty and Africa Agenda 2063.

Project implementation

The Building Urban Climate Resilience project was launched in mid-October 2020 at a time of uncommon challenges and unusual opportunities. In the first year of the project the following are worth noting:

Global context – COVID-19 pandemic

The project was launched in the midst of chaotic uncertainty around COVID-19 prevention methods. Like all other states, national government had little to no reliable information about the right prevention measures, issuing decrees to respond to the global panic around the disease which tended mostly to prevent people from moving and gathering. These measures impacted on the initial project coordination activities and therefore delayed most of the start-off activities.

Despite initial hopes the pandemic did not rebate until almost 16 months after the project launch.

National context – political instabilities

The project is being implemented in strict partnership and coordination with the local city council. This condition entails massive vulnerability to any government instability but also good positioning for project buy-in by local community authorities' structures.

Locally, the most impactful event was the passing of the City Mayor earlier in 2021, a time when the project was gaining shape and direction. At the national level, the social unrest in northern and central Mozambique generated some political instability which combined with central government restructuring affected the main structures linked to the project namely the National Institute for Disaster Risk Management and Reduction (INGD) and the Ministry of Land and Environment.

Local context – extreme weather conditions

Mozambique, as a nation, came first in the most climate hit countries in Africa ranking in 2019. Extreme weather conditions reached Chokwe and in 2020, urban flooding and Cyclones Eloise and Guambe affected the city and tested its resilience to the limit; an opportunity for the project team to understand the full extent of the city's vulnerability but also a delaying factor since local government had to divert focus from project activities to cope with the weather impact.

Organizational context – Oxfam restructuring

Oxfam undertook massive organizational restructuring towards forming the Oxfam Southern Africa Cluster, a regional entity with the aim to respond with effectiveness and flexibility to global and regional changes and demands. The restructuring process went far and beyond 2020 and collided with the project start causing uncertainty among staff, which

in association with the COVID-19 pandemic, reduced efficiency and flexibility towards administrative processes and contributed to the delay of starting project activities.

Baseline review objectives

Overall objectives
Establish the initial conditions for the implementation of the SEA Building Urban Climate Resilience project.

Specific objectives

- Review the relevance of planned interventions, capture and justify any change requests by the community and the municipality;
- Map complementary/similar existing/upcoming initiatives at municipality level;
- Define the initial conditions to a level of compliance with AF principles, gender strategy and human rights approach; and
- Document the technical design development process and the legal base under which the physical intervention will be implemented.

Methodology

In order to achieve the objectives listed above, a variety of methods were suggested according to the characteristics of the source of information, the availability of information and the purpose of the information. For each objective listed below, the appropriate methods are included.

Interventions relevance review – check proposed changes and justification

This task should be carried out with communities and the municipal council in the implementation area through observation and unstructured interviews, oriented to the understanding of the constituent aspects of the defined objective. Visits to the implementation sites should be made with the City Council of Chokwe (CMCC) and another with/to the communities involved in the intervention. Relevant notes from the visits should be documented in an understandable and logical manner in response to the initial request.

Mapping of existing/upcoming complementary/similar initiatives

Assuming that initiatives that are similar to the Building Urban Climate Resilience project do not miss scrutiny from CMCC and, even if they escaped its management would at least be communicated to this body, this task will be triggered through a brief survey at the municipality, following a deeper discussion of any initiatives with relevant actors (executing organizations, donors or implementers). This second action will be carried out by virtual and/or face-to-face meetings according to the availability of counterparts.

Compliance with the upholding principles (AF, gender perspective and human rights approach)

Based on the enquiry questionnaire, the main sources of information during the initial phase are CMCC and its communities. As the size and content of the questionnaire is extensive,

it will be shared prior to the survey followed by direct and face-to-face engagement with these actors. Exploratory questions will be added to the questionnaire to ensure data accuracy and help to scope the range of each one of the questions. Answers and the reflection around them will be compiled and shared first with the respondents, then with the technical staff appointed to the survey including the focal point of the project in the municipality in order to endorse the information given.

Social and environmental analysis

Despite all the planned construction elements, the SEA Building Urban Climate Resilience project is essentially a social intervention with a multi-dimensional interposition. It entails a solid community engagement methodology, combined with thematic-centred groupings. The following methodology should be adopted:

- Desk review: a bibliography of good practices on resilient project design compiled along with local, international legislation and survey of existing documents;
- Community consultation: meetings held with city council members, blocks' and neighbourhoods' representatives, vulnerable groups, disaster risk management committees, representatives of local institutions, Oxfam representatives and members of the City Project Coordination Team (CPCT); and
- Iconography, topography survey and direct observation: capturing, analysing and interpreting images of the implementation sites and surroundings; surveying the depth and height of the intervention site grounds in relation to a set reference; and direct interaction with the flooding phenomenon, waste streams and the social dynamic.

Hydraulic analysis

The drainage system was found to be the most critical factor of urban climate resilience in Chokwe. Specific methods were therefore tailored for the hydraulic analysis of drainage sizing. The surveying methods adopted are:

- Desk review: analysis of all written reports from Arcadis from 2018 during the project design phase. Engineering bibliography consulted to back up the inference on the structural project design;
- Topography: used to survey the drainage declivity and the interoperability of the drainage network elements.

Budgeting of interventions

- Measurement of planned work: project designs were measured and a bill of quantities developed following the architectural work agreed upon during community consultation with technical inputs from Oxfam, UN-Habitat and CMCC;
- Market analysis: the items on the bill of quantities developed in the first stage were assigned a budget based on their average cost in the targeted market. The next exercise would be to fit the cost estimate to the available budget.

Architecture and project design

- Compared analysis: analysis of typical/similar architectural projects around the country, where the consultant explored and absorbed the best aspects resulted in a design that would cumulatively contain the best experience and practices of all its precedents;
- Community consultation: the product of the previous stage would then be fed by community inputs, which would make the design accessible and reliable.

Documentary review and analysis

The planned sub-projects cover many fields within construction engineering from structure to hydraulic and include, but are not restricted to, technicity of topography and iconography. Desk reviewing all interventions and alignment to local standards and legislations is discussed under ‘Compliance with national standards’.

Baseline review guidelines

In order to harmonize and adjust the scope of the baseline review, the following guidelines were provided:

1. For each initiative, checking if the initiative as described in the project is still relevant and responds to the needs and priorities of the communities and local government. The information collected will be also useful for the development of a strategy/plan for community mobilization, engagement and communication and development of the municipal engagement strategy and sustainability plan;
2. For each initiative, identifying and justifying (with evidence) any adjustments/changes that might be required in the approach and/or in the activities plan of the initiative. The information collected will be also useful for a. a technical final detailed review/design of the activities for each initiative; b. development of a strategy/plan for community mobilization, engagement and communication; and c. development of the municipal engagement strategy and sustainability plan;
3. For each initiative, mapping all the existing/upcoming initiatives (beyond the current initiative) that might be complementary; identifying other stakeholders and actors that can be relevant for establishing synergy, collaboration and coordination while avoiding duplication;
4. For each community, clearly defining the initial conditions so that it is easy to monitor progress, compliance with AF principles, a gender perspective and human rights approach, and evaluating the final impact.

Baseline review summary

Overall, the baseline review confirmed that the proposed intervention objectives and conditions for project implementation to begin remain as before. Challenges were mapped in land governance where informal settlement now affects project sites in the original locations proposed. The project budget was found to be largely insufficient to meet actual costs – modification of sub-projects based on new prioritization and sequencing is needed. These modifications, replanning, revising the budget and renegotiating terms may be time-consuming and therefore delay the physical intervention.

The baseline review was quite fruitful and revealing in many ways, including the understanding of the project design process from the perspective of communities and the municipality. To follow the baseline review guidelines, the main findings have been broken down into four lines of analysis, as follows:

Project sites

In order to make appropriate technical designs, the project sites needed to be surveyed to establish their current state. This section highlights the most important findings and the full survey is documented in annex 1.

Chokwe drainage system

The main drainage system in Chokwe is comprised of two channels: the southern drainage channel and the northern drainage channel. These two drainage channels surround the city, fed by water streams from the seven neighbourhoods of Chokwe, dispatching them in the Limpopo River. The proposed intervention consists of maintenance of the two main drainage channels, and construction of one underground pass and two new drainage channels.

The southern drainage channel

The southern drainage channel of 5,853.28 m lies along neighbourhoods 3, 4, 5 and 6 in south Chokwe and is characterized by green vegetation and a shallow drainage bed. The vegetation helps to stabilize the soil delaying erosion of the channel and should be maintained despite the reptile and insect habitats generated by this environment. The drainage channel is affected mainly by two activities: using the area as cattle pasture which impacts positively in the reduction of excessive vegetation at some drainage sections, and for agriculture which contributes to the erosion of the channel. The channel has already broken its banks near bottlenecks, and at the most southern section the obstruction and collapse of the discharge pipes has led to drainage congestion. Additionally, a small bridge in neighbourhood 5 (see figure 1) is clearly obstructing the discharge of drainage water creating a bottleneck which leads to local flooding of the area, including a local road. The channel's banks have eroded over its complete length, leading to siltation and loss of discharge and retention capacity downstream.

Connecting infrastructure between the southern drainage channel and the channel leading water streams to the Limpopo River can be seen in the bottom right corner of figure 1. The second (underground) channel cuts across three public infrastructures: a railway, a road and an irrigation channel. The underground channel has proved to be stable and operational underneath the road and the railway, however it is damaged underneath the irrigation channel and at the output end. This prevents water flowing from the southern drainage channel to the underground channel at its designed capacity, causing the upstream zone to flood in an average raining season. Several bridges cross the channel. They are structurally intact however erosion is compromising their draining capacity. Along the drainage trajectory no informal occupation was documented.

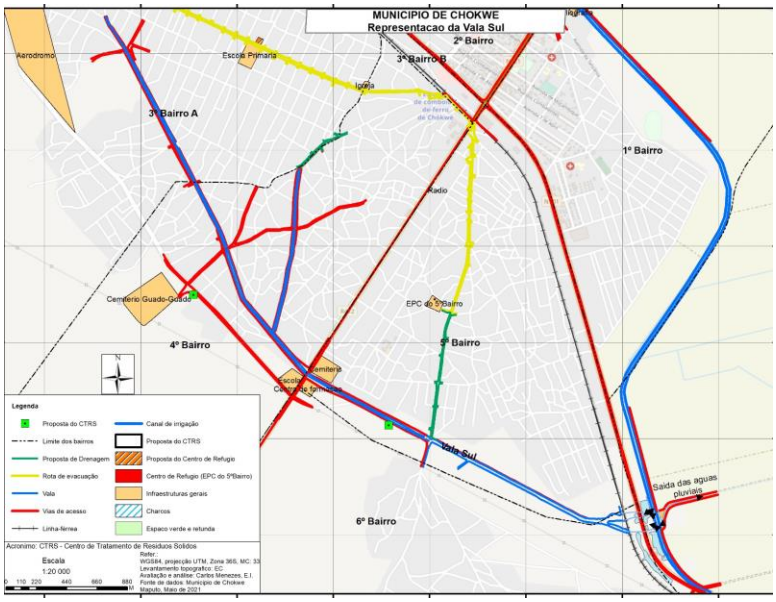

Figure 1: The southern drainage channel and surrounding infrastructure.

The northern drainage channel

The northern drainage channel of 3,164.10 m lies along neighbourhoods 2 and 1-B in north Chokwe, characterized by green vegetation and a shallow drainage bed on its west side and reinforced concrete cladding on its east side.

The vegetation provides stability to the channel bed, however the lack of maintenance has caused the vegetation to grow unsustainably and is compromising the concrete. At joins in the channel solid waste dumped by local residents has gathered which is contributing to the decrease of draining capacity.

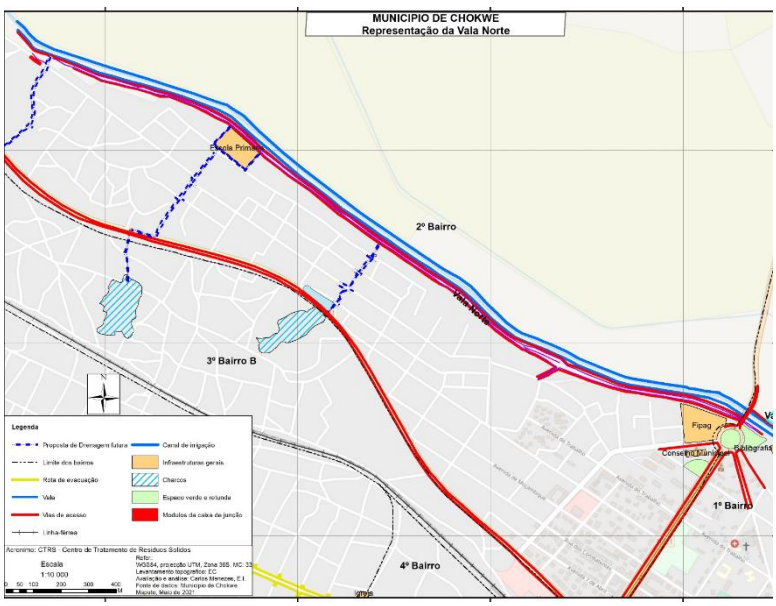

Figure 2: The northern drainage channel and surrounding infrastructure.

Using the channel bed for agriculture is also having a negative impact on drainage functionality. The drainage bed has flattened and become susceptible to water overflows, and its blocking capacity for the not-so-rare overflows from the irrigation channel during heavy rainfall has been weakened.

In figure 2, the section of the northern drainage channel in need of maintenance is represented in blue. The northern drainage channel is particularly important for the city since it provides the first barrier to overflowing waters from the irrigation channel and/or in the rare but catastrophic event when fluvial waters approach the urban area.

Underground drainage channel

The underground drainage channel which collapsed in the 2013 floods from silted up inlets is now covered by heavy vegetation that prevented deeper exploration of the area for topographic and related studies. The survey revealed that check valves have become stuck in the *open* position allowing an unwanted permanent flow of water to the surrounding area.

Safe havens

Existing safe haven

There is a safe haven located in the environs of the Complete Primary School of the 5th District B, about 170 m from the appointed evacuation road occupying a plot of approximately 9,000 m^2 (Google Earth) within area D: an area allocated for housing.

The evacuation road is a dirt road that rises in the fragmentation of the E221, passes through the southern drainage channel and continues to the neighbourhoods south of Chokwe. It is a wide road with few trees and minimal traffic – essentially pedestrian – and is in good condition. See figure 3.

Figure 3: Existing safe haven.

The main entry and access to/from the school to the evacuation road is clearly defined in the east façade by a masonry wall. However, there are no fences on the other boundaries allowing the free passage across the school grounds of people, animals and vehicles. Neighbouring buildings are mostly unfinished or precarious masonry dwellings.

The school and housing area are susceptible to flooding because rain water pools together on the low land where it sits dues to the lack of a drainage system. The highest flood level reached was 2.10 m which occurred during the 2000 floods.

Mozambican legislation was also referenced during the survey: the Chokwe City Posture Code; the General Urban Buildings Regulation; and the Building and Maintenance Regulations of Technical Accessibility, Circulation and Use of Public Service Systems.

New safe havens

One of the sites proposed for a new safe haven is on the edge of the evacuation road in an inhabited area. The site has an area of 2110.97 m^2 situated between two other plots, one with masonry houses and the other, a police station. A school is on the other side of the road – see figure 4.

The second proposed site is also located on the edge of the evacuation road in the airfield area near the Chokwe Urban Health Centre. The plot of 5,964.66 m^2 is located in an area defined in the urbanization plan for housing use. Near the plot there are two buildings in ruins and the existing vegetation consists of herbaceous grass-like plants. The area has been used for grazing cattle. See figure 5.

Figure 4: Location of safe haven 2.

Figure 5: Location of safe haven 3.

None of the plots are defined by masonry walls and neighbouring buildings are mostly permanent masonry dwellings. The land is located in a housing area whose soil becomes muddy when it rains.

Reinstatement of the evacuation road raised the level of the road and rainwater drains into the surrounding terrain, flooding it. The evacuation road does not have a drainage system. This situation is not a substantial risk due to the incline of the land, however when the soil becomes muddy, movement is hampered.

Solid waste management

There is a strong scientific consensus that the global climate will be significantly altered in the present century. The scientific, academic, governmental and everyday world are trying to give greater balance to the ecosystems that change day by day, putting public health and the balance of the planet itself at serious risk.

Solid waste is one of the major challenges of public management given the environmental degradation generated by human waste and it requires some kind of intervention. Household waste causes particular damage to the surface drainage networks in Chokwe. See figure 6.

The general scenario of solid waste management at country level is that although the collection of waste is carried out in cities and towns, it covers very low averages, not exceeding 30 per cent (C. Serra *et al*, 2012). Waste collection is mainly carried out in masonry-built urban areas with better access routes for collection trucks; a large part of the population in peri-urban and suburban areas do not have any collection services. This intervention aims to seek solutions by making the problem of solid waste explicit in order to ensure sustainable development for the city.

A high percentage of Chokwe's population disposes of waste inadequately according to the Arcadis consultant's report citing WAPCOM (2009). According to the data obtained from the consultation carried out that year of the total population, 73 per cent did not benefit from municipal collection services. Instead they buried or burned waste, or would throw it away anywhere.

Although more than 10 years have passed since this survey, from the recent review it was found that the same inappropriate conditions of littering in the city still persist, aggravated even more today by the significant increase in the population. See figure 6.

An accumulation of residential solid waste is piled up in different sites in Chokwe producing concentrations of insects, contamination in the air, soil and watercourses, as well as clogging drainage networks and incorporating other means of contamination.

Figure 6: Household waste.

Chokwe has no landfill site. During the survey it was found that there are two places where waste could be deposited. The first, situated closer to the city, works well in the rainy season because it has better access by roads. The second, the official waste area, is where the municipality transfers the waste in the dry period when it is accessible. Animals and humans that transit in these places help disperse waste to the surrounding areas thus generating contamination of all kinds.

From the preliminary diagnosis on the first field visit, the following were noted:

a. The condition of the watercourses and drains is pitiful as they are full of bags, loose solid waste, bottles, etc.;
b. The socio-economic factor of the neighbourhoods involved in the sub-project corresponds to sectors of very low income;
c. The proposed network to improve the environmental situation regarding waste is appropriate for this first methodological intervention of collection and separation of municipal solid waste from the four concerned neighbourhoods;
d. The proposed network responds to economic and human availability and provides flow to needs expressed by the population;
e. The three collection centres will be treated as municipal solid waste disposal and separation facilities;
f. The five locations named on the map accompanying the sub-project form as mini waste collection points will be renamed waste transfer points. The final location will be subject to a detailed review and can be changed or added in number according to the needs of community groups.

Early warning system

The early warning system (EWS) is comprised of: the radio station; signage on the evacuation route; and visual and auditive warning devices (siren and megaphones).

EWS is the responsibility of the National Administration of Southern Waters, more specifically, the Limpopo Basin Management Unit (UGBL), with its current head office in Chinhacanine near Macarretane on the north bank of the Limpopo River. With information and suggestions from the community, the review included meeting with the Director of UGBL, Ivan Cuna and technical staff who were provided with a flowchart that summarizes the operational procedures for flood and cyclone forecasting along with a summary of the communication procedures.

A Limpopo Flood Warning System (SAC) based on tele-measure hydrometric stations has been in operation in recent years. Hydrometric data is obtained in real time from various stations, the most important upstream station is the Beit Bridge station in the Republic of South Africa. In Mozambique the main stations are Combomune, Massingir and Pafuri. All stations are equipped with tele-measure devices powered by solar energy, although they also have an alarm that warns of any incident that occurs at the station. This is necessary due to events such as vandalization of station components.

SAC is based on modern software that predicts with great accuracy the times of propagation of floods and their size. Pre-defined values of forecasts of any floods immediately put SAC on alert. Recently, WhatsApp groups have been set up with staff from the various institutions most involved for exchanging information. One aspect that can be improved is the number of participants in these groups so that problems are not caused by vital information being missed.

Important aspects to consider include:

- Recognition of the existence of climate change that jeopardizes the frequency and predictable volume of floods. SAC is based on data that may not match the future. It is increasingly clear that cyclones and floods will have greater frequency and magnitude in the world;
- Strengthening the telemetric system;
- The training of more personnel and local technicians in the use of SAC software; and
- The integration into SAC of the sub-basin of the Chinguidze River, a tributary of the Elephant River, that flows downstream of the Massingir dam. Flow values have already registered as higher than those expected showing that its inclusion is of importance.

How the early warning system works

When high water levels are reached, the Emergency Operating Committee (COE) based in Xai-Xai are alerted. COE is headed by the Provincial Secretary of State and is composed of:

- INGD;
- National Institute of Meteorology;
- UGBL/Mozambique Regional Administration of Waters in the South;
- Provincial directorates connected with support and relief activities;
- District entities and municipal councils;
- Media agencies; and
- Others.

Several digital platforms involving all participants are also activated on these occasions. A flowchart of operation at emergency heights was subsequently received from UGBL.

Radio station

The Nhluvuku community radio building was built after the 2013 floods by the municipality of Chokwe with the support of UN-Habitat on the understanding that as half of the city's population listen to the radio, it would be a good system for flood warnings. The building today, however, is abandoned and has been vandalized. See figure 7.

Figure 7: Abandoned radio station building.

The building needs construction work as well as new radio equipment and to be connected to the services – water, electricity and telephone. Once rehabilitated community radio will be part of SAC and will translate alert messages into local languages so that they can be better understood by all

communities. Radio messages should be reinforced by an automated siren system as well as by megaphones used by trained leaders in the local community.

Relevance of interventions

In recognition of the change in circumstances experienced since the project launch, checking the relevance of the priorities agreed with the municipality and communities back in 2018 became the priority of the baseline review. The exercise was carried out in two phases: 1. By interviewing municipality officers, including the mayor, on an in-depth visit to the implementation sites; and 2. Bilateral meetings with the chiefs of the targeted neighbourhoods.

The most revealing findings during engagement with the community was the poor knowledge of the interventions scheduled for each individual neighbourhood, resulting in false expectations within the communities towards the project. Communities claim that their suggested interventions were not shared back with the them, even though the municipality proceeded to endorse approved priorities.

Improving the overall drainage capacity of the city

All planned interventions remain relevant and more so as the last rainy season put the drainage system to the test again, inundating the main flood prone areas with the Limpopo River threatening to overflow. Communities in some affected areas (e.g. neighbourhood 5) fled their houses for a couple of days until the water levels lowered. Despite efforts by the municipality in helping communities manage rainwater, the drainage system has got worse over time and raised higher expectations for project implementation.

The drainage intervention remains vital for building resilience in Chokwe, both for the municipality and local communities. All stakeholders have renewed their commitment to participate, mobilize and support the executing partner and contractors in the implementation of the initiative, as well as recognizing the importance of this particular sub-project.

Construction of safe havens

Site visits to the existing safe haven in neighbourhood 5 provided the best opportunity for the team to witness the importance that a multi-purpose, climate proof and socially accessible building has. From observations and interviews, the team confirmed that the building serves as a classroom (see figure 8) when not needed for disaster response – even the supporting floor has been improvised for a classroom. Despite it being incomplete, this building provides hope for the community living around the school, including the children.

The community expects the planned safe havens to also address the needs of other schools as well as serving as a venue for community gatherings, workshops and training. Disaster Risk Reduction committees are hoping that these buildings can store their equipment and tools both for crisis response and for EWS.

Figure 8: Use of current safe haven.

Improving solid waste management systems

As previously stated, the waste management system in Chokwe has got worse as the municipality has failed to respond to the needs of its ever-growing population. The urban area is expanding quickly and city council resources do not accompany this growth. Most neighbourhoods claim that the municipality has not been able to collect their waste and others suggest that the collection frequency is not suited to the rate with which waste is generated. See figure 9. Establishing a solid waste treatment centre would not only benefit the disposal areas but also monetize the waste, promoting a new mindset and awareness about the need to care for the environment.

Figure 9: Waste overflowing from collection bin.

Strengthening early warning systems

While natural hazards cannot be stopped, and as they grow in magnitude and frequency, EWS will continue to be the most reliable lifesaving method communities can count on. This particular component has benefitted from significant development along the Limpopo River in terms of tools but less in range. Flood warning messages remain coded to ordinary community members, both in language and in access. Leveraging on local committees' expertise through providing equipment and promoting the local radio station will allow EWS contributors to disseminate messages faster and further. And by doing so, the odds of saving lives in the most vulnerable groups is increased.

Identification and justifying of project modification

Within the scope of the technical design consultation following the first year of preparatory activities, the baseline review further examined the intervention, including impacts on the budget. In summary, a combination of the following factors may have contributed to an overwhelming budget deficit:

- Underbudgeting: activities such as the construction of safe havens were already underbudgeted even when compared to Arcadis estimates. See annex 1;
- Underestimates: Arcadis underestimated over 2.6 km less than the actual length of the drainage channels needed;
- Degradation of existing infrastructures: the project was designed with assumptions that some infrastructure such as the radio building was ready to use, however at the implementation phase this proved incorrect. This building requires significant rehabilitation before it can be used and some drainage components are far more damaged that previously verified; and
- Inflation: Mozambique's currency has depreciated over the last few years and the cost of living has risen, impacting the construction sector particularly.

Summary of the consultation process

Changes to the initial project proposal have stemmed from a three-layered consultation process:

- **Baseline review:** all proposed interventions remained current in relevance both at community and municipal level;
- **Technical design:** multiple consultation meetings with stakeholders, especially people with disabilities, were held in the communities. These consultations aimed to determine the optimal design for the interventions, as well as update the actual needs to be addressed;
- **Deliberating committee:** budget constraints (before the deficit was noted) were presented at a Capacity Building Plan Development workshop and a deliberating team established. The team comprised: municipality (focal point); Oxfam (coordinator and finance officer); UN-Habitat (national manager and resilience architect); and consultants (architect Menezes and a construction engineer). The available budget, disbursement plan, intervention priorities and project timeframe to determine what interventions were non-negotiable and which should get implemented in the first wave were all discussed.

Sub-project title: 5.3.1. Improving the overall drainage capacity of the city

Location	**Neighbourhoods 3B, 4 and 5**
Numbers and dimensions	1. Construction of three sets of drainage pipes and valves with high capacity 2. Rehabilitation of the southern drainage channel: 3.3 km 3. Construction of new drainage channels in neighbourhoods 4 and 5: 275 m + 422 m = 697 m 4. Maintenance of the northern drainage channel: 1.3 km
Proposed modification in numbers and dimensions	1. No changes requested 2. Rehabilitation of the southern drainage channel: 5.9 km 3. Construction of one new drainage channel in neighbourhood 5: 422 m length 4. No changes requested
Description of materials needed	Mortared rocks and reinforced concrete, compacted soil, bricks
Land status	Public – construction of new drainage channels along existing roads, rehabilitation/maintenance works of existing drainage ditches
Total cost	USD 1 million
Estimated number of beneficiaries	68,000 (whole city population)
Estimated number of beneficiaries proposed modification will impact	68,000* *Although no linear relation can be established between the requested modification and the number of beneficiaries, we know that around 10,179 people living in neighbourhood 4 will no longer benefit from the withdrawn proposed drainage construction. However, the drainage system will continue benefiting the whole city population.
Cost per beneficiary	USD 14.71

Proposed modification in implementation strategy and planned activities, in relation to sub-project interventions

The drainage intervention consists of four sub-interventions:

1. Construction of three sets of drainage pipes and valves with high capacity. Initially, the consultant proposed doubling the capacity of the valves recommended by Arcadis, arguing that it is key to install a platform with a capacity that can address future needs in this hard-to-access site. However, this meant a higher budget and therefore we have

stayed with the original Arcadis proposal. Therefore there are no changes here, neither in approach, dimensions or number;

2. Rehabilitation of the southern drainage channel (3.3 km). Topographic work by the consultant has shown that the actual drainage channel length is around 2.6 km longer – nearly double that estimated by Arcadis. This means a legitimate raise on the cost estimate and respective impairment of the budget as per the original plans. A change of approach is therefore required. Based on the actual funds available, the committee concluded that the project cannot afford an external contractor but should support the municipality (providing gas or other resources) to execute the rehabilitation task instead. Local labour will be an asset here;
3. Construction of new drainage channels in neighbourhoods 4 and 5 (275 m + 422 m = 697 m). Due to the budget constraints (see annex 1), this sub-intervention cannot be fulfilled as planned. The appraisal committee had to decide which drainage channel construction to withdraw, despite the relevance of both of them. Comparing the vulnerability of the two neighbourhoods, the committee decided to cancel the proposed channel in neighbourhood 4 which is less flood-prone;
4. Maintenance of the northern drainage channel (length: 1.3 km). The northern drainage channel is mostly affected by collapsed banks and impending vegetation in its beds. No changes are requested.

Expected impact of proposed modifications on social, economic and environmental benefits, gender, and sustainability in relation to sub-project interventions

Impact from sub-intervention 2. Extending the drainage channel has a positive impact for beneficiaries since it would secure more effective water draining and deliver the intervention as per the original plans. However, this negatively affects the already-constrained budget of the overall intervention.

Impact from sub-intervention 3: Cancelling the construction of the second new drainage channel will reduce the draining capacity of the southern drainage system, especially in the surrounding area of the implementation site (neighbourhood 4). This impacts the efficiency of the system to respond to inundation and may also cause the project to fail short on social expectations.

Sub-project title: 5.3.2 Construction of safe havens

Location	Neighbourhoods 3, 5 and 7
Numbers and dimensions	Two new safe havens to be built of approximately 300 m^2 each
Proposed modification in numbers and dimensions	Build one new safe haven of approximately 300 m^2
Description of materials needed	Concrete, soil-cement blocks, iron and aluminium
Land status	Public (within school area – open space)
Total cost	USD 100,000

Estimated number of beneficiaries	41,626
Number of beneficiaries impacted under proposed modification	20,813 The number of beneficiaries is likely to drop to half if one building is constructed instead of two.
Cost per beneficiary	USD 9.61

Proposed modification in implementation strategy and planned activities, in relation to sub-project entry

The sub-project entry proposes construction of two safe havens to serve as shelters during flood emergency times, and as school classrooms and community centres (to organize social events, training, workshops and meetings) at other times. Each safe haven should be approximately 300 m^2.

The cost estimate for two safe havens is USD 424,639 against an actual budget availability of USD 180,000. Arcadis estimated USD 330,000 for this activity which is USD 150,000 lower than the estimates. These figures show a significant deficit in the original budget.

A way around this problem is to reduce the number of buildings from two to one and to consider using an individual consultant for the on-site construction supervision instead of contracting a firm for the task. Additionally, the current design may have to lose some internal non-structural elements.

Expected impact of proposed modification on social, economic and environmental benefits, gender and sustainability, in relation to the sub-project

The most obvious impact of this change will be on the number of beneficiaries, which will reduce from 41,626 to 20,813 people. This could also mean an overload on service demand for this building, resulting in rapid degradation, which may impact on its sustainability.

Sub-project title: 5.3.3 Improving solid waste management

Location	Neighbourhoods 3, 4 and 5
Numbers and dimensions	Construction of three community-based waste collection and treatment centres of 600 m^2 each
Proposed modification in numbers and dimensions	Construction of two community-based waste collection and treatment centres of 600 m^2 each
Description of materials needed	Cement, blocks, sand, equipment for waste collection (e.g. pallet stacker, bulk bags, waste bins, trolleys, etc.)
Land status	Public/owned by the municipality
Total cost	USD 265,000
Estimated number of beneficiaries	35,000

Number of beneficiaries impacted under proposed modification	23,3000 Reducing the centres from three to two means a third of the total beneficiaries will be deprived of the service
Cost per beneficiary	USD 11.37

Proposed modification in implementation strategy and planned activities in relation to sub-project entry

To improve solid waste management the project proposed construction of three waste management centres spread out in different neighbourhoods and secluded from urban areas. These centres are intended to better manage urban solid waste which could otherwise be dumped in drainage channels resulting in a reduction of the water draining capacity of the system.

The cost estimate for the construction of three solid waste management centres is USD 353,099 against an actual budget availability of USD 165,000. Poor detail in the design proposed by Arcadis is the root cause of this discrepancy, as well as inflation over the year since the initial proposal was developed.

An alternative for this intervention is to reduce the number of centres from three to two, consider using an individual consultant for on-site construction supervision instead of contracting a firm and to make the most of the local labour.

Expected impact of proposed modification on social, economic and environmental benefits, gender and sustainability

Withdrawing the construction of one centre will deprive a whole region of waste treatment services, weaking the overall capacity of the city to deal with solid waste. This may lead to less clean drainage channels and/or streets, leading to poor draining capacity in the water channels and the perpetuation of water-borne diseases among communities.

Sub-project title: 5.3.4 Establish early warning for floods at community level

Location	City-wide
Numbers and dimensions	Radio, automatic sirens, megaphones, billboards and signage, awareness and training material
Proposed modification in numbers and dimensions	Purchase radio, automatic sirens, megaphones, billboards and signage, awareness and training material and rehabilitate local radio station building
Description of materials needed	Radio, automatic sirens, megaphones, billboards and signage, awareness and training material
Land status	Public/owned by the municipality
Total cost	USD 100,000
Estimated number of beneficiaries	68,000 (whole city population)

Number of beneficiaries impacted under proposed modification	None
Cost per beneficiary	USD 1.44

Proposed modification in implementation strategy and planned activities

To strengthen EWS the project proposed 1. Marking identified evacuation routes to facilitate access to safe havens; 2. Establishing/improving local communication mechanisms as part of EWS; and 3. Awareness-raising and capacity building at community level. All these activities remain relevant and are covered by the original budget since no prior quantities were previously agreed on this sub-project.

The sub-intervention 'establishment of improved local communication mechanisms as part of the EWS' includes equipping the radio station with transmission devices and related equipment. However, the radio station building has been looted/vandalized (see annex 2) and left in need of rehabilitation work. This includes repairing broken windows, replacing sanitary ware, repairing a compromised electrical network, and resupplying expired power and water services.

Restoration of the radio transmission channel will impact on the quantities of the other components of EWS such as automatic sirens, megaphones, billboards and signage and the number of awareness raising sessions needed.

Expected impact of proposed modification on social, economic and environmental benefits, gender and sustainability

Rehabilitation of the radio building will force the project to repurpose some budget lines and therefore reduce the amount needed for EWS equipment. The budget diversion entailed by this request is minimal and can be managed without major implications.

Table 1: Comparison of intervention budget proposals.

#	Interventions	Description	Proposals (USD)		Available budget (USD)
			Arcadis	CM EI	
1	5.3.1 Drainage	All drainage interventions, including on site supervision fees (10%)	1,068,762.77	(1,150,000) 1,265,000	**1,000,000**
2	5.3.2 Safe havens	Construction of two safe havens including on site supervision fees (10%)	330,000	(424,639.73) 467,103.703	**180,000**
3	5.3.3	Construction of three solid waste treatment centres including on site supervision fees (10%)	138,000	(353,099.65) 388,409.615	**165,000**

	Solid waste treatment centres				
4	5.3.4 Strengthening of EWS	Marking routes and areas at risk, purchase equipment, rehabilitate and equip radio station building, raise awareness and secure institutional coordination	110,000	155,907.77	**83,555.56**
		TOTAL	**1,646,762.77**	**2,276,421.09**	**1,428,555.56**

Environmental and social assessments

In order to diagnose the socio-environmental pulse of Chokwe, the review adopted a multiplicity of methodology, namely:

- Desk review on good practice and customs in the design of resilient projects;
- Analysis of legislation and international standards;
- Dialogue and interaction with various representatives of the city council, representatives of Oxfam, members of the Local Project Coordination Committee, local representatives of neighbourhoods, localities, heads of residential blocks, disaster management committees and representatives of various local institutions;
- Survey of existing documentation;
- Iconographic recording;
- Topographic survey;
- Mapping of the social and environmental situation;
- Direct and indirect observation using sky images; and
- Compilation of review reports.

Drainage channel system

Climate related extreme events such as floods have been affecting Chokwe over the years. Its low-lying land and proximity to the Limpopo River overexposes the city to the hydrological climate chocks. The following elements comprise the root causes of this socio-economic and socio-environmental unrest:

- Inundation and urban flooding in the rainy season;
- Poor drainage system;
- Rapid urban expansion and climate-vulnerable housing;
- Almost non-existent secondary drainage system to support draining rain water from the neighbourhood to the main drainage channels;
- Non-existent transient basins for rain water retention that can later be drained into the secondary drainage system;
- Poor solid waste management leading to drainage channel congestion;

- Erosion of the slopes of the drainage ditches, especially near bridges; and
- Low installed infrastructure capacity (piping of a smaller size) to facilitate fluidity in the exit of the waters downstream of the south ditch with ditch 2.

The review diagnosed a variety of challenges at both community and municipality levels, emanating or causing the drainage system to fail. The main findings are:

- Waste is dumped into drainage channels which reduces their draining capacity;
- Farming along the drainage channel slopes causes erosion and leads to water overflow when it rains;
- A lack of periodic cleaning of the drainage ditches leads to excessive vegetation in the drainage channels resulting in growing populations of insects such as mosquitoes and reptiles such as snakes;
- Housing along the water draining trails endangers the habitants and limits the community water draining capacity;
- The poor drainage of rainwater has contributed to flooding in the neighbourhoods that in turn contributes to the degradation of living conditions in the communities (pools of water form that host mosquitoes and increase the risk of contracting malaria and diarrhoeic diseases).
- Low levels of rainwater infiltration due to soil saturation; and
- Difficulties in the run-off of rainwater due to the topography of the land being almost flat – water pools on the streets.

Socio-environmental intervention

The drainage system intervention consists of four sub-interventions: construction of the underground channel; rehabilitation of the southern drainage channel; maintenance of the northern drainage channel; and the construction of two new drainage channels. These sub-interventions will impact the environment and society both positively and negatively.

Negative impact

- Removal of existing vegetation (including existing farms on the drainage slopes);
- Movement of soil and deposit in areas belonging to farmers;
- Generation of vibration and compaction as well as noise during the rehabilitation and construction phase of the ditches;
- Limitation of movement of farmers during the rehabilitation and construction phase (new valves) of the ditches;
- Presence of curious children during the phases of interventions;
- Generation of solid waste;
- Air pollution;
- Manoeuvres of vehicles and construction equipment;
- Possibility of work accidents; and
- Possibility of HIV/AIDS and COVID-19 contamination.

Positive impact

- Improved rainfall fluidity;

- Generation of local employment opportunities;
- Emergence of small business opportunities (e.g. food) on the construction site; and
- Gain of participatory awareness in the management of the drainage system.

Table 2: Main mitigation actions points for the drainage intervention.

Impact	Mitigation measures	Site	Frequency	Responsible	Supervision
Vegetation removal.	The removal of vegetation should be centred on the place of execution of the work; Proceed with the replacement whenever possible; Prohibit or discourage the practice of farming in ditches.	Northern and southern drainage channels	When necessary	Contractor	Supervisor; municipality; Environment Provincial Services (SPA)
Movement of soil and deposits in areas belonging to farmers.	The movement of soil and deposits must be included in the work; The extent of the use of farmer's spaces must be by mutual agreement.	Southern drainage channel	When necessary	Contractor	Supervisor; municipality; SPA
Vibration and compaction noise as well as noise during the rehabilitation and construction phase of the ditches.	The use of vibration and compaction equipment shall not exceed the recommended tonnage; Pay attention to any cracks that may arise in houses; Sound emission should not exceed 85 dB.	Southern drainage channel	Monthly	Contractor	Supervisor; municipality; SPA
Limitation of movement of people and goods during the rehabilitation and construction phase (new valves) of drainage ditches.	Create alternative bypass for circulation purposes; Place signs.	Southern drainage channel	At the preparation phase	Contractor	Supervisor; municipality; SPA
Presence of children during the intervention phases.	Raise awareness among the community and neighbourhood so that children are kept away from the works; Maintain a caretaker for site safety.	Northern and southern drainage channels	Monthly	Contractor	Supervisor; municipality; SPA
Solid waste generation.	Segregation of solid waste; Removal of solid waste.	Southern drainage channel	Weekly	Contractor; municipality	Supervisor; SPA

Air pollution.	Soil humidification; Maintenance of equipment to reduce gas emissions.	Southern drainage channel	Weekly	Contractor	Supervisor; municipality; SPA
Movement of vehicles and construction equipment.	Avoid unruly parking; Define area intended for safely manoeuvring vehicles; Display signs in visible places.	Southern drainage channel	Weekly	Contractor	Supervisor; Municipality; SPA
Possibility of work accident.	Provide first aid kits; Use of EPIs; Emergency contacts to be available in a visible location; Ensure the existence of evacuation vehicles.	Northern and southern drainage channels	Monthly	Contractor	Supervisor; municipality; SPA
Possibility of HIV/AIDS contamination.	Raise awareness against HIV/AIDS; Keep condoms in visible and safe places; Repress discrimination against people with HIV/AIDS.	Northern and southern drainage channels	Monthly	Contractor	Supervisor; municipality; SPA; District Administration for Environmental Services (DDSAS)
Possibility of contamination of COVID-19.	Apply a sanitary protocol (keep at a distance of 2 m, use of masks, hand washing; Identification of a transient isolation room for suspected cases; Contact the health unit; Implement a weekly plant disinfection programme.	Northern and southern drainage channels	Weekly	Contractor	Supervisor; municipality; SPA; DDSAS

Recommended actions and approaches

Given the social settings mapped in Chokwe combined with governance structure, a health socio-environmental footprint can be achieved by grouping actions and approaches:

- Apply for an environmental permit for the construction of the three high-capacity valves at the exit of the south ditch and for the construction of the new ditches in accordance with Decree No. 54/2015 of 31 December on the Process for the Environmental Impact Assessment Regulation;
- Carry out training for the conservation and maintenance of ditches at the municipal level with the participation of community groups;
- Maintain and clean drainage ditches before the rainy season;
- Sensitize the population not to use the ditches for agriculture and not to dump solid waste in or near them;
- Adopt applicable and low-cost programmes for the management of drain ditches including cleaning and frequent maintenance in scheduled campaigns;
- Conserve and protect drainage infrastructure with community participation;
- Opportunities for labour access must be fair and gender-free;

- The labour force for drainage projects should be recruited locally and with at least 50 per cent women;
- All actors must communicate, using dialogue as a means for the resolution of any conflicts that arise; and
- Respect the cultural norms of every one without discrimination.

Safe haven and evacuation routes

Arcadis explained that Chokwe has suffered cyclically from floods that are characterized by the destruction of infrastructure and some loss of human life. During these events, one of the most critical aspects is the existence of a safe place where communities can take refuge and preserve assets that are fundamental for their post-disaster recovery. During the local consultations, community members (especially women and the most vulnerable) expressed the need for evacuation centres/safe havens in their neighbourhood that can be accessed during a flood emergency. The existing evacuation centres are located too far from the city.

Arcadis suggests that the construction of safe havens in critical areas of the city will greatly contribute to vulnerability reduction of the poorest community members. These constructions will have a double function: they will serve as shelter during flood emergencies and as school classrooms and/or community centres (for social events, training, workshops, meetings, etc.) in normal times. The multi-purpose safe havens will be built in already identified primary schools' plots and will be managed by school officials. They will be designed as elevated platforms using construction techniques that make them resistant to floods and strong winds, with the possibility to harvest rainwater. The construction of safe havens remains crucial and relevant, and community expectation has just grown higher.

Safe haven intervention impact

The safe haven intervention proposes the construction of two new safe havens of approximately 300 m^2 each with the evacuation routes identified by signage to facilitate access to the safe havens. As result of this physical and social intervention, there are positive and negative impacts:

Negative impacts

- Land conflict and local urban restructuring;
- Removal of existing vegetation;
- Dust generation and noise generation;
- Ground vibration;
- Manoeuvres of vehicles and construction equipment;
- Generation of solid waste;
- Possibilities of accidents at work;
- Possibility of removal and destruction of the signs on the evacuation route;
- SARS-COV-2 contagion; and
- HIV/AIDS contamination in the workplace.

Positive impacts

- Increased employment opportunities;
- Improved socio-economic conditions;
- Training and cross-fertilization of construction knowledge,
- Existence of multifunctional safe havens;
- Possibility of externalities of small businesses; and
- Changing the urban landscape.

Table 3: Main mitigation action points for the safe haven intervention.

Impact	Mitigation measures	Site	Frequency	Responsible	Supervision
Vegetation removal.	The removal of vegetation should be centred on the worksite; Proceed with the construction as soon possible.	Safe haven 2; safe haven 3	Preparation phase	Contractor	Supervisor; municipality; SPA
Dust generation.	Dampening with water of the main route of the evacuation route to avoid high levels of dust emissions due to the movement of trucks carrying materials; Use of protective masks and personal protective equipment.	Safe haven 2; safe haven 3	Whenever necessary	Contractor	Supervisor; municipality; SPA
Noise generation.	Use hearing protectors and personal protective equipment.	Safe haven 2; safe haven 3	Monthly	Contractor	Supervisor; municipality; SPA
Ground vibration.	Use of low tonnage equipment according to required safety standards; Observation of indicators of cases of use and their compensation.	Safe haven 2; safe haven 3	Preparation phase	Contractor	Supervisor; municipality; SPA
Movement of vehicles and construction equipment.	Respect for signs; Definition of appropriate areas for manoeuvring and parking of circulating media.	Safe haven 2; safe haven 3	Monthly	Contractor	Supervisor; municipality; SPA
Solid waste generation.	Daily cleaning of the construction site; Definition of a point for depositing solid waste integrating the segregation of the same and its subsequent collection;	Safe haven 2; safe haven 3	Weekly	Contractor; municipality	Supervisor; SPA

	Re-use where possible of certain solid waste resulting from construction; Avoid burning solid waste at the site of the works.				
Occurrence of work accident.	Supply first aid kits; Use of EPIs; Emergency contacts to be available in a visible location; Ensure the existence of evacuation vehicles.	Safe haven 2; safe haven 3	Monthly	Contractor	Supervisor; municipality; SPA
Possibility of HIV/AIDS contamination.	Raise awareness against HIV/AIDS; Keep condoms in visible and safe places; Repress discrimination against people with HIV/AIDS.	Safe haven 2; safe haven 3	Monthly	Municipality	Supervisor; municipality; SPA; DDSAS
Possibility of contamination of COVID-19.	Apply the sanitary protocol (keep a distance of 2 m, use of masks, handwashing); Identification of a transient isolation room for suspected cases; Contact the health unit; Implement a weekly plant disinfection programme.	Safe haven 2; safe haven 3	Weekly	Contractor	Supervisor; municipality; SPA; DDSAS
Removal and destruction of signage on the evacuation route.	Community awareness of the importance of signage boards; Integration of the management process of signs at the evacuation centres with the participation of local authorities; Replacement of signage in case of damage or theft.	Safe haven 2; safe haven 3	Quarterly	Supervisor; municipality; SPA	Supervisor; municipality;

Recommended actions and approaches

In order to secure environmentally-friendly and socially sustainable construction of the safe havens, the following are recommended:

- Apply for an environmental permit for the construction activities of safe shelters in accordance with Decree No. 54/2015 of 31 December on the Regulation of the Environmental Impact Assessment (EIA) procedure;
- Compliance with the instructions included in this document with a view to ensuring effective observation of the guidelines contained therein;
- All activity that may impact the environment should be fully monitored;
- In the implementation phase of the project works, the local workforce of 50 per cent female should be prioritized;
- Raise awareness and explain to the population about the importance and functionality of safe shelters;
- Carry out training for the conservation of infrastructures with the participation of community groups;
- Maintenance and cleaning at the construction site; and
- Respect the cultural norms of all without discrimination;

Sustainability of the building is seen as key in Chokwe based on the amount of abandoned buildings. Key actions include:

- The adoption of integrated solid waste management programmes for the area so that it is not a place where rodents and other animals settle;
- The sense of conservation and protection of a community-level infrastructure should be a common denominator; and
- Profitability and/or integrated budgeting in the public expenditure of the municipality as much as possible to ensure its maintenance.

Solid waste management

During the project design phase, Arcadis reported that no formal landfill sites exist in Chokwe. Solid waste is currently dumped in an informal site located in neighbourhood 4 which is 2 km from the city centre. The site is not fenced and there is no proper waste management. Both animals and humans have free access to the site and subsequently there are challenges in terms of public health. A survey carried out in 2009 recommended the construction of a sanitary landfill site as a matter of urgency, however, nothing was done and the situation is deteriorating.

Arcadis also reported that only 27 per cent of households benefit from formal waste collection services. Other residents (35 per cent) dig a rubbish pit, burn their waste (12 per cent) or dispose of it informally (27 per cent). In 2012, a solid waste management strategy (2010–2025) was developed for the city.

The solid waste management intervention consists of 1. Design and construction of a landfill site; 2. Purchase of equipment; and 3. Staff training.

The increase in the population and the rapid urban expansion have both contributed to consumption and consequently an increase in the production of solid waste creating social and environmental problems derived from the following:

- Poor management of solid waste (collection and handling);
- Use of drainage ditches for the dumping of solid waste;
- Spreading and dumping of solid waste in inappropriate places and outside containers;
- Burning of solid waste in containers;
- Lack of segregation of solid waste stemming from the poor distribution of containers for this purpose;
- Location of the municipal waste bin combined with frequent mobility difficulties in the rainy season due to the soil becoming muddy; and
- No solid waste treatment centres.

The construction of solid waste management centres is one of the solutions that will help the situation and may host the following facilities:

- Sorting solid waste in a safe space;
- Alternative source of financial fundraising from the sale of recyclable materials;
- Reduction of spreading or deposit of solid waste in inappropriate locations;
- Awareness on the need to participate in the management of the environmental situation in general; and
- Promotion of the sustainable urban environmental-based on the premise of integrated participation.

Solid waste management root causes

Due to the depth of environmental implications of this particular intervention, the waste management challenge in Chokwe was examined more deeply. The root causes/problems are:

- A weak capacity of municipal services for the collection and treatment of waste;
- A collection is only made in neighbourhoods 1 and 2;
- There is an unequal distribution of waste containers throughout the city's neighbourhoods, with neighbourhoods 1 and 2 being the most privileged;
- Access to the dumpsite is difficult in the rainy season which leads to several unauthorised waste sites;
- Waste – especially plastics bags, bottles and disposable nappies – is thrown into drainage ditches; and
- Emergence of mosquitoes, flies and rodents due to poor management of solid waste.

Solid waste management intervention social benefits

The solid waste management sub-project could bring social, economic and environmental benefits in the sense that it will:

- Ensure better sanitation of the environment, preventing the proliferation of diseases such as malaria, diarrhoea and cholera;
- Avoid proliferation of mosquitoes, flies and rodents;
- Ensure monetization of the waste will have economic value and is managed in a sustainable way with the collection for recycling towards this;
- Ensure that waste becomes a source of income for families, bringing more jobs;
- Ensure that waste is not disposed of indiscriminately, particularly not thrown or carried by rain water to the drainage ditches with the result of better drainage performance; and
- Reducing contamination of soil, water table, rivers and streams, and air.

Solid waste management intervention impact

As a construction intervention, the solid waste management centres will have a similar impact as the safe havens, however, their environmental impact differs enormously.

Negative impacts

- Removal of existing vegetation;
- Dust generation;
- Noise generation;
- Vibrations from equipment;
- Movement of vehicles and construction equipment;
- Generation of solid waste;
- Possibility of accidents at work;
- Possibility of removal and destruction of signage on the evacuation route;
- SARS-COV-2 contagion; and
- HIV/AIDS contamination in the workplace.

Positive impacts

- Supply of labour;
- Improving socio-economic conditions;
- Training and transmission of knowledge;
- Possibility of creation of small businesses; and
- Change in the urban landscape.

Table 4: Main mitigation action points for the solid waste management intervention.

Impact	Management measures	Site	Frequency	Responsible	Supervision
Vegetation removal.	The removal of vegetation should be centred on the worksite; Proceed with the construction as soon possible.	Solid waste treatment centre (SWTC) 1 SWTC 2	Preparation phase	Contractor	Supervision; municipality; SPA

		SWTC 3			
Dust generation.	Dampening the local track with water to avoid high levels of dust emissions due to the movement of trucks carrying materials; Use of protective masks and personal protective equipment.	SWTC 1 SWTC 2 SWTC 3	Where necessary	Contractor	Supervision; municipality; SPA
Noise generation.	Use hearing protectors and personal protective equipment. Noise emission must not exceed 85 dB.	SWTC 1 SWTC 2 SWTC 3	Monthly	Contractor	Supervision; municipality; SPA
Ground vibrations.	Use of low tonnage equipment according to required safety standards; Observation of indicators of cases of use and their compensation.	SWTC 1 SWTC 2 SWTC 3	Monthly	Contractor	Supervision; municipality; SPA
Movement of vehicles and construction equipment.	Respect for signs; Definition of appropriate areas for manoeuvring and parking of circulating media.	SWTC 1 SWTC 2 SWTC 3	Monthly	Contractor	Supervision; municipality; SPA
Solid waste generation.	Daily cleaning of the construction site; Definition of a point for depositing solid waste integrating the segregation of the same and its subsequent collection; Re-use where possible of certain solid waste resulting from construction; Avoid burning solid waste at the site of the works.	SWTC 1 SWTC 2 SWTC 3	Weekly	Contractor; municipality	Supervision; SPA
Possibility of occurrence of work accident.	Provide first aid kits; Use of EPIs; Emergency contacts to be available in a visible location; Ensure the existence of evacuation vehicles.	SWTC 1 SWTC 2 SWTC 3	Monthly	Contractor	Supervision; municipality; SPA
Possibility of HIV/AIDS contamination.	Raise awareness against HIV/AIDS; Keep condoms in visible and safe places;	SWTC 1 SWTC 2 SWTC 3	Monthly	Empreiteiro	Supervision; municipality; SPA; DDSAS

	Repress discrimination against people with HIV/AIDS.				
Possibility of contamination of COVID-19.	Apply a sanitary protocol (keep at a distance of 2 m, use of masks, hand washing; Identification of a transient isolation room for suspected cases; Contact the health unit; Implement a weekly plant disinfection programme.	SWTC 1 SWTC 2 SWTC 3	Weekly	Empreiteiro	Supervision; municipality; SPA; DDSAS

Recommended actions and approaches

As this intervention has specific benefits towards the environment, the following recommendations are tailored to meet those benefits:

- Apply for an Environmental Permit for the construction of the solid waste management centre in accordance with Decree No. 54/2015 of 31 December on the regulation of the EIA process;
- Building solid waste management centre 3 is not recommended due to its location (in the aerodrome area) being too close to a residential area and allied to the standards of the PEU-Chokwe and the Urban Solid Waste Management regulation;
- Comply with the instructions included in this report in order to ensure effective observation of the guidelines contained therein;
- All activity that may impact the environment should be fully monitored;
- In the implementation phase of the project works, 50 per cent of the workforce should be female;
- Carry out training for the conservation of infrastructures with the participation of community groups;
- Maintenance and cleaning at the construction sites;
- Respect the cultural norms of everyone without discrimination;
- Adoption of integrated solid waste management programmes in the surrounding area so that it is not a place where rodents and other animals live;
- The sense of conservation and protection of community-level infrastructure should be a common denominator;
- Profitability and/or integrated budgeting should be included in the public expenditure of the municipality as much as possible to ensure its maintenance;
- Encourage and revitalize community management committees; and
- Increase the technical and human capacity for the management of solid waste.

Early warning system

The EWS intervention has no impact on the environment, however, this intervention will have a massive social impact and its peculiarities are detailed in annex 2.

Compliance with upholding principles

The AF project displays a remarkable level of sensitivity towards human rights in all its dimensions: it is indeed a human-centred project. The SEA Building Urban Climate Resilience project is upheld by 15 AF principles, gender and environmental and social policies, and a human rights approach.

In line with the baseline review guidelines, communities and the municipality were surveyed on the compliance of 1. AF principles, 2. Women empowerment indicators and 3. Human rights indicators.

1. Adaptation Fund principles

AF principles gravitate around the need of safeguarding domestic legislation, ensuring women and vulnerable groups participation and protection of biodiversity. Detailed results of the review on AF principles can be read in annexes 4 and 5. In summary the review revealed:

- Existence of clear legislation to be applied for each initiative within the scope of the project;
- A fair level of involvement of women and youth in the activities designed by the municipality and community;
- Low sensitivity and knowledge of the inclusion of vulnerable and marginalized people in the community activities and decision-making processes;
- Acceptable observation of core labour rights at municipality level;
- Existing (but non-practical) intention to protect natural habitats and safeguard the conservation of biodiversity; and
- Poor actions on public health concerns.

Chokwe is currently complying with AF principles at a fair level with room for improvement, especially in respect to public health and the conservation of biodiversity.

2. Women empowerment indicators

Women empowerment indicators are essentially the measure of implementation of gender policy. They refer to a positive discrimination approach to capture involvement of women in the society they live in, enabling them to maximize their contribution to mitigation against extreme weather events in the face of climate change.

In summary, the main findings on women empowerment indicators are:

- Gender balance in the establishment of EWS and rescue mechanisms;
- Disregard of gender differences in the activities design and roles setting;
- Poor awareness of women on the needs of protection and rehabilitation of the ecosystem;
- Insignificant knowledge on women empowerment impact; and
- Inexpressive inclusion of women in the decision-making processes.

Although women are evenly participating in sanitation activities – one of the lowest paid work in the city – they are not evenly granted access to leadership positions in this area and are less involved in awareness raising activities resulting in unsustainable waste management and a social unawareness of the need for biodiversity protection.

3. Human rights indicators

A human rights approach cuts across all interventions planned for Chokwe. It is the *modus operandi* adopted by the project to safeguard human dignity over the implementation period and beyond. The level of compliance with a human rights approach has been reviewed using the human rights indicators, as per the baseline review guidelines.

Overall interviewees, particularly community members, could not demonstrate any relevant knowledge or give examples of human rights considerations. Although local media and government entities have been disseminating human rights principles via local campaigns, it has clearly not been effective so far. To clarify, not only is there a critical disregard for the rights of people living with disabilities and the elderly, but also community members do not know the rights of these groups.

The social structure of the targeted neighbourhoods is sufficiently organized to host and sustain effective human rights awareness raising activities and people are willing to learn more on human rights.

Compliance with national standards

In this section the level and extent of alignment of individual sub-projects to the local legislation and regulations, as per the projects upholding principles, are examined.

Drainage system

The drainage system is comprised of four components: the construction of an underground drainage system, rehabilitation of the southern drainage channel, rehabilitation of the northern drainage channel and construction of two new drainage channels.

Underground drainage channel

As indicated previously, this intervention is based on the theories of material resistance, obeying Mozambican and Portuguese regulations complemented by other regulations or recommendations with special attention to Eurocodes, namely:

- Safety Regulation and Actions in Buildings and Bridges – Decree Law No. 235/85 of May 31;
- Regulation of Reinforced and Pre-Hardworking Concrete Structures – Decree Law No. 349 C/83 of July 30;
- E 464 – 2007: Concretes, prescriptive methodology for a project life of 50 and 100 years in the face of environmental actions;
- NP EN 206 – 1: Concrete, Specification, Performance, Production and Compliance;
- NP EN 1991-1-1: 2009;

- Eurocode 0: Bases for the design of structures;
- Eurocode 1: Actions in structures;
- Eurocode 2: Concrete structures project; and
- Eurocode 7: Geotechnical project.

Drainage channels component

Drainage channels are legislated by the Mozambique Urban Terrain Regulation, Decree No. 60/2006. It is suggested that Article 8 of this regulation applies with the areas occupied by the southern and northern drainage ditches considered as a reserve area of the state. The space occupied by the ditches, berms and both sides of the roads at a width of at least 6 m should also be included.

The ditches proposed to be built in the short or medium term, ditches 3.4 and 3.5, should also be included under this legislation. As they are situated on one side of existing municipal roads, the grey area is more what happens at intersections with other roads. However, at least 1–2 m on the side of the berms should be within the reserve area to prevent illegal occupation.

Emanating from the need of an intervention below the local irrigation channel, this component has to comply with the Regulation of Urban Public Systems of Water Supply and Drainage of Waste Waters.

The classification of the climatic regions of Mozambique was applied for the purpose of calculating the rain drainage networks intensity curves: duration and frequency. Chokwe falls in Zone C at the lowest value of the four bands which the country is divided into.

Solid waste management

Table 5 summarizes the legislation in force in Mozambique for Urban Solid Waste Management projects with regard to environmental, social, health and safety aspects. It was previously presented in the phase I and phase II reports. The most important legislation is the Urban Solid Waste Management Regulation.

Table 5: Matrix of legislation on solid waste management.

Thematic Area	Norm	Description
Environmental Law	N 20/97 from 01 October, article 33	Urban solid waste management
Urban Solid Waste Management Regulation	Decree N 94/2014, from 31 December	Chapter I – General provisions Articles: 1 to 7
		Chapter II – Urban solid waste management Articles: 1 to 12
		Chapter III – Fees, infractions and penalties Articles: 19 to 23
		Chapter IV – Final provisions Articles: 24 and 25

		Annex I: Minimum requirement of an integrated plan for urban solid waste management
		Annex II: Annual register sheet on solid waste management

Table 6 details the separate aspects of the solid waste management intervention and whether they are applicable at this stage.

Table 6: Aspects of solid waste management and if applicable.

Location	Denomination by regulation	Description	Assignment
Chapter I Article 1: Definition	Sorting station (collection point)	Infrastructures where waste is separated by manual or mechanical processes into materials intended for recovery	Applicable
	Transfer station (mini collection point)	Transitional installations with the aim of consolidating, preparing and transporting waste	Applicable
	Integrated solid waste management plan	Document containing systematized technical information on waste collection, transport, handling, storage, valorization or disposal operations including monitoring of unloading sites	Not applicable in the present phase
	Segregation	Process of separation of municipal solid waste based on the constituent materials for subsequent recycling, composting, incineration and final deposition	Applicable
	Transport of waste	Any physical waste transfer operation using road means	Applicable
	Waste treatment	Any value or disposal operation, comprising mechanical, physical and thermal processes which alter the characteristics of the waste in order to reduce its volume	Not applicable in the present phase
Article 3	Scope of application	Applies to all natural and legal persons, public or private persons involved in the production and management of solid waste	Applicable

Intervention architecture

- Legislative Diploma No. 1976 – General Regulation of Urban Buildings;
- Decree No. 48/2010 ;
- Fire Safety Regulation (Portugal):
    - Resolution 31/89 of 31 August – Public Services Buildings
    - Decree-Law No. 410/98 of 23 December – Administrative buildings;
- Decree No. 15/2004 of 15 July – Regulation of the systems for the distribution of water and drainage of waste water;
- Decree No. 53/2008 of 30 December – Regulation of Construction and Maintenance of Technical Devices for Accessibility, Circulation and Use of Public Service Systems for Persons with Disabilities or Disabilities.

Safe havens

The architecture work of the safe haven sub-project was normalized under the following legislation:

- Legislative Diploma No. 1976 – General Regulation of Urban Buildings;
- Decree No. 48/2010;
- Fire Safety Regulation (Portugal):
    - Resolution 31/89 of 31 August – Public Services Buildings.
    - Decree-Law No. 410/98 of 23 December – Administrative buildings;
- Decree No. 15/2004 of 15 July – Regulation of the systems for the distribution of water and drainage of waste water;
- Decree No. 53/2008 of 30 December – Regulation of Construction and Maintenance of Technical Devices for Accessibility, Circulation and Use of Public Service Systems for Persons with Disabilities or Disabilities.

Legislation of the environmental and social component applicable to all projects

Constitution of the Republic

Article 85(2) – *The worker has the right to protection, safety and hygiene at work.*
Article 117 – Environment and quality of life.

Environment Law – Law No. 20/97 of 1 October

Define the legal basis for the proper use and management of the environment and its components in order to ensure sustainable development in Mozambique. This law applies to all public or private activities that may directly or indirectly influence the environment.

Regulation on the Environmental Impact Assessment Process Decree No. 54/2015 of 31 December

Establishes and defines the procedures and scope of each phase of the EIA process:

- Article 4. For the purpose of defining the type of EIA to be carried out, the activities should be categorized (this component has not yet been carried out).
- Article 7. Prepare the instruction of the process and be submitted to the environmental authorities (this activity was not carried out because of environmental licensing purposes).

General Directive for Environmental Impact Studies – Ministerial Diploma No. 129/2006 of 19 July.

Provides the general guidelines and parameters for EIA.

Regulation on the Environmental Audit Process – Decree No. 25/2011 of 15 June.

Establishes parameters for environmental audits.

Regulation on Environmental Inspection – Decree No. 11/20006 of 15 June.

Regulates the activity of supervision, control and audit related to compliance with environmental protection standards at national level.

Regulation establishing the legal regime for Accidents at Work and Occupational Diseases – Decree No. 62/2013 of 4 October.

Regulation on The Management of Municipal Solid Waste – Decree No. 94/2014 of 31 December.

Lays down the general principles of management of municipal solid waste and industrial waste with characteristics similar to municipal waste in Article 4, it lays down the obligations of waste producers in Article 11.

Regulation on Hazardous Waste Management – Decree No. 83/2014 of 31 December.

Lays down the general principles of hazardous waste management in Article 4 and lays down the obligations of waste producers in Article 8.

Regulations on Environmental Quality and Effluent Emission Standards – Decree No. 18/2004 of 2 June and Decree 67/2010.

Define environmental quality and effluent emission standards to control and maintain permissible levels of pollutant concentration in environmental components.

Mapping of existing/upcoming initiatives

The SEA Building Urban Climate Resilience project is a contribution to the wider effort to minimize the effect of extreme weather events in Chokwe. Over the years, different initiatives have been designed to tackle the urban resilience challenge by a number of actors. For the interest of the baseline review in its aim to reduce the likelihood of duplication of efforts and/or implementation conflicts, and leverage synergies across different agencies addressing the same thematic, all existing/planned initiatives were mapped. Visibly, the AF

project is the greatest of its kind in Chokwe, however continued coordination with other initiatives is key to maximize the impact of the project in the targeted communities.

Table 7 summarizes current initiatives with relevance to the four interventions in the AF project.

Table 7: Mapping current initiatives of relevance to the SEA Building Urban Climate Resilience project.

#	Intervention	Existing initiative	Donor	Focal point contact
1	Drainage system	Routine maintenance	Municipality funds	846448865 Councilwoman Regina
2	Safe havens and evacuation routes	Reordering of expansion areas in safe locations	Local Urban Development Programme /World Bank	engnaze@gmail.com
3	Early warning system	Revitalization of community radio	National Forum for Community Radio	842213780
4	Solid waste treatment centres	Strengthening the means of collection of solid waste and construction of a sanitary landfill site	Local Urban Development Programme	estrelaantonioantonio@gmail.com engnaze@gmail.com
5	Training in climate change, resilience and emergency rescue	First aid in case of emergency through local committees	Disaster Management National Institute	846448865 Councilwoman Regina

With regard to the drainage system, the municipality has been allocating internal funds to run routine maintenance especially on the main north and south drainage channels. The Local Urban Development Programme (PDUL) will be working on the re-ordering of the city expansion for better navigation on evacuation routes. PDUL has also planned a set of actions aiming to strengthen the capacity of solid waste collection with the construction of a sanitary landfill site. The National Forum for Community Radio is working on the recovery of the frequency assigned to the local radio that the AF project expects to equip and activate. And the National Institute for Disaster Management has been training local disaster management committees in first aid and emergency rescue in the face of natural disasters.

Risk assessment and follow up actions

Risk assessment

The baseline review exposed a set of risks that the project is running into within the scope of its implementation. Most of them have emanated from the project design process with a few connected to the local context. The summary of the risks are shown in table 8.

Table 8: Baseline risk mapping.

#	Risk identified	Risk clarification
1	Loss of community support to the project resulting in inhospitality in implementation areas.	Communities claim that the project failed to carry out approved interventions which is why some of the cancelled interventions were still expected. It also sounded as if the priorities given by the community were not taken into consideration.
2	Project is unfeasible due to informal occupation of the implementation sites.	Implementation sites were not safeguarded after their selection. No commitments were made at any level to safeguard those so people could be held accountable for informal occupation.
3	Loss of municipality support to the project resulting in a lack of prioritization of AF project activities, stemming from delays on the project start-off.	This risk is more of a lesson learned: avoid too much visibility of the project before all preparatory work is finalized. The concept and need of environmental, topographic and other related preparatory work was not clear to the communities. To them, the project launch meant prompt physical intervention straight way which raised hard-to-handle expectations.
4	Disappointment from the municipality leading to a lack of prioritization of AF project activities.	Weak understanding of the project scope (most likely deriving from the language barrier) caused the municipality itself to place high expectations on the project which influence unrealistic budgeting at municipality level.

Follow up actions

A considered follow up action plan to the baseline review should be one that secures proper management of the identified risks and safeguards the agreed time-frame of implementation and compliance of upholding principles. A general follow up plan is proposed in table 9.

Table 9: Follow up action plan.

#	Proposed activity	Responsible	M1	M2	M3	M4	M5	M6	M7
1	Perform baseline review	Oxfam/consultant	■						
2	Return baseline review's main findings to CPCT	Oxfam		■					
3	Consolidate the findings w/- CPCT's inputs	Oxfam			■				
4	Embed the findings to tech. design work	Oxfam/consultant			■	■			
6	Monitor the findings' performance over time	Oxfam/CMCC				■	■	■	
7	Assess the level of their resolution	CPCT							■

Conclusions and recommendations

This useful and revealing baseline review has helped project stakeholders clarify the dimensions of the project implementation, enabling them to foresee challenges and craft solutions ahead of time.

The SEA Building Urban Climate Resilience project remains of highest relevance in Chokwe. Both government and communities are anxious to see the project implemented since it is believed it will provide a safety measure for most of the city-wide urban flooding challenges. However, it is clear that the original plans cannot be implemented as initially stated but with minor to significant changes due in the main to budget constraints. This will cause initiatives such as the solid waste management system and improvement of the drainage system to be only 50 per cent completed which will soon start generating new needs that this project cannot address, at least not in its present shape.

Despite all efforts from the municipality to run similar projects, there are currently not many existing initiatives to build on although donors seem to be more sensitive to a climate adaptation cause.

Chokwe has the structure to accommodate and implement the project successfully to both donor requirements as well as Oxfam values. The city is open to gender strategy and human rights approaches and is flexible enough to house AF upholding principles.

Developed technical designs and plans alone are a meaningful asset for the city. The local authority can use these for future interventions and guides for preventive actions.

An initial factual statement about the project should highlight its relevance in Chokwe. While it is true that the project will not resolve all climate resilience challenges, the review revealed that its approach is essentially the correct approach to seed the movement and contribute to the most pressing needs of the city.

It is crucial that the project team and stakeholders focus on:

- Frank and open dialogue with service providers, city council and donors on the project limitations as this is how project modifications can be understood and supported by everyone involved to ensure smooth implementation;
- Prioritize ownership by sharing developed plans and designs so the city can leverage on them when opportunities present themselves;
- Fundraise continuously to complete the interventions and activities;
- Diligently document all lessons learned from this project from the very beginning up to the project exit. This approach has the potential to help deploy resilience initiatives within similar contexts geographically.

Annexes

Annex 1: Site survey report

Annex 2: Early warning system survey report

Annex 3: Consolidated gender indicator results

Annex 4: Survey applied to municipality staff

Annex 5: Survey applied to the communities

Available at https://oxfam.box.com/s/5qc98vp1lgdp44lys3rcx74s7dlg8mrq

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Thanks!

Oxfam in Mozambique