



**ENVIRONMENTAL AND SOCIAL IMPACT STATEMENT**

**FOR THE**

**PROPOSED WATER SUPPLY IMPROVEMENT PROJECT FOR  
PERI-URBAN AREAS OF LUSAKA CITY: GARDEN PARK  
WARD 10, LUSAKA DISTRICT, LUSAKA PROVINCE, ZAMBIA**

**BY**

**LUSAKA WATER SUPPLY AND SANITATION COMPANY  
LIMITED**

Draft Report, June, 2026

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## **EXECUTIVE SUMMARY**

### **Project Background**

Lusaka Water Supply and Sanitation Company (LWSC) is the largest water and sanitation utility in Zambia, mandated under the Water Supply and Sanitation Act No. 28 of 1997 to provide reliable and sustainable services within Lusaka Province. Despite ongoing investments to expand production and distribution capacity, rapid urbanization and the growth of unplanned and peri-urban settlements, now accommodating about 70% of Lusaka’s population, continue to exert significant pressure on existing water supply infrastructure.

These peri-urban areas experience persistent water supply challenges, characterized by limited piped networks and heavy reliance on unsafe and contamination-prone water sources, particularly during the rainy season. This results in heightened public health risks, including outbreaks of waterborne diseases such as cholera. In line with Zambia’s Vision 2030 and the Eighth National Development Plan (2022–2026), which prioritize universal access to safe water and protection of groundwater resources, LWSC is implementing targeted interventions following the Lusaka Water Supply Master Plan and is implementing various projects aimed at improving water supply in the province.

Within this context, Garden Park Ward 10 has been identified as a priority area due to rapid population growth, low piped water coverage, and elevated public health risks. Consequently, with support from the Japan International Cooperation Agency (JICA), LWSC proposes to implement the project titled “Improvement of Water Supply in Peri-Urban Areas of Lusaka City in the Republic of Zambia” (the Project) as part of ongoing efforts to improve water supply infrastructure and provide sustainable potable water to an estimated 73,200 residents, with a planned supply capacity of approximately 6,400 m<sup>3</sup>/day. The Project will involve the development of groundwater sources, construction of boreholes and elevated storage tanks, installation of pumping facilities, and laying of transmission and distribution pipelines, thereby contributing to improved public health, enhanced living conditions, and socio-economic development in the wider Project area.

In line with the provisions of the Environmental Management Act No. 12 of 2011, as amended by the Environmental Management (Amendment) Act No. 8 of 2023, and the Environmental Impact Assessment Regulations SI No. 3 of 2026, an Environmental and Social Impact Assessment study of the proposed development, which included the assessment of ecological, environmental, and socio-economic impacts of the Project components, was undertaken, and the findings of the study are presented in this report.

## Objectives of the Project

The primary objective is to improve access to safe, reliable, and adequate potable water supply for residents of Garden Park Ward 10 and surrounding peri-urban communities in Lusaka City through the development of sustainable groundwater sources and the construction of a modern piped water supply system. The specific objectives are:

- To construct two elevated water storage tanks with a capacity of about 1,000 m<sup>3</sup> and associated pumping and control facilities in Garden Park Ward 10;
- To install a reticulated water distribution network within Garden Park Ward 10 to supply households, public institutions, and commercial users;
- To reduce reliance on unsafe water sources such as shallow and unprotected wells and thereby lower the incidence of waterborne diseases, including cholera; and,
- To ensure that Project planning, construction, and operation comply with Zambian environmental legislation and JICA environmental and social safeguard requirements.

## Project Location

The proposed project is situated within Chilanga and Lusaka Districts of Lusaka Province. The Project will originate at the groundwater source (boreholes) in the Kalundu area of Chilanga District, approximately 18 km west of the Lusaka Main Post Office and approximately 28.5 km northwest of the Chilanga Post Office.

From this point, the transmission pipeline will follow existing public road reserves, primarily along Mumbwa Road (M9) through Garden Park, terminating in Garden Park Ward 10 of Lusaka District. The termination point is located about 12 km from the Lusaka Main Post Office and approximately 26 km northwest of the Chilanga Post Office. The GPS coordinates of the site are as follows:

Table 1: Coordinates of the Proposed Site

| Label                                                   | Coordinates  |              |           |
|---------------------------------------------------------|--------------|--------------|-----------|
| Point                                                   | Latitude     | Longitude    | Elevation |
| Source of Water (start point and location of boreholes) | 15°24'23.1"S | 28°09'07.7"E | 1238m     |
| Termination Point (elevated storage water tanks site)   | 15°23'50.8"S | 28°13'16.3"E | 1269m     |

**Directors/Shareholders**

Table 2: Directors

| <b>Name</b>           | <b>Position</b> | <b>Nationality</b> | <b>Identity</b> | <b>Physical Address</b>                                                 |
|-----------------------|-----------------|--------------------|-----------------|-------------------------------------------------------------------------|
| Watson Ngambi         | Director        | Zambia             | 248549/67/1     | Plot No 871/2, Katemo Road, Rhodes Park, P.O Box 50198, Lusaka, Zambia. |
| Wesley Kaluba         | Directors       | Zambia             | 325309/67/1     | Plot No 871/2, Katemo Road, Rhodes Park, P.O Box 50198, Lusaka, Zambia. |
| Jilly Chiyombwe       | Director        | Zambia             | 191028/75/1     | Plot No 871/2, Katemo Road, Rhodes Park, P.O Box 50198, Lusaka, Zambia. |
| Melvin Sikazwe        | Director        | Zambia             | 756501/11/1     | Plot No 871/2, Katemo Road, Rhodes Park, P.O Box 50198, Lusaka, Zambia. |
| Ireen Mwansa Chitesha | Director        | Zambia             | 243153/66/1     | Plot No 871/2, Katemo Road, Rhodes Park, P.O Box 50198, Lusaka, Zambia. |
| Bupe Mutanya          | Director        | Zambia             | 142799/25/1     | Plot No 871/2, Katemo Road, Rhodes Park, P.O Box 50198, Lusaka, Zambia. |
| Charlston Hamulyata   | Director        | Zambia             | 134668/72/1     | Plot No 871/2, Katemo Road, Rhodes Park, P.O Box 50198, Lusaka, Zambia. |
| Rabbecca Hantoongo    | Director        | Zambia             | 183548/10/1     | Plot No 871/2, Katemo Road, Rhodes Park, P.O Box 50198, Lusaka, Zambia. |

Table 3: Shareholders

| <b>Name of Business</b>   | <b>Shareholder /Member</b> | <b>% Shares</b> | <b>Share Class</b> |
|---------------------------|----------------------------|-----------------|--------------------|
| Chilanga Town Council     | Yes                        | 9.9             | Ordinary           |
| Chongwe Municipal Council | Yes                        | 9.9             | Ordinary           |
| Kafue Town Council        | Yes                        | 17.4            | Ordinary           |
| Luangwa Town Council      | Yes                        | 9.9             | Ordinary           |
| Lusaka City Council       | Yes                        | 42.9            | Ordinary           |
| Rufunsa Town Council      | Yes                        | 9.9             | Ordinary           |

## **Proposed Project Cost and Implementation Date**

The total investment cost has been estimated based on preliminary designs, equipment, construction works, and environmental management measures. However, the detailed project cost is commercially sensitive and therefore cannot be disclosed at this stage.

The Project is expected to commence upon receipt of all required approvals and is scheduled for completion within a period of 24 to 28 months. It is designed to have an operational lifespan of approximately 50 years.

## **Project Description**

Lusaka Water Supply and Sanitation Company (LWSC), with support from the Japan International Cooperation Agency (JICA), proposes to implement the Project for the Improvement of Water Supply in Peri-Urban Areas of Lusaka City.

The proposed Project involves the development of a raw water transmission pump station and storage facility at the well field, alongside a distribution reservoir station at Garden Park Ward 10. It is designed to abstract, temporarily store, and pump raw water through transmission pipelines for distribution to Garden Park and surrounding peri-urban areas.

The project comprises two main sites:

- i. Well field transmission pump station site (water source): - This includes a raw water receiving tank, pump house, and associated infrastructure.
- ii. Garden Park distribution reservoir site (termination point): This includes elevated storage tanks, distribution pipelines, flow measurement facilities, and administrative buildings.

The infrastructure will support reliable water transmission and distribution through reinforced concrete structures, underground pipelines, electrical installations, drainage systems, and security facilities. The proposed Project sites/components include:

- **Well field transmission pump station and raw water storage facility (water source):**
  - Raw water receiving tank: A reinforced concrete ground-level tank (118.8 m<sup>2</sup>) that receives water from boreholes before pumping;
  - Transmission pumping station: Houses pumps, control panels, and electrical equipment, directly connected to the storage tank and transmission pipeline;
  - Office building: Operational control and staff workspace;
  - Guard house: Security control at the entrance (approx. 16 m<sup>2</sup>);
  - Transmission pipelines (approximately 12 km): Underground pipelines connecting the well field to the distribution reservoir;

- Sanitation system: Underground septic tank;
- Parking area: Crushed stone-paved surface; and
- Perimeter infrastructure: A 2.0 m high block wall with barbed wire and a 4.0 m × 2.0 m electric sliding gate.
- **Garden Park distribution reservoir station (termination point):**
  - Elevated storage tanks: Two reinforced concrete tanks (1,000 m<sup>3</sup> each) providing gravity-based water distribution;
  - Administration building: Staff offices and operational management space;
  - Flowmeter room: Houses bulk flow measurement equipment (approx. 40 m<sup>2</sup>);
  - Main distribution pipeline: DN 400 mm pipeline distributing water to the network;
  - Transmission pipeline: DN 350 mm pipeline conveying water from the pumping station to the reservoir;
  - Drainage infrastructure: DN 150 mm rainwater drainage pipes with crushed stone permeation areas;
  - Sanitation facilities: Septic and rock absorption tanks;
  - Parking area; and
  - Security infrastructure: A 2.0 m high block wall with barbed wire, an electric sliding gate, and a guard house.

The Project will also include associated infrastructure such as pumping stations, guard houses, and ancillary works required for effective water supply operations. Construction activities will include the installation of submersible pumps, excavation and trenching for pipelines, concrete works for foundations and structures, and the installation of mechanical and electrical equipment. During operation, the system will abstract groundwater at approximately 98–100 litres per second, store it in elevated tanks, and distribute it through the piped network.

The proposed Project will be implemented in three phases, namely: the preparation phase, construction phase, and operation phase. In terms of technology and raw material use, the Project will be constructed in accordance with all relevant Zambian standards.

Specialized local contractors will be engaged for construction works. As far as possible, priority will be given to employing labour from local communities around the Project area, although some of the contractor's permanent skilled staff may be sourced from other areas.

## **Technology**

The infrastructure will be constructed using reinforced concrete and appropriate pipeline materials, with associated drainage, electrical, and mechanical installations, and site reinstatement upon completion. Construction machinery and equipment to be used for the project will generally include the following:

- Earthmoving equipment: excavators, loaders, graders, and trenchers;
- Hauling and transport equipment: dump trucks and tippers;
- Material handling equipment: cranes, forklifts, and hoists;
- Construction and installation equipment: concrete mixers, batching equipment, compactors, welding machines, pipe-laying equipment, road-making and reinstatement machinery, and spraying and plastering machines.

## **Project Alternatives**

The impact assessment process will consider feasible alternatives to identify the most appropriate option for the proposed Bulk Water Supply Project, taking into account technical feasibility, environmental and social impacts, cost considerations, and the need to ensure reliable water supply to the project area. The alternatives to be assessed include the following:

### ➤ Project Alternative

The proponent had two project alternatives, which is the no action option or to implement the proposed project.

- i. The No Action Alternative – this option involves not implementing the proposed water supply improvement project.
- ii. The Proposed Project Alternative – This option entails the construction and operation of the water supply improvement project.

The proposed project has been selected as the preferred alternative because it provides a reliable, sustainable, and cost-effective solution to the water supply challenges in Garden Park Ward 10. The no-action alternative was rejected because it would maintain the current inadequate water supply conditions and fail to deliver socio-economic and public health benefits. In contrast, the proposed project improves water access, supports economic activities, and enhances living conditions for the target population.

### ➤ Technology and / or Design Alternatives

- i. Borehole development configuration
  - Four high-yield boreholes (Preferred Option)
  - Thirteen boreholes
- ii. Water treatment technology alternatives
  - Chlorine disinfection only (Preferred Option)
  - Advanced treatment (Ion exchange or Reverse Osmosis)
- iii. Transmission system design alternatives
  - Conventional pumped transmission system (Preferred Option).
  - Alternative short-distance system with intensive treatment.

The preferred design option consists of a simplified system using a limited number of high-yield boreholes, chlorine disinfection, and a conventional pumped transmission system. This configuration was selected because it provides a cost-effective, reliable, and operationally manageable solution.

The alternative involving multiple boreholes and advanced treatment was rejected due to higher capital and operational costs, increased technical complexity, and greater maintenance requirements.

➤ Site Alternatives

- i. Option 1: Distant Borehole Site with Pipeline along M9 Road Reserve and Garden Park Inner Roads (Preferred Option) - This option involves locating boreholes in the Kalundu Area in an undeveloped area away from the densely populated supply area (Garden Park) where groundwater quality is relatively high and less susceptible to contamination. The pipeline is routed along the M9 road reserve and extends into Garden Park through the internal road network.
- ii. Option 2: Nearby Borehole Site with Short Pipeline Route (Approximately 2 km) This option involves locating boreholes in Garden Park (the demand area), thereby reducing the required pipeline length.

The preferred alternative combines a distant borehole site and routing along existing road corridors, as it ensures access to high-quality groundwater and supports the use of simple, cost-effective treatment technology. Although the pipeline is longer, the use of road reserves minimizes environmental and social impacts, reduces land acquisition requirements, and facilitates easier construction and maintenance. The nearby borehole option was rejected due to the higher risk of contamination and the associated need for advanced treatment technologies, which would significantly increase costs and operational complexity. The no-action alternative was rejected because it does not meet the objective of improving access to safe and reliable water supply.

➤ Water Supply Alternatives

- i. Continued reliance on existing boreholes (groundwater abstraction only)
- ii. Bulk water supply system from dedicated borehole field (Proposed Option)

The bulk water supply system has been selected as the preferred alternative because it provides a reliable, sustainable, and long-term solution to the water supply challenges in Garden Park Ward 10. Continued reliance on individual boreholes was rejected because it is unable to sustainably meet increasing demand and may result in over-abstraction of groundwater resources, leading to declining yields and potential long-term resource depletion. The proposed bulk water supply system ensures controlled abstraction,

improved water quality management through centralized treatment, and reliable distribution to the entire service area. It also supports planned urban growth and development while reducing the cumulative environmental pressure associated with dispersed borehole systems.

➤ Sewage Management

The following sewage management alternatives were considered:

- i. Continued reliance on existing on-site sanitation systems (No formal intervention / No-action alternative) - Under this option, the project would rely entirely on existing sanitation systems within the project area, which include pit latrines and septic tanks.
- ii. Use of LWSC-managed centralized sewer connection (where applicable) - This option considers connection to the existing LWSC sewerage network where infrastructure is available.
- iii. Portable chemical toilets for construction and on-site septic systems for operations (Preferred Option) - During the construction phase, sanitation will be managed through the provision of hired portable chemical toilets at active work areas along the pipeline corridor and associated sites.

The preferred sanitation approach combines portable chemical toilets during construction and septic tank systems for operational facilities. This option was selected because it is practical, immediately implementable, and appropriate for an area not currently served by the LWSC sewer network. Portable chemical toilets ensure hygienic conditions during construction activities, while septic tank systems provide a safe and compliant solution for permanent facilities such as pumping stations and reservoirs. Both systems will be managed in accordance with LWSC sanitation and environmental guidelines, including regular servicing and safe disposal of wastewater at approved facilities.

The option of relying solely on existing on-site sanitation systems was rejected due to hygiene risks and limited capacity to support construction and operational needs. Direct connection to the LWSC sewer network is not currently feasible due to the absence of nearby sewer infrastructure, although it remains a potential long-term option as urban services expand.

➤ Power Supply

The following power supply options were considered:

- i. Grid Connection (ZESCO Only) – This option involves connecting the project infrastructure to the national electricity grid operated by ZESCO Limited.

- ii. Diesel Generators Only – This option would involve powering the project infrastructure entirely through diesel generators.
- iii. Grid Connection with Backup Generators – This option involves using the national grid as the primary power source while installing diesel generators to provide backup power for critical infrastructure in the event of grid outages.

Power required for the operation of associated infrastructure such as valves, control systems, and pumping facilities will primarily be supplied through the national electricity grid operated by ZESCO Limited. Backup generators may be incorporated for critical infrastructure to ensure continuity of water supply in the event of power outages.

This option was selected because it provides a reliable and cost-effective power supply while minimizing environmental impacts associated with continuous diesel generator use. The use of backup generators ensures operational resilience and continuity of water supply in the event of interruptions to the national grid.

### **Relevant Legislation**

The proposed project falls under the First Schedule of the Environmental Impact Assessment (EIA) Regulations SI no.3 of 2026, and it is therefore a requirement that an Environmental and Social Impact Assessment (ESIA) study be carried out. The ESIA study should also include Environmental policies and framework. The ESIA study should also include Environmental policies and framework.

This study took into account the following relevant legislation:

1. The Environmental Management Act No. 12 of 2011 as amended by Environmental Management (Amendment) Act No. 8 of 2023.
2. Environmental Management (Environmental Impact Assessment) Regulations, SI no.3 of 2026
3. Environmental Management (Licensing) Regulations, SI No. 112 of 2013
4. The Standards Act No. 4 of 2017
5. Local Government Act No. 2 of 2019
6. The Water Resources Management Act No. 21 of 2011
7. The Zambia National Public Health Institute Act, No.19 of 2020
8. Statutory Instrument No. 21, Public Health (Corona Virus) Infectious Disease
9. Statutory Instrument No. 22 of 2020, the Public Health (infected areas) (Corona Virus Disease) Regulations, 2020
10. The Public Health (Notifiable Infectious Disease) (Declaration) Notice, 2020
11. Urban and Regional Planning Act No. 3 of 2015
12. The Occupational Health and Safety Act, No. 16 of 2025
13. Roads and Road Traffic Act No. 2 of 2011

14. The Workers' Compensation Act No. 10 of 1999
15. Solid Waste Regulations & Management Act No. 20 of 2018
16. The Lands Act No. 20 of 1996 read as one with the Lands Amendment Act No 20 of 2015
17. The Energy Regulation Act No. 12 of 2019
18. The Public Roads Act No. 12 of 2002
19. The Employment Code Act No. 3 of 2019
20. National Council for Construction Act No. 10 of 2020
21. The Factories Act cap 441 No. 2 of 1966
22. The Gender Equity and Equality Act No.22 of 2015
23. The National HIV/AIDS/STI & TB Council Act No. 10 of 2002 read as one with The National HIV/AIDS/STI/TB Council (Amendment) Act, No. 8 of 2021
24. Metrology Act No.7 of 2017
25. The Water Supply and Sanitation Act No. 28 of 1997
26. The Investment Act No. 4 of 2015
27. Relevant International Agreements and Conventions and
28. International Best Practice Guidelines and Standards
29. The Compulsory Standards Act No.3 of 2017
30. IFC Performance Standards (PS) 1–8 (Environmental and Social Sustainability)
31. World Bank Environmental and Social Framework (ESF)
32. WHO Guidelines for Drinking Water Quality
33. International Finance Corporation (IFC) Guidance on Water Infrastructure Projects
34. ISO 14001 – Environmental Management Systems
35. ISO 45001 – Occupational Health and Safety Management Systems
36. Montreal Protocol on Substances that Deplete the Ozone Layer (1987)

### **Major Impacts and Environment Management Commitments**

The proposed project is expected to have the following positive impacts:

- Provision of employment;
- Capacity building for the local community;
- Increased public revenue;
- Improved water supply reliability in Garden Park and nearby communities;
- Increasing access to clean water; and,
- Market for local products and services.

Enhancement of the positive impacts:

- To ensure that employment is given to the local people, workers will be employed on the basis of merit and not gender or race.

- To ensure capacity building the developer will ensure that the supervisors/skilled workers explain to the semiskilled and unskilled workers the reasons to why tasks are done a certain way and the steps required to complete a certain activity.
- All relevant taxes and scrutiny fees will be paid to the relevant authorities.
- The developer will ensure that the proposed project adheres to the specified site layouts. Additionally, they will oversee the implementation of the project by qualified contractors to ensure the longevity of the bulk water supply system.
- Local suppliers for raw materials will be called upon. All the products that can be procured locally will be procured locally.
- Water supply reliability will be improved through the construction of durable infrastructure, provision of adequate storage, and implementation of routine maintenance and staff capacity building to ensure efficient and sustainable system operation.
- Access to clean water will be enhanced by extending the distribution network, promoting affordable household connections, and conducting regular water quality monitoring and community sensitization on safe water use.

The proposed project will also have negative impacts during its lifecycle. The project negative impacts include:

- Noise and air pollution arising from equipment and vehicles during the preparation, construction, and operation phases;
- Accidental spillage of vehicle lubricants which may inadvertently contaminate surface water, groundwater, and/or soil;
- Occupational health and safety risks due to activities on site;
- Public health and safety risks;
- Waste nuisance;
- Temporary loss of trading facilities for traders along the pipeline route;
- Traffic disruption, access restrictions, and business interruption arising from pipeline construction and trench excavation, which may temporarily affect traffic flow, access to businesses, institutions, residences, health facilities, and service stations, resulting in inconvenience and temporary loss of income; and
- Loss and disturbance of structures and nearby infrastructure, including kiosks, trading booths, paved surfaces, signposts, utility services, boundary walls, and structures located close to the pipeline route.

To mitigate the impact arising from the proposed project the developer will put up the following measures:

- Noise and vibration management - the contractor(s) will adopt the international standard of 85 decibels (dB) for exposure of its employees to noise over an 8-hour shift. Employees

will wear appropriate hearing protection in workplaces where noise levels exceed 85 dB, all machinery will be regularly maintained to ensure the same are as quiet as possible;

- Air pollution from dust – the project site will be equipped with appropriate emission abatement equipment. Workers will be given appropriate PPE to avoid exposure to dust;
- Hydrocarbon spillages - the developer will ensure that contractor(s) on site will have well trained supervisors who will ensure proper maintenance and handling machinery to prevent spills/leakages of hydrocarbons to the environment.
- Occupational health and safety - workers on site will be inducted in occupational health and safety, and the site will have a competent health and safety officer to ensure compliance to health and safety procedures and guidelines;
- To ensure public safety, the site will have restricted access and have strict waste management procedures to prevent water contamination;
- Waste to be disposed will be managed by the use of bins in designated areas on site which will be later removed from site by a licensed waste collection company.
- Traffic and access management – warning signs, barriers, flag personnel, and traffic management measures will be implemented during construction. Works will be undertaken in short sections using a phased or rolling approach to minimise disruption;
- Maintenance of access – safe pedestrian and vehicular access, including emergency access to health facilities, businesses, residences, and service stations, will be maintained at all times. Temporary crossings, steel plates, ramps, or alternative access routes will be provided where necessary;
- Stakeholder communication – affected businesses, institutions, and communities will be provided with advance notice of construction activities, expected disruptions, and access arrangements;
- Protection of structures and infrastructure – affected assets, utilities, and nearby structures will be identified and documented prior to construction. Excavation near utilities and structures will be carefully controlled and supervised to minimise damage; and
- Reinstatement of disturbed areas – disturbed infrastructure, paved surfaces, access points, and utilities will be reinstated promptly after construction. Trenches will be properly compacted after backfilling to prevent settlement, and any construction-related damage will be repaired or compensated appropriately.

To ensure successful implementation of mitigation measures, parameter monitoring and subsequent audits, the Environmental Social Management Plan (ESMP) will be strictly adhered to. The Environmental Monitoring Plan (EMP) summarises mitigation measures to be taken during the project implementation and operation phases in order to eliminate adverse environmental and social impacts, offset them, or reduce them to acceptable levels. The plan identifies and assigns responsibilities to key stakeholders at the various project phases.

## **Public Consultation and Disclosure**

Stakeholder engagement formed a key component of the ESIA process. A central scoping meeting was held on 18<sup>th</sup> February, 2026 at the Pentecostal Holiness Church in Garden Park, Lusaka, attended by representatives from the project proponent (LWSC), environmental consultants (DHEC), government institutions, local leadership, and community members. A total of 102 participants (64 females and 38 males) attended the meeting, where the proposed project and ESIA process were presented and stakeholder views were collected.

Key issues raised included the cost of household water connections, reliability of the water source, project implementation timelines, potential disturbances during construction, road reinstatement after construction, and the need for continued stakeholder engagement and transparency.

In addition, targeted consultations were conducted from the 16<sup>th</sup> to 25<sup>th</sup> February, 2026 with traders and property owners along the Mumbwa Road servitude through door-to-door and cluster-based engagements to ensure that stakeholders directly affected by the proposed project were adequately consulted. A total of 87 stakeholders (48 males and 39 females) were engaged, including operators of medical facilities, filling stations, kiosks, small businesses, and nearby residents. Key concerns focused on maintaining access to businesses and emergency services during construction, protection of existing infrastructure such as fuel tanks and utilities, dust and safety management, timely restoration of affected surfaces, and opportunities for local employment.

A public disclosure meeting was held on 24<sup>th</sup> March 2026 at the Pentecostal Holiness Church in Garden Park. The meeting formed part of the statutory ESIA process and provided stakeholders with an opportunity to review the findings of the environmental and social studies, seek clarification, and provide final input prior to submission of the ESIA report to ZEMA.

The session was attended by 46 participants (30 females and 16 males), representing community members, government agencies, utility providers, and local leadership. Discussions focused on key issues, including land acquisition for project infrastructure, affordability of household connections, access to water for vulnerable households, protection of public health, coordination with road authorities during construction, and the Project's grievance redress mechanism.

The meeting confirmed strong stakeholder support for the Project, largely due to its potential to improve water access and reduce the risk of waterborne diseases in the area. It also provided a platform for the Project team to clarify implementation procedures, outline proposed mitigation measures, and assure participants of continued stakeholder engagement throughout the Project lifecycle.

## **Recommendations**

To ensure the Project’s long-term viability and regulatory compliance, the Environmental and Social Management Plan (ESMP) shall be strictly implemented and supported by a robust monitoring and reporting system. Particular attention shall be given to the effective management of temporary socio-economic impacts associated with pipeline construction, including the timely compensation for affected assets and temporary loss of income, as well as the reinstatement or reconstruction of affected business structures within the road reserve.

In addition, comprehensive rehabilitation of all disturbed areas along the pipeline route should be undertaken, including backfilling, regrading, and replanting of indigenous vegetation to restore the affected landscape to its original or improved condition. Furthermore, the developer shall maintain continuous stakeholder engagement throughout the Project lifecycle to ensure transparency, promptly address community concerns, and foster sustained local support. An effective grievance redress mechanism should remain operational throughout implementation to ensure that complaints are managed and resolved in a timely and equitable manner.

## **Conclusion**

The proposed *Water Supply Improvement Project for Peri-Urban Areas of Lusaka City (Garden Park Ward 10)* is expected to deliver substantial social and economic benefits through improved access to safe and reliable potable water, enhanced public health conditions, and strengthened local livelihoods. Stakeholder engagement conducted during the assessment indicated strong community support, particularly in view of the anticipated improvements in water security and sanitation services.

The assessment identified a range of environmental and social impacts associated with the construction, operation, and decommissioning phases. These impacts are generally localized, short-term, and manageable through the implementation of the prescribed Environmental and Social Management Plan (ESMP), as well as compliance with national regulatory requirements and applicable international standards.

In conclusion, the project is considered environmentally acceptable and socially beneficial. With the effective implementation of mitigation and monitoring measures, the long-term positive outcomes of the project are expected to outweigh the identified adverse impacts, thereby supporting sustainable development objectives within the project area.

## **NON-TECHNICAL SUMMARY (English)**

### **The Project**

Lusaka Water Supply and Sanitation Company (LWSC) is responsible for providing water and sanitation services in Lusaka. However, due to rapid population growth, especially in peri-urban areas (areas on the outskirts of the city), many people still do not have reliable access to clean water. Approximately 70% of Lusaka's population lives in these areas.

As a result, many residents rely on unsafe water sources, particularly during the rainy season, which increases the risk of waterborne diseases such as cholera.

To address this challenge, LWSC is working to improve water supply systems across the city. Garden Park Ward 10 has been identified as a priority area due to its growing population and limited access to safe and reliable water.

With support from the Japan International Cooperation Agency (JICA), LWSC plans to develop new groundwater sources, drill boreholes, construct water storage tanks, and install pipelines to supply clean water to approximately 73,200 people.

The Project is expected to improve public health, enhance living conditions, and contribute to a better quality of life for the community.

### **Project Description and Components**

The Project aims to improve access to clean and reliable water for people living in Garden Park Ward 10 and surrounding areas. Water will be collected from underground using boreholes, stored in tanks, and then pumped through pipelines to homes and other users within the community.

The Project has two main locations:

#### **1. Water Source Area (Well Field)**

This is where water will be collected from the ground. The following facilities will be developed at this site:

- A large tank to collect water from boreholes;
- Pumps to move water through pipelines;
- A small office for workers;
- Security features such as a guard house and perimeter fence;
- Underground pipelines (approximately 12 km long) to transport water to the distribution area; and
- Basic facilities such as sanitation (toilets) and parking space.

#### **2. Distribution Area (Garden Park)**

This is where the water will be stored and then distributed within the community. At this site, there will be:

- Two large elevated water tanks for storage;

- Pipelines to distribute water to homes and surrounding areas;
- An office for managing operations;
- Equipment to measure water supply;
- Drainage systems to manage rainwater; and
- Sanitation facilities, parking space, and security features.

During construction, activities will include digging trenches, laying pipelines, building tanks and structures, and installing pumps and other equipment. Once completed, the system will pump water from underground, store it in tanks, and distribute it through pipelines to provide safe and reliable water to the community.

Overall, the Project will help improve access to clean water, reduce water-related health risks, and enhance living conditions in the area.

### **Objective of the Project**

The main goal of the Project is to ensure that people in Garden Park Ward 10 and surrounding areas have access to adequate, clean, and safe water on a daily basis. This will be achieved by abstracting groundwater and supplying it through a well-developed pipeline system.

### **Project Location**

The Project will be implemented in Chilanga and Lusaka Districts in Lusaka Province.

Water will be sourced from underground (boreholes) located in the Kalundu area of Chilanga District, approximately 18 km from Lusaka City Centre and about 28.5 km from Chilanga Town Centre. From the well field, water will be transported through pipelines that will largely follow the Mumbwa Road corridor, passing through Garden Park. The water will then be delivered to its final destination in Garden Park Ward 10 in Lusaka District, located approximately 12 km from Lusaka City Centre and about 26 km from Chilanga Town Centre.

### **Investment Cost**

The total cost of the Project has been estimated; however, the exact figure is not being disclosed at this stage. Implementation will commence once all required approvals have been obtained. The construction phase is expected to take approximately 2 to 2.5 years, while the Project is designed to operate for an estimated lifespan of about 50 years.

### **Technology**

Construction of the Project will involve the use of machinery and manual labour.

## Identified Environmental and Social Impacts, and Mitigation and Enhancement Measures

The proposed Project is expected to result in a range of environmental and socio-economic impacts. These may include both positive and negative effects on the surrounding environment and local communities. Appropriate mitigation and enhancement measures will be implemented to manage potential negative impacts and strengthen the expected benefits of the Project.

Table 4: Potential Impacts, Mitigation/Enhancement Measures

| POSITIVE IMPACTS                                                                                                                                                                                                     | ENHANCEMENT MEASURE                                                                                                                                                                                                                                                                                                      |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Job creation and skills development:</b> The Project will create temporary employment opportunities and provide workers with practical skills during construction and operation.                                  | <ul style="list-style-type: none"> <li>Local people will be prioritised for employment opportunities where possible.</li> <li>Workers will be provided with training to improve technical, health, safety, and operational skills.</li> </ul>                                                                            |
| <b>Reliable access to clean water:</b> Communities, institutions, and businesses will benefit from improved access to safe and reliable water supply.                                                                | <ul style="list-style-type: none"> <li>Tanks, pumps, and pipelines will be regularly inspected and maintained.</li> <li>Adequate water storage capacity will be provided to support supply reliability.</li> <li>Leaks and damaged pipes will be repaired promptly to prevent water losses and contamination.</li> </ul> |
| <b>Improved public health and sanitation:</b> Improved water supply will contribute to reduced incidence of waterborne diseases such as cholera, dysentery, and typhoid.                                             | <ul style="list-style-type: none"> <li>Water quality will be regularly monitored to ensure compliance with applicable standards.</li> <li>Communities will be sensitised on safe water handling, storage, hygiene, and sanitation practices.</li> </ul>                                                                  |
| <b>Improved community services and local economy:</b> Reliable water supply will support schools, clinics, businesses, service stations, and households, thereby improving service delivery and economic activities. | <ul style="list-style-type: none"> <li>Water infrastructure will be maintained to minimise service disruptions.</li> <li>Users will be educated on the proper use and protection of the water supply system.</li> </ul>                                                                                                  |
| <b>Job creation and skills development:</b> The Project will create temporary employment opportunities and provide workers with practical skills during construction and operation.                                  | <ul style="list-style-type: none"> <li>Local people will be prioritised for employment opportunities where possible.</li> <li>Workers will be provided with training to improve technical, health, safety, and operational skills.</li> </ul>                                                                            |
| NEGATIVE IMPACT                                                                                                                                                                                                      | MITIGATION MEASURE                                                                                                                                                                                                                                                                                                       |

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| <p><b>Risk of HIV/AIDS and communicable diseases:</b> Increased workforce presence may increase public health risks.</p>                                                                                                                                                                                              | <ul style="list-style-type: none"> <li>Workers and nearby communities will receive awareness training on HIV/AIDS and communicable diseases.</li> <li>Preventive measures and safe practices will be promoted throughout the Project.</li> </ul>                                                                                                                                                                                                                                                                                                                   |
| <p><b>Noise, dust, vibration, and general construction nuisances:</b> Construction activities may cause dust emissions, noise, vibration, visual disturbance, and inconvenience to nearby residents, businesses, and road users.</p>                                                                                  | <ul style="list-style-type: none"> <li>Water will be sprayed on exposed areas and access roads to suppress dust.</li> <li>Trucks transporting materials will be covered.</li> <li>Construction equipment and vehicles will be regularly maintained.</li> <li>Noisy activities will be limited to daytime hours where practicable.</li> <li>Affected communities and businesses will be informed of construction schedules in advance.</li> <li>Construction activities will be undertaken in phases to minimise prolonged disruption.</li> </ul>                   |
| <p><b>Waste generation and pollution risks:</b> Construction and operation activities may generate solid waste, wastewater, and accidental spills that could contaminate soil and water resources.</p>                                                                                                                | <ul style="list-style-type: none"> <li>Waste bins and temporary sanitation facilities will be provided on site.</li> <li>Wastewater and sewage will be properly managed through approved sanitation systems.</li> <li>A licensed waste management company will be engaged for waste collection and disposal.</li> <li>Machinery will be regularly maintained to prevent fuel and oil leaks.</li> <li>Spill prevention and emergency response measures will be implemented.</li> <li>Reusable and recyclable materials will be recovered where possible.</li> </ul> |
| <p><b>Traffic disruption, access restrictions, and business interruption:</b> Pipeline construction and trench excavation may temporarily disrupt traffic flow, access to businesses, institutions, residences, health facilities, and service stations, resulting in inconvenience and temporary loss of income.</p> | <ul style="list-style-type: none"> <li>Warning signs, barriers, flag personnel, and traffic management measures will be implemented.</li> <li>Construction works will be carried out in short sections using a phased or rolling approach.</li> <li>Safe pedestrian and vehicular access, including emergency access, will be maintained at all times.</li> </ul>                                                                                                                                                                                                  |

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|                                                                                                                                                                                                                                                                                                  | <ul style="list-style-type: none"> <li>• Temporary crossings, steel plates, ramps, or alternative access routes will be provided where necessary.</li> <li>• Affected businesses and institutions will receive advance notice of construction activities and access arrangements.</li> <li>• Livelihood restoration and compensation measures will be implemented.</li> </ul>                                                                                                                                                                                                                                                                                                                      |
| <p><b>Loss and disturbance of structures and nearby infrastructure:</b> Construction activities may result in temporary or permanent disturbance to kiosks, trading booths, paved surfaces, signposts, utility services, boundary walls, and structures located close to the pipeline route.</p> | <ul style="list-style-type: none"> <li>• Affected assets and utilities will be identified and documented before construction.</li> <li>• Excavation near utilities and structures will be carefully controlled and supervised.</li> <li>• Disturbed infrastructure, utilities, access points, and paved surfaces will be reinstated promptly after construction.</li> <li>• Trenches will be properly compacted after backfilling to prevent settlement and maintain access.</li> <li>• Any construction-related damage will be repaired or compensated appropriately.</li> </ul>                                                                                                                  |
| <p><b>Occupational and community health and safety risks:</b> Open trenches, heavy machinery, dust, and construction activities may pose risks to workers, businesses, nearby communities, and public facilities.</p>                                                                            | <ul style="list-style-type: none"> <li>• Personal protective equipment (PPE) will be provided and used by all workers.</li> <li>• Open trenches will be barricaded, signposted, and illuminated, particularly at night.</li> <li>• Steel plates, temporary bridges, or safe crossings will be installed where required.</li> <li>• Fire-fighting equipment and first aid kits will be provided on site.</li> <li>• Qualified health and safety personnel will supervise works and conduct regular inspections.</li> <li>• Enhanced safety, dust suppression, and noise control measures will be implemented near hospitals, clinics, churches, schools, and other sensitive facilities.</li> </ul> |
| <p>Chance discovery of cultural heritage resources during excavation works.</p>                                                                                                                                                                                                                  | <ul style="list-style-type: none"> <li>• A chance finds procedure will be implemented during construction.</li> <li>• Works will stop immediately if any cultural or archaeological materials are discovered.</li> <li>• Relevant authorities will be notified and guidance followed before works resume.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                               |

Appropriate mitigation and enhancement measures will be implemented to address the identified impacts. These measures will be outlined and managed through the Environmental and Social Management Plan (ESMP).

No physical resettlement of people will be required under the Project. Environmental, Health, and Safety (EHS) awareness campaigns will be conducted regularly to help reduce potential occupational health and safety risks.

## **NON-TECHNICAL SUMMARY (Nyanja)**

### **Pulojekiti**

Lusaka Water Supply and Sanitation Company (LWSC) ni bamene bama peleka thandizo ya manzi na zo yelesa mu Lusaka. Koma, chifukwa cha kukwela msanga kwa chibelengelo cha bantu, makamaka m'madera a mumbali (madera a kunja kwa tawuni), bantu bambili balibe mopezela mamanzoyera. Pafupifupi 70% ya bantu ba mu Lusaka bamankala mumalo aya.

Chifukwa cha izi, bantu bambili bamachetekela manzi osayera, makamaka ntawi ya mvula, ndiye zamene zima wonjezela matenda obwela chifukwa cha manzi monga kolera.

Pofuna kusiliza vuto iyi, LWSC ili kusebenza kukonza njila zopelekela manzi mutawuni yonse. Garden Park Ward 10 yazibika kuti ni yofunika kwambili chifukwa cha kuchuluka kwa bantu komanso kusapeza manzi abwino komanso ochetekela.

Motandizidwa na ba Japan International Cooperation Agency (JICA), LWSC ikonzekela kupanga magwero asopano a manzi apansi, kubowola mabowo amanzi, kumanga matanki osungila manzi, na kunkazikisa mapaipi opelekela manzi oyera kuli bantu pafupifupi 73,200.

Pulojekiti iyi iyenera kupitisa pasogolo thanzi la anthu, kupititsa pasogolo umoyo wa bantu, nakutandizila kuti umoyo unkale wabwino kuli bantu ba m'mudzi.

### **Kufotokozela kwa Pulojekiti na Zigawo**

Pulojekiti iyi ifuna kukonza mwayi wopeza manzi oyera komanso ochetekela kuli bantu bonkala mu Garden Park Ward 10 na madera ozungulila. Manzi azatengewa kuchokela pansi pa doti po sebenzesa zibowo, kusungiwa m'matanki, na kupompa na mapaipi kupita ku manyumba na kuli bantu bena kuti ba sebenzese m'dera.

Pulojekiti iyi ili na malo abili akulu:

#### **1. Kochosela Manzi (Malo Amugodi wa Manzi)**

Apa ndiye pamene manzi azachosewa pansi. Izi ndiye zamene ziza pangiwa pamalo apa:

- Tanki yaikulu yotengela manzi m'mabowo;
- Mapampu oyendesa manzi mu mapaipi;
- Ofesi yaying'ono ya bogwila nchito;
- Za chitetezo monga nyumba ya amalonda na fensi yozungulila;
- Mapaipi apansi pa doti (pafupifupi makilomita 12) kuti azinyamula manzi kupita kumalo ogawa; na
- Malo ofunikila monga zaukondo (zimbudzi) na malo oimikapo magalimoto.

#### **2. Malo Ogawa (Garden Park)**

Apa ndiye pamene manzi aza sungiwa na kugabiwa pakati pa bantu. Pa malo aya, pazankala:

- Matanki abili akuluakulu okwela osungila manzi;
- Mapaipi ogabila manzi kumanyumba na madera ozungulila;
- Ofesi yoyang'anila nchito;
- Zipangizo zopimila manzi;
- Njila zoyendesela manzi amvula; na
- Malo aukhondo, malo oimikapo magalimoto, na za chitetezo.

Pantawi yomanga, kuza nkala nchito monga kukumba mifolo, kufaka mapaipi, kumanga matanki na ma nyumba, na kuika mapampu na zipangizo zina. Bakasiliza, makina azapompa manzi pansi pa doti, kuasunga mu matanki, na kuagaba mumapaipi kuti apeleke manzi abwino na ochetekela kuli bantu.

Ponseponse, Pulojekiti izatandiza kupeza manzi abwino, kuchepesa kuopsa kwa matenda a madzi, komanso kupitisa pasogolo moyo wa bantu m'dera.

### **Cholinga cha Pulojekiti**

Cholinga chachikulu cha Pulojekiti ni kuwonesesa kuti bantu baku Garden Park Ward 10 na madera ozungulila apeze manzi okwanila, oyera komanso abwino siku iliyonse. Izi zitheka pochosa manzi apansi padoti na ku apeleka mu mapaipi opangidwa bwino.

### **Malo a Pulojekiti**

Pulojekiti iza nkazikisidwa mu maboma a Chilanga na Lusaka m'chigawo cha Lusaka.

Manzi azachokela pansi pa doti (boreholes) amene ali m'dera la Kalundu m'boma la Chilanga, pafupifupi makilomita 18 kuchokela ku Lusaka City Center na pafupifupi 28.5 km kuchokela ku Chilanga Town Centre. Kuchokela popompela manzi, manzi aziyenda mumapaipi amene azakonka makamaka njila ya Mumbwa Road, kupita mu Garden Park. Manzi ayo azatumizidwa kumalo yake omaliza ku Garden Park Ward 10 m'boma ya Lusaka, yamene ili pamtunda wa makilomita 12 kuchokela ku Lusaka City Center komanso pafupifupi 26 km kuchokela ku Chilanga Town Centre.

### **Mtengo Wogulisa**

Mtengo wonse wa Pulojekiti wayanganiwa; koma, mtengo weniweni siunga kambiwe pali pano. Nchito izayamba pamene zivomelezo zonse zofunika zikapezeka. Nchito yomanga iyembekezeka kutenga pafupifupi zaka 2 mpaka 2.5, pamene Pulojekiti izafunika kuti izigwila nchito kwa zaka pafupifupi 50.

### **Zamakono**

Kumanga kwa Pulojekiti kuzankala kusebenzesa makina na nchito zamanja.

**Zamene Zazibika Zachilengedwe na Pagulu, na Njila Zochepesela na Kupitisa pasogolo**

Pulojekiti iyi iyembekezeka kubwelesa zovuta zosiyanasiyana pazachilengedwe komanso pazachuma. Izi zinga nkale zabwino na zoipa pa malo ozungulila komanso madera akuminzi. Njila zoyenela zochepeleka na zopeleka pasogolo ziza nkazikisidwa kuti ayanganile zovuta zamene zingachitike na kulimbisa mapindu amene ayembekezedwa mu Pulojekiti iyi.

Table 5: Zamene Zingachitike, Njila Zochingiliza/Zopeleka Pasogolo

| <b>ZABWINO ZINGACHITIKE</b>                                                                                                                                                                                    | <b>NJILA ZOPELEKA PASOGOLO</b>                                                                                                                                                                                                                                                                                           |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Kupanga nchito na kukulitsa luso:</b> Pulojekiti izapanga mwayi wozeza nchito zosankalisa komanso kupasa bogwila nchito luso lotandizila panchito yomanga na kugwila nchito.                                | <ul style="list-style-type: none"> <li>Bantu bam'dera bazapasidwa mwayi wozeza nchito kuka kwanisika.</li> <li>Bogwila nchito bazapunzidwa kuti bapitise pasogolo luso, umoyo, chitetezo, na luso logwila nchito.</li> </ul>                                                                                             |
| <b>Kupeza manzi oyera mochetekela:</b> Madera, mabungwe, na mabizinesi azapindula na mwayi wozeza manzi abwino komanso ochetekela.                                                                             | <ul style="list-style-type: none"> <li>Matanki, mapampu, na mapaipe azayanganiwa na kusamalidwa pafupipafupi.</li> <li>Malo okwanila osungila manzi azapelekedwa kuti atandizile kuperekedwa mochetekela.</li> <li>Kutayikila na mapaipe owonongeka azakonzedwa mwam'sanga kuti manzi asatayike na kuipisidwa</li> </ul> |
| <b>Kupitisa pasogolo umoyo wa bantu na ukhondo:</b> Kuchulukila kwa manzi kuzatandiza kuchepesa matenda obwela na manzi monga kolera, kamwazi, na typhoid.                                                     | <ul style="list-style-type: none"> <li>Ubwino wa manzi uzawunikidwa ntawi zonse kuti kukonkewe malamulo moyenera.</li> <li>Madera azazibidwa za kasamalidwe ka manzi abwino, kusunga, zaumoyo, na zo yeresalo malo.</li> </ul>                                                                                           |
| <b>Kupitisa pasogolo nchito zamagulu na chuma cha m'dera:</b> Manzi ochetekela azatandiza masukulu, zipatala, mabizinesi, malo opangila chitandizo, na mabanja, potelo kupitisa pasogolo zantchito na zachuma. | <ul style="list-style-type: none"> <li>Zomangamanga zamadzi zidasamalidwa pofuna kuchepetsa kusokonezeka kwa ntchito.</li> <li>Bogwilisa nchito bazapunzidwa kugwilisa nchito moyenera komanso kuteteza njila yopelekelela manzi.</li> </ul>                                                                             |
| <b>Kupanga nchito na kukulisa luso:</b> Pulojekiti iyi izapanga mwayi wozeza nchito zosankalisa komanso kupasa bogwila nchito luso lotandizila panchito yomanga na kugwila nchito.                             | <ul style="list-style-type: none"> <li>Bantu bam'dera bazapasidwa mwayi wozeza nchito ngati kwa kwanisika.</li> <li>Bogwila nchito bazapunzidwa kuti bapitise pasogolo luso, umoyo, chitetezo, na luso la kagwilidwe kwa nchito.</li> </ul>                                                                              |
| <b>ZOIPA ZINGACHITIKE</b>                                                                                                                                                                                      | <b>NJILA ZOCHEPESELA</b>                                                                                                                                                                                                                                                                                                 |
| <b>Chiwopsezo cha HIV/Edzi na matenda opasilana:</b> Kuchulukila kwa ogwila nchito kunga kulise chiwopsezo chaumoyo wa bantu.                                                                                  | <ul style="list-style-type: none"> <li>Bogwila nchito na madera oyandikana nawo azalandila mapunzilo ozibisa bantu za HIV/AIDS na matenda opasilana.</li> </ul>                                                                                                                                                          |

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|                                                                                                                                                                                                                                                                                                                                                     | <ul style="list-style-type: none"> <li>• Njila zozitetezela na njila zotetezeka zizalimbikisidwa mu Pulojekiti yonse.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| <p><b>Chongo, lukungu, kugwedezeke, na zosokoneza za zomangamanga:</b> Zomangamanga zimaleta lukungu, chongo, kugwedezeke, kusokonezeke kwa menso, na kusokoneza kwa bantu bonkala pafupi, mabizinesi, na bosebenzesa misewu.</p>                                                                                                                   | <ul style="list-style-type: none"> <li>• Manzi azatiliwa mumalo oseguka pamozi na misewu yongenela kuti kakungu kachepe.</li> <li>• Magalimoto yonyamulila katundu aza valiwa pa mwamba .</li> <li>• Zida zomangila na magalimoto azayanganiwa ntawi zonse.</li> <li>• Zochitika zachongo zizangonkala muzuba kulingana na nchito.</li> <li>• Madera na mabizinesi amene akuzidwa azazibisidwa za ntawi yomanga ikalibe ya yamba.</li> <li>• Nchito zomanga zizachitidwa pang'ono pang'ono kuti achepese kusokoneza kwa ntawi yayitali.</li> </ul>                                                                                                                                                                        |
| <p><b>Zoyofya zowononga zinyalala na kuwononga chilengedwe:</b> Kumanga na nchito zina ziyenela kupanga zinyalala zolimba, manzi oipa, komanso kutaya mwangozi zamene zinga ipise doti na manzi.</p>                                                                                                                                                | <ul style="list-style-type: none"> <li>• Zosungilamo zinyalala na zimbuji zosankalisa zizapelekedwa pamalo apo.</li> <li>• Manzi otayila na zimbudzi azasamalidwa bwino muukhondo wovomelezeka.</li> <li>• Kampani yosamalila zinyalala yamene ili na chilolezo izagwila nchito yotenga zinyalala na kutaya.</li> <li>• Makina azasungidwa pafupipafupi kuti mafuta na oyilo asatayike.</li> <li>• Njila zochingiliza kutaya komanso kuyankha mwa msanga zizankazikisidwa.</li> <li>• Zida zamene zinga gwilisidwenso nchito na zobwezerezedwa futi zizabwezedwa ngati kuli kotheka.</li> </ul>                                                                                                                           |
| <p><b>Kusokonezeke kwa kuyenda kwa magalimoto, zolesa kupita, na kusokoneza mabizinesi:</b> Kumanga mapai na kukumba mifolo kunga sokoneze kwakantawi kayendedwe ka magalimoto, njila yo pitila kumabizinesi, mabungwe, nyumba zogona, zipatala, na malo opelekela chitandizo, zamene zingabwelese mavuto na kutaya kwakantawi kochepe ndalama.</p> | <ul style="list-style-type: none"> <li>• Zizindikilo zochenjeza, zochinga, ogwila nchito na mafulagi , na njila zoyendesela magalimoto ziza nkazikisidwa.</li> <li>• Nchito zomanga zizachitika mumagawo ang'ono ang'ono pogwilisa nchito njila yopima malo kapena yozungulila.</li> <li>• Njila zotetezeka za boyenda pansi na za magalimoto, na njila zopeza mwam'sanga, zizasungiwa ntawi zonse.</li> <li>• Njila zakantawi, mbale za nsimbi, mabwalo, kapena njila zina zopitila ziza pelekewa ngati kuli kofunikila.</li> <li>• Mabizinesi na mabungwe amene akuzidwa azazibisidwa pakalibe kunkala za nchito yomanga na njila zofikila.</li> <li>• Njira zobwezelesa moyo na zolipila ziza nkazikisidwa.</li> </ul> |

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| <p><b>Kuwonongeka na kusokonezeka kwa nyumba na zomangamanga zapafupi:</b> Zomangamanga zinga sokoneze kwakantawi kapena kulekelatu kwa mashopu, ntemba, malo oyanzika konkiri, zikwangwani, nchito zofunikila, mafensi amalire, na nyumba zamene zili pafupi na njila ya mapai.</p> | <ul style="list-style-type: none"> <li>• Katundu na zofunikila zamene zakuzidwa ziza yanganiwa naku lembewa nchito yomanga ikalibe kuyamba.</li> <li>• Kufukula pafupi na zofunikila na zomangamanga kuzayendesewa bwino na kuyanganiwa.</li> <li>• Zomangamanga zamene zasokonezewa, zofunikila, malo opitila, na malo ana tiliwa konkiri aza bwelesewa futi bakasiliza kumanga.</li> <li>• Migodi ziza sindilidwa bwino pambuyo po manga kuchingiliza kunkazikika kwa doti komanso kusunga njila.</li> <li>• Zowonongeka zilizonse zolengedwa na nchito yomangamanga ziza konzedwa kapena kulipilidwa moyenela.</li> </ul>                                                                            |
| <p><b>Zowopsa paumoyo na chitetezo munchito na m'dera:</b> Mifolo zoseguka, makina olema, kakungu, na nchito zomanga zinga lenge zoipa kuli bogwila nchito, mabizinesi, madera apafupi, na malo aboma</p>                                                                            | <ul style="list-style-type: none"> <li>• Zida zozitetezela (PPE) ziza pelekewa naku gwilisiwa nchito na bogwila nchito bonse.</li> <li>• Mifolo zoseguka zizankala zochinga, zolembedwa, na kuonekela, makamaka usiku.</li> <li>• Mambale zansimbi, mabiligi yapantawi, kapena njila zotetezeka zizayikidwa ngati pakufunika.</li> <li>• Zida zozimisa moto na zida zotandizila zoyamba ziza pelekedwa pamalo apo.</li> <li>• Bogwila nchito zaumoyo na chitetezo baza yang'anila nchito naku yang'anila pafupipafupi.</li> <li>• Chitetezo chowonjezeleka, kulesa kakungu, na chongo ziza nkazikisidwa pafupi na zipatala zikulu, zipatala zin'gono, machechi, masukulu, na malo ena ovuta.</li> </ul> |
| <p>Kupezeka kwa mwayi kwa zolowa zachikhalidwe pakufukulula zintu zakale.</p>                                                                                                                                                                                                        | <ul style="list-style-type: none"> <li>• Mwayi wopezela njila uzankazikisidwa pantawi yomanga.</li> <li>• Nchito iza imilila ntawi yamene iyo ngati zida zilizonse zachikalidwe kapena zofukulidwa zakale zapezeka.</li> <li>• Akuluakulu oyenelela azazibisidwa naku konka malangizo nchito zikalibe kuyamba.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                               |

Njila zoyenela zochepesela na kukulisa ziza nkazikisidwa kuti ziyanganile zovuta zamene zazibika. Izi ziza fotokozedwa naku yendesedwa muli Environmental and Social Management Plan (ESMP).

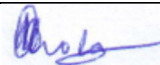
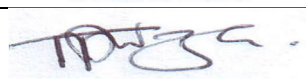
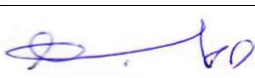
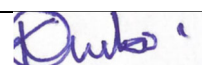
Palibe kukukisidwa kwa bantu kwamene kuzafunika pansi pa Pulojekiti. Makampeni ozibisa bantu za Chilengedwe, Chikhalidwe, na Chitetezo (EHS) azichitika pafupipafupi kuti atandize kuchepesa ngozi zamene zingachitike paumoyo na chitetezo pa nchito.



## The ESIA Team

The Environmental and Social Impact Assessment study for the proposed *Water Supply Improvement Project for Peri-Urban Areas of Lusaka City (Garden Park Ward 10)* was undertaken by the Environmental Consultants' Team and other professional consultants shown in the table below:

Table 6: EIA Study Team

| Name                      | Role in the Project                                               | Signature                                                                             |
|---------------------------|-------------------------------------------------------------------|---------------------------------------------------------------------------------------|
| Danny Holmes              | Environmental Engineer and Water quality Specialist / Team Leader |    |
| Tobias Muyaba             | Social Economic Specialist                                        |    |
| Bernadette Chola          | Environmental Engineer                                            |    |
| Tiwine Mwanza             | Environmental Specialist                                          |    |
| Godfrey Mulenga           | Air Quality and Noise Specialist                                  |    |
| Jacob Tembo               | Flora and Fauna and Wildlife Specialist (Ecologist)               |    |
| Madima Zenzozenkosi       | Land Acquisition Specialist                                       |                                                                                       |
| Kasongo Mubanga<br>Fwambo | Environmental Officer                                             |  |
| Chellah Muswilwa          | Geological, hydrogeology and Geophysical Expert                   |  |

## **Management Statement**

We trust the above provides a fair and accurate Executive Summary of the Environmental and Social Impact Statement for the Proposed Water Supply Improvement Project for Peri – Urban Areas of Lusaka City: Garden Park 10, Lusaka Province by Lusaka Water Supply and Sanitation Company Limited presented to the Zambia Environmental Management Agency (ZEMA) for consideration for approval.

---

Owen Micho  
Project Manager  
Lusaka Water Supply and Sanitation Company Limited

***To be signed in final report***

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## ABREVIATIONS AND ACRONYMS

|                       |                                                               |
|-----------------------|---------------------------------------------------------------|
| <b>AIDS</b>           | Acquired Immune Deficiency Syndrome                           |
| <b>AQI</b>            | Air Quality Index                                             |
| <b>CO<sub>2</sub></b> | Carbon Dioxide                                                |
| <b>CSO</b>            | Central Statistical Office                                    |
| <b>ECZ</b>            | Environmental Council of Zambia                               |
| <b>EIA</b>            | Environmental Impact Assessment                               |
| <b>EIS</b>            | Environmental Impact Statement                                |
| <b>EMA</b>            | Environmental Management Act                                  |
| <b>EMMP</b>           | Environmental Management and Monitoring Plan                  |
| <b>EMP</b>            | Environmental Management Plan                                 |
| <b>EPPCA</b>          | Environmental Protection and Pollution Control Act            |
| <b>FSM</b>            | Faecal Sludge Management                                      |
| <b>GPS</b>            | Global Positioning System                                     |
| <b>GRM</b>            | Grievance Redress Mechanism                                   |
| <b>GRZ</b>            | Government of the Republic of Zambia                          |
| <b>HIV/AIDS</b>       | Human Immune Virus/ Acquired Immune deficiency Syndrome       |
| <b>IAPs</b>           | Interested and Affected Parties                               |
| <b>JICA</b>           | Japan International Cooperation Agency                        |
| <b>LCC</b>            | Lusaka City Council                                           |
| <b>LWSC</b>           | Lusaka Water Supply and Sanitation Company Limited            |
| <b>NHCC</b>           | National Herita National Heritage Conservation and Commission |
| <b>GDP</b>            | Gross Domestic Product                                        |
| <b>HIV</b>            | Human Immunodeficiency Virus                                  |
| <b>IFC</b>            | International Finance Corporation                             |
| <b>ITCZ</b>           | Inter – Tropical Convergence Zone                             |
| <b>IUCN</b>           | International Union for Conservation of Nature                |
| <b>LEL</b>            | Lower Explosive Limit                                         |
| <b>LWSC</b>           | Lusaka Water and Sanitation Company                           |
| <b>NAPSA</b>          | National Pensions Scheme Authority                            |
| <b>NCC</b>            | National Council for Construction                             |
| <b>NCS</b>            | National Conservation Strategy                                |
| <b>NEAP</b>           | National Environmental Action Plan                            |
| <b>NHCC</b>           | National Heritage Conservation Commission                     |
| <b>NPE</b>            | National Policy on Environment                                |
| <b>O&amp;M</b>        | Operation and Maintenance                                     |
| <b>PAYE</b>           | Pay As You Earn                                               |
| <b>PM</b>             | Particulate Matter                                            |
| <b>PPE</b>            | Personal Protective Equipment                                 |
| <b>RDA</b>            | Road Development Authority                                    |
| <b>SEA</b>            | Strategic Environmental Assessment                            |
| <b>SOE</b>            | State of Environment                                          |
| <b>STP</b>            | Sewage Treatment Plant                                        |

|               |                                                       |
|---------------|-------------------------------------------------------|
| <b>UNFCCC</b> | United Nations Framework Convention on Climate Change |
| <b>USEPA</b>  | United States Environmental Protection Agency         |
| <b>VAT</b>    | Value Added Tax                                       |
| <b>WHO</b>    | World Health Organization                             |
| <b>WARMA</b>  | Water Resource Management Authority                   |
| <b>ZABS</b>   | Zambia Bureau of Standards                            |
| <b>ZEMA</b>   | Zambia Environmental Management Agency                |
| <b>ZNBC</b>   | Zambia National Broadcasting Corporation              |
| <b>ZRA</b>    | Zambia Revenue Authority                              |
| <b>ZSA</b>    | Zambia Statistics Agency                              |

## **1.0 INTRODUCTION**

### **1.1 Background**

Lusaka Water Supply and Sanitation Company (LWSC) is the largest water and sanitation utility in Zambia, mandated under the Water Supply and Sanitation Act No. 28 of 1997 to provide reliable and sustainable services within Lusaka Province. Despite ongoing investments to expand production and distribution capacity, rapid urbanization and the growth of unplanned and peri-urban settlements, now accommodating about 70% of Lusaka’s population, continue to exert significant pressure on existing water supply infrastructure.

These peri-urban areas experience persistent water supply challenges, characterized by limited piped networks and heavy reliance on unsafe and contamination-prone water sources, particularly during the rainy season. This has resulted in heightened public health risks, including outbreaks of waterborne diseases such as cholera. In line with Zambia’s Vision 2030 and the Eighth National Development Plan (2022–2026), which prioritize universal access to safe water and the protection of groundwater resources, LWSC is implementing targeted interventions following the Lusaka Water Supply Master Plan and is implementing various projects aimed at improving water supply in the province.

Within this context, Garden Park Ward 10 has been identified as a priority area due to rapid population growth, low piped water coverage, and elevated public health risks. To address these challenges, the Lusaka Water Supply and Sanitation Company (LWSC), with financial and technical support from the Japan International Cooperation Agency (JICA), proposes to implement the Project titled “Improvement of Water Supply in Peri-Urban Areas of Lusaka City in the Republic of Zambia” (the Project). This initiative forms part of ongoing efforts to improve water supply infrastructure and provide sustainable potable water to an estimated 73,200 residents, with a planned supply capacity of approximately 6,400 m<sup>3</sup>/day.

The Project will involve the development of groundwater sources, construction of boreholes and elevated storage tanks, installation of pumping facilities, and the laying of transmission and distribution pipelines. These interventions are expected to contribute to improved public health, enhanced living conditions, and socio-economic development within the wider Project area.

In line with the provisions of the Environmental Management Act No. 12 of 2011, as amended by the Environmental Management (Amendment) Act No. 8 of 2023, and the Environmental Impact Assessment Regulations, SI No. 3 of 2026, an Environmental and Social Impact Assessment (ESIA) study of the proposed development was undertaken. This study included an assessment of the ecological, environmental, and socio-economic impacts of the Project components, and the findings are presented in this report.

### **1.2 Project Rationale**

Unplanned and peri-urban settlements in Lusaka, which accommodate approximately 70% of the city’s population, continue to face persistent and systemic water supply challenges. These challenges are primarily attributed to inadequate and aging infrastructure, limited network coverage, high levels of non-revenue water, and insufficient investment to match rapid urban

growth. As a result, many households rely on shallow wells, boreholes of varying water quality, and informal water vendors.

During the rainy season, these alternative water sources are highly susceptible to contamination from surface runoff, poorly constructed sanitation facilities, and flooding. This increases the prevalence of waterborne diseases such as cholera, dysentery, and typhoid. The recurrent outbreaks of cholera in Lusaka underscore the urgent need for sustainable and resilient water supply interventions in vulnerable communities.

The proposed Project is aligned with Zambia's long-term and medium-term national development frameworks, including Vision 2030 and the Eighth National Development Plan. These policy instruments prioritize universal access to safe and affordable water supply services, improved sanitation, enhanced groundwater protection, and strengthened public health systems. The Project also supports sector-specific strategies outlined in the Lusaka Water Supply Master Plan and complements ongoing investments under the Lusaka Water Supply Improvement Project Phase II, which aim to expand water production capacity, rehabilitate and extend distribution networks, and improve service delivery in underserved areas.

Garden Park Ward 10 has been identified as a priority intervention area due to its limited piped water coverage, rapid population growth, increasing housing density, and elevated public health risks. The current supply system is insufficient to meet existing and projected demand, resulting in intermittent supply and inequitable access to potable water. Without timely intervention, the gap between demand and supply is expected to widen, further exacerbating health and socio-economic vulnerabilities.

As such, the implementation of the Project will enhance access to safe and reliable potable water, reduce dependence on unsafe water sources, improve public health outcomes, and support socio-economic development. In this context, the Government of the Republic of Zambia, through the Ministry of Water Development and Sanitation, has sought grant-aid support from the Government of Japan to facilitate Project implementation

### **1.3 Project Description**

Lusaka Water Supply and Sanitation Company (LWSC), with support from the Japan International Cooperation Agency (JICA), proposes to implement the Project for the Improvement of Water Supply in Peri-Urban Areas of Lusaka City.

The proposed Project involves the development of a raw water transmission pump station and storage facility at the well field, alongside a distribution reservoir station at Garden Park Ward 10. It is designed to abstract, temporarily store, and pump raw water through transmission pipelines for distribution to Garden Park and surrounding peri-urban areas.

The project comprises two main sites:

- i. Well field transmission pump station site (water source): - This includes a raw water receiving tank, pump house, and associated infrastructure.

- ii. Garden Park distribution reservoir site (termination point): This includes elevated storage tanks, distribution pipelines, flow measurement facilities, and administrative buildings.

The infrastructure will support reliable water transmission and distribution through reinforced concrete structures, underground pipelines, electrical installations, drainage systems, and security facilities. The proposed Project sites/components include:

- Well field transmission pump station and raw water storage facility (water source):
  - Raw water receiving tank: A reinforced concrete ground-level tank (118.8 m<sup>2</sup>) that receives water from boreholes before pumping;
  - Transmission pumping station: Houses pumps, control panels, and electrical equipment, directly connected to the storage tank and transmission pipeline;
  - Office building: Operational control and staff workspace;
  - Guard house: Security control at the entrance (approx. 16 m<sup>2</sup>);
  - Transmission pipelines (approximately 12 km): Underground pipelines connecting the well field to the distribution reservoir;
  - Sanitation system: Underground septic tank;
  - Parking area: Crushed stone-paved surface; and
  - Perimeter infrastructure: A 2.0 m high block wall with barbed wire and a 4.0 m × 2.0 m electric sliding gate.
- Garden Park distribution reservoir station (termination point):
  - Elevated storage tanks: Two reinforced concrete tanks (1,000 m<sup>3</sup> each) providing gravity-based water distribution;
  - Administration building: Staff offices and operational management space;
  - Flowmeter room: Houses bulk flow measurement equipment (approx. 40 m<sup>2</sup>);
  - Main distribution pipeline: DN 400 mm pipeline distributing water to the network;
  - Transmission pipeline: DN 350 mm pipeline conveying water from the pumping station to the reservoir;
  - Drainage infrastructure: DN 150 mm rainwater drainage pipes with crushed stone permeation areas;
  - Sanitation facilities: Septic and rock absorption tanks;
  - Parking area; and
  - Security infrastructure: A 2.0 m high block wall with barbed wire, an electric sliding gate, and a guard house.

The Project will also include associated infrastructure such as pumping stations, guard houses, and ancillary works required for effective water supply operations. Construction activities will include the installation of submersible pumps, excavation and trenching for pipelines, concrete works for foundations and structures, and the installation of mechanical and electrical equipment. During operation, the system will abstract groundwater at approximately 98–100 litres per second, store it in elevated tanks, and distribute it through the piped network.

The proposed Project will be implemented in three phases, namely: the preparation phase, construction phase, and operation phase. In terms of technology and raw material use, the Project will be constructed in accordance with all relevant Zambian standards.

Specialized local contractors will be engaged for construction works. As far as possible, priority will be given to employing labour from local communities around the Project area, although some of the contractor's permanent skilled staff may be sourced from other areas.

#### 1.4 Objectives of the Project

The primary objective is to improve access to safe, reliable, and adequate potable water supply for residents of Garden Park Ward 10 and surrounding peri-urban communities in Lusaka City through the development of sustainable groundwater sources and the construction of a modern piped water supply system. The specific objectives are:

- To construct two elevated water storage tanks with a capacity of about 1,000 m<sup>3</sup> and associated pumping and control facilities in Garden Park Ward 10;
- To install a reticulated water distribution network within Garden Park Ward 10 to supply households, public institutions, and commercial users;
- To reduce reliance on unsafe water sources such as shallow and unprotected wells and thereby lower the incidence of waterborne diseases, including cholera; and,
- To ensure that Project planning, construction, and operation comply with Zambian environmental legislation and JICA environmental and social safeguard requirements.

#### 1.5 Brief Description of the Location

The proposed Water Supply Project is situated within Chilanga and Lusaka Districts of Lusaka Province. The Project will originate at the groundwater source (boreholes) in the Kalundu area of Chilanga District, approximately 18 km west of the Lusaka Main Post Office and approximately 28.5 km northwest of the Chilanga Post Office.

From this point, the transmission pipeline will follow existing public road reserves, primarily along Mumbwa Road (M9) through Garden Park, terminating in Garden Park Ward 10 of Lusaka District. The termination point is located about 12 km from the Lusaka Main Post Office and approximately 26 km northwest of the Chilanga Post Office. The GPS coordinates of the site are as follows:

Table 7: GPS Coordinates of the Proposed Site

| Label                                                   | Coordinates  |              |           |
|---------------------------------------------------------|--------------|--------------|-----------|
| Point                                                   | Latitude     | Longitude    | Elevation |
| Source of Water (start point and location of boreholes) | 15°24'23.1"S | 28°09'07.7"E | 1238m     |
| Termination Point (elevated storage water tanks site)   | 15°23'50.8"S | 28°13'16.3"E | 1269m     |



Figure 1: Location Map

## 1.6 Particulars of Directors and Shareholders

Table 8: Director Details

| Name                  | Position  | Nationality | Identity    | Physical Address                                                        |
|-----------------------|-----------|-------------|-------------|-------------------------------------------------------------------------|
| Watson Ngambi         | Director  | Zambia      | 248549/67/1 | Plot No 871/2, Katemo Road, Rhodes Park, P.O Box 50198, Lusaka, Zambia. |
| Wesley Kaluba         | Directors | Zambia      | 325309/67/1 | Plot No 871/2, Katemo Road, Rhodes Park, P.O Box 50198, Lusaka, Zambia. |
| Jilly Chiyombwe       | Director  | Zambia      | 191028/75/1 | Plot No 871/2, Katemo Road, Rhodes Park, P.O Box 50198, Lusaka, Zambia. |
| Melvin Sikazwe        | Director  | Zambia      | 756501/11/1 | Plot No 871/2, Katemo Road, Rhodes Park, P.O Box 50198, Lusaka, Zambia. |
| Ireen Mwansa Chitesha | Director  | Zambia      | 243153/66/1 | Plot No 871/2, Katemo Road, Rhodes Park, P.O Box 50198, Lusaka, Zambia. |
| Bupe Mutanya          | Director  | Zambia      | 142799/25/1 | Plot No 871/2, Katemo Road, Rhodes Park, P.O Box 50198, Lusaka, Zambia. |
| Charlston Hamulyata   | Director  | Zambia      | 134668/72/1 | Plot No 871/2, Katemo Road, Rhodes Park, P.O Box 50198, Lusaka, Zambia. |

| Name               | Position | Nationality | Identity    | Physical Address                                                        |
|--------------------|----------|-------------|-------------|-------------------------------------------------------------------------|
| Rabbecca Hantoongo | Director | Zambia      | 183548/10/1 | Plot No 871/2, Katemo Road, Rhodes Park, P.O Box 50198, Lusaka, Zambia. |

Table 9: Shareholder Details

| Name of Business          | Shareholder /Member | % Shares | Share Class |
|---------------------------|---------------------|----------|-------------|
| Chilanga Town Council     | Yes                 | 9.9      | Ordinary    |
| Chongwe Municipal Council | Yes                 | 9.9      | Ordinary    |
| Kafue Town Council        | Yes                 | 17.4     | Ordinary    |
| Luangwa Town Council      | Yes                 | 9.9      | Ordinary    |
| Lusaka City Council       | Yes                 | 42.9     | Ordinary    |
| Rufunsa Town Council      | Yes                 | 9.9      | Ordinary    |

## 1.7 The Developer's Physical Address and the Contact Person

### 1.7.1 Contact Details of the Developer

Lusaka Water Supply and Sanitation Company Limited,  
Plot No 871/2, Katemo Road, Rhodes Park  
P.O Box 50198, Lusaka, Zambia.

Contact Person Details;

Eng. Jilly Chiyombwe  
Managing Director-Lusaka Water and Supply Company Limited

#### Attention

Name: Engineer Owen Micho  
Position: Water Security Expert  
Address: Lusaka Water and Sanitation Company Limited,  
Plot No 871/2, Katemo Road, Rhodes Park  
P.O Box 50198, Lusaka, Zambia.  
Mobile: 260 979 705837  
Email: [owenmicho@gmail.com](mailto:owenmicho@gmail.com)

### **1.7.2 Environmental Consultants' Details**

DH Engineering Consultants

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### **1.8 Track Record/Institution Overview**

The Lusaka Water Supply and Sanitation Company is the largest water and sanitation utility in Zambia, mandated under the Water Supply and Sanitation Act No. 28 of 1997 to provide reliable and sustainable water supply and sanitation services across Lusaka Province. Established in 1988 and operational since 1990, the Company evolved from a small department within the Lusaka Urban District Council into a fully commercialized utility with a broad service mandate covering both urban and peri-urban areas.

Since its inception, LWSC has demonstrated steady growth in service coverage and operational capacity. The number of customer connections increased from approximately 34,000 in 1990 to approximately 148,000 by December 2025, comprising domestic, commercial, and Government (GRZ) consumers across the province. The utility currently serves an estimated population of about 4.6 million people, reflecting its expanded footprint and continued efforts to improve access to essential services.

In terms of water supply operations, LWSC produces an average of approximately 250,000 cubic metres of water per day from a combination of surface water and groundwater sources, against an estimated demand of about 420,000 cubic metres per day. Recognizing this supply-demand gap, the Company has consistently implemented infrastructure development initiatives and operational improvement programs aimed at increasing production capacity, rehabilitating aging infrastructure, reducing non-revenue water, and strengthening distribution networks.

Within the sanitation subsector, LWSC operates conventional sewerage systems in Lusaka and Kafue districts, supported by wastewater treatment plants and waste stabilization ponds. In areas not expected to be connected to sewer systems in the medium to long term, the Company promotes On-site Sanitation (OSS) and Fecal Sludge Management (FSM) solutions. These integrated and adaptive service delivery approaches have significantly contributed to improving access to safely managed sanitation services and strengthening public health outcomes within the province.

### **1.9 Proposed Project Cost and Implementation Date**

The total investment cost has been estimated based on preliminary designs, equipment, construction works, and environmental management measures. However, the detailed project cost is commercially sensitive and therefore cannot be disclosed at this stage.

The Project is expected to commence upon receipt of all required approvals and is scheduled for completion within a period of 24 to 28 months. It is designed to have an operational lifespan of approximately 50 years.

## **2.0 POLICY, INSTITUTION AND ORGANIZATIONAL FRAMEWORK**

The Project will be implemented in accordance with Zambian legislative requirements. The main pieces of legislation that will guide the regulatory framework include:

### **2.1 Policy, Legal and Institutional Framework Relevant to the Project**

#### **2.1.1 Zambian Environmental Policy**

The National Policy on Environment (NPE) which was adopted in 2007 (and officially launched in 2009) provides environment and natural resources management policies to address current and future threats to the environment and to human livelihoods and provides policy guidelines for sustainable development.

**Relevance:** The proposed Project will bring about positive impacts and will also bring about negative impacts that may present future threats to the environment. These impacts should be addressed according to the National Policy on Environment as it provides guidelines for sustainable development.

**Compliance:** The proposed development will be done in accordance with the National Policy on Environment guidelines, to ensure sustainable development which includes Environmental and Social Impact Assessment (ESIA) and monitoring of the environment.

#### **2.1.2 Zambian Environmental Legislation**

##### **2.1.2.1 Environmental Management Act, No. 12 of 2011 as amended by the Environmental Management (Amendment) Act No.8 of 2023**

In April 2011, the Environmental Management Act (EMA) was signed into law. The EMA includes provision for Integrated Environmental Management (IEM), provision for the declaration of protected areas, a general increase in penalties, and the imposition of orders for remedying pollution. Further, the production of State of Environment (SOE) Reports and the need for Strategic Environmental Assessment (SEA) is legislated. The sections of the Environmental Management Act relevant to the Project are as follows:

- Section 29 which state that; “A person shall not undertake any Project that may have an effect on the environment without the written approval of the Agency, and except in accordance with any conditions imposed in that approval”, and that “A person shall not prepare an environmental assessment report without registering with the Agency as an environmental assessment expert in accordance with section 29B”.

**Relevance:** The proposed Project is likely to have an effect on the environment and therefore, before undertaking of the Project, written approval should be obtained from the Agency (ZEMA). To obtain written approval from the agency, an environmental assessment report needs to be prepared by a registered person.

**Compliance:** The developer is currently undertaking an environmental and social impact assessment, and the Environmental and Social Impact Statement (ESIS) which will be reviewed by the Agency before approval. Undertaking of the proposed Project

will only commence upon receipt of written approval from the Agency. Currently registration of environmental experts is pending the signing of the regulations (registration of Environmental Assessment Experts).

- Part II, section 9(j) provides that, one of the functions of ZEMA is to review environmental impact assessment reports.

**Relevance:** Since the proposed development is likely to have environmental and social impacts, it falls under activities that require environmental assessment and regulatory approval.

**Compliance:** The developer has engaged a consultant to liaise with ZEMA and ensure that best environmental management practices are incorporated into the project design.

- Part iv, Environmental Protection and Pollution Control, Division 4 - waste management, section 54 provides that a person shall not collect, transport, sort, recover, treat, store, dispose of, or otherwise manage waste in a manner that results in an adverse effect, or creates a significant risk of an adverse effect occurring; section 56 provides that a Local Authority shall within its area of jurisdiction ensure that waste is collected, transported and disposed of in accordance with this Act.

**Relevance:** The proposed development will produce waste which should be collected, transported and disposed of in accordance with this Act.

**Compliance:** Solid waste will be collected in bins at various locations on site and then disposed of at a licensed facility by a contractor licensed to manage waste.

### **2.1.2.2 Environmental Management (Environmental Impact Assessment) Regulations, SI no.3 of 2026**

The Environmental Management (Environmental Impact Assessment) Regulations, Statutory Instrument (SI) No. 3 of 2026, issued under the Environmental Management Act, provide the legal framework for conducting Environmental Impact Assessments (EIAs) in Zambia. The Regulations outline requirements for project screening, scoping, stakeholder consultation, preparation of ESIA reports, public disclosure, and decision-making.

The EIA Regulations specifically states the following:

*“The developer shall, prior to the submission of the ESIS take all measures necessary to seek the views of the people in the communities which will be affected by the Project. In seeking the views of the community in accordance with sub-regulation, the developer shall:*

*(d) Conduct public consultations involving government agencies, local authorities, non-governmental organizations, community-based organizations and other persons who may have an interest in, or likely be affected by, a proposed Project; and*

*(e) Prepare a scoping report in order to determine and establish the spatial and temporal boundaries and key issues to be addressed in an environmental and social impact statement.*

**Relevance:** The proposed Project falls under the first schedule of the EIA regulations which requires comprehensive stakeholder engagement.

**Compliance:** The Developer will ensure that the ESIA has comprehensive stakeholder engagement through various meetings with stakeholders giving them an opportunity to give views on the Project.

In addition, the EMA, through the **Environmental Management (Licensing) Regulations, SI No. 112 of 2013**, controls and regulates the following areas, relevant to the present study:

- **Air and Water Pollution: Part II**

These regulations provide for the ZEMA to regulate the treatment and discharge of sewage and other effluents into the natural aquatic environment.

**Relevance:** Construction and operation activities may generate wastewater, sewage and other effluents that could affect surface and groundwater resources. The regulations mandate ZEMA to regulate the treatment and discharge of effluents into the natural aquatic environment to prevent pollution and protect water quality.

**Compliance:** The developer shall ensure that all wastewater and sewage generated during construction and operation are adequately treated prior to discharge, in accordance with the prescribed effluent standards. Effluent discharges shall only be undertaken with the requisite approvals from ZEMA, and water quality monitoring shall be conducted to demonstrate compliance. Good housekeeping practices, spill prevention measures and emergency response procedures shall be implemented to minimise the risk of air and water pollution.

- **Hazardous Waste: Part IV**

These regulations provide for the control of generation, collection and storage of hazardous waste. Section 4 part 1 of these regulations state that no person shall generate or store hazardous waste without a license from the Competent Authority.

**Relevance:** The Hazardous Waste Regulations (Part IV) are relevant as the Project may generate hazardous waste during construction and operation, including waste oils, fuels and chemicals. The regulations control the generation, collection and storage of hazardous waste to protect human health and the environment.

**Compliance:** The developer shall obtain the required licence from ZEMA for the generation and storage of hazardous waste and ensure that all hazardous waste is properly stored, handled and disposed of through licensed waste handlers, in accordance with regulatory requirements.

- **Waste Management: Part III**

These Regulations provide definitions of waste and sets out the licensing requirements for transporters and waste disposal sites.

**Relevance:** Activities of the proposed Project will result in the generation of solid waste such as domestic, and construction debris that have to be disposed of at an approved site.

**Compliance:** All solid waste will be collected in bins at various locations on site and then disposed of at a licensed facility by a contractor licensed to manage waste.

### **2.1.3 Other Acts Reviewed**

Other than the EMA which is the principal Act on environmental management, Zambia is broadly covered with legislation relating to the protection of the environment and to various developments. Among others the relevant legislation applicable to this Project are discussed below:

#### **2.1.3.1 The Standards Act No. 4 of 2017**

This Act provides for standardisation and quality assurance of products and services through the setting of national standards and provision of conformity assessment services for products and services. This Act provides for the continued existence of the Zambia Bureau of Standards (ZABS). The functions of the Bureau relevant to the proposed Project are to: administer and maintain standards and ensure conformity with standards; promote quality health and safety standards for commodities, products and services and to facilitate efficiency in industry and promote trade through standardisation which are found in the Act in part II section 5 (b)(e) and (f).

**Relevance:** The development will require that material (pipes, sand, stone, food stuffs, machinery and other finished material) be used for the construction and operation of the Water Supply Improvement System. According to this standard, the material and products to be used for the proposed Project conform to the standards set by the Zambia Bureau of Standards.

**Compliance:** All raw material procurement and all designs and layouts will be in compliance with the Zambia Bureau of Standards through the various consultants to be employed by the Project.

#### **2.1.3.2 Local Government Act No. 2 of 2019**

The Act provides for an integrated local government system and gives effect to the decentralisation of functions, responsibilities and services at all levels of local government. The part of this Act relevant to the Project is Part II which provides for Local Governance of an area by a council.

**Relevance:** The proposed Project site is within an area under the administration of the Lusaka City Council and the Chilanga Town Council.

**Compliance:** The Project plans will go through the Lusaka City Council and the Chilanga Town Council for any comments on the plan and for approval.

#### **2.1.3.3 The Water Resources Management Act No. 21 of 2011**

This Act provides for the management of the water resource through the Water Resources Management Authority (WARMA) which ensures the sustainable resource use and protection of the resource. Sections of this Act relevant to the proposed Project are section 6 which provides for efficient, sustainable and beneficial use of water in the public interest and that

Zambia's water resource shall be protected and the use controlled and that all non-domestic water use shall require a permit.

**Relevance:** The Water Resources Management Act No. 21 of 2011 is directly relevant to the Water Supply Improvement Project as the Project involves abstraction and conveyance of water for domestic and non-domestic use. The Act mandates the Water Resources Management Authority (WARMA) to regulate and protect Zambia's water resources and promotes efficient, sustainable and beneficial use of water in the public interest.

**Compliance:** The developer shall obtain the relevant water abstraction and use permits from WARMA prior to Project implementation. Water abstraction shall be undertaken in accordance with approved permit conditions, and measures shall be implemented to ensure efficient use, protection of the water source and prevention of resource depletion or pollution, in line with the requirements of the Act.

#### **2.1.3.4 The Zambia National Public Health Institute Act, No.19 of 2020**

The Act provides for the coordination of public health security; continue the existence of the Zambia National Public Health Institute and provide for its functions; establish the Public Health Emergency Operations Centre; establish the National Public Health Laboratory and establish the National Public Health Emergency Fund. The sections of the Act relevant to the proposed Project are part ii section 4 which provides for functions of the Zambia National Public Health Institute. The functions of the institute relevant to this Project are: educate the public-on-public health and develop, publish and disseminate information on public health.

**Relevance:** The development will also require that members of the public move to and from the site with different health conditions during both construction and operation phase.

**Compliance:** Access to the active area of the site will be restricted. The developer will ensure that they put in place all guidelines provided on public health by the Ministry of Health.

#### **2.1.3.5 Urban and Regional Planning Act No. 3 of 2015**

This Act provides for development, planning and administration principles in Zambia. The provisions of the Act relevant to the proposed development are section 13 providing for the establishment for Local Authorities as Local Planning Authorities whose functions are to regulate the use of land in its area and receive and process applications for planning permission for the development of land. The Local Councils also give standards for how plans should be drawn up.

**Relevance:** The proposed development site is in Lusaka and Chilanga Districts and falls under the Lusaka City Council/Chilanga Town Council who review proposed development plans in the area. No development can take off without plans going through the Local Authorities.

**Compliance:** Plans for the proposed development have been drawn up in accordance with the planning authority guidelines. The plans for the proposed Project will be submitted to the Lusaka City Council/Chilanga Town Council for processing and review in order to obtain planning permission.

### 2.1.3.6 The Occupational Health and Safety Act, No. 16 of 2025

This Act provides for the health, safety, and welfare of persons at work, as well as the protection of persons other than employees against risks to health or safety arising from, or in connection with, workplace activities. Sections of this Act relevant to the proposed Project include:

- Section 9: Mandates the establishment of a workplace health and safety committee within 30 days of employing 10 or more persons, thereby promoting shared responsibility for occupational health and safety between employers and employees.
- Section 14: Requires employers to prepare, sign, display, and communicate a comprehensive occupational health and safety policy to all employees.
- Section 15: Places a duty on employers to report cases of employee ill-health, occupational diseases, and work-related absences to the Occupational Health and Safety Institute (OHSI).
- Sections 20 and 21 (Duties of Manufacturers, Importers and Suppliers): Provide for the responsibility of manufacturers, importers, suppliers, and ostensible suppliers to ensure that all articles, substances, and equipment provided for use at work are safe and without risk to health when properly used.

**Relevance:** The Project works will have occupational health and safety risks during both operation and construction phases such as exposing workers on site to high levels of dust, lifting heavy equipment, work in confined spaces, work at heights, trip hazards and risk of fire.

**Compliance:** Site preparation, construction and operation of the plant shall be done in compliance with this Act ensuring that risk assessments are done at the beginning of any job specifications and workers provided with appropriate PPE. There will always be a competent supervisor on site ensuring that work is done according to the health and safety procedures.

### 2.1.3.7 Roads and Road Traffic Act No. 2 of 2011

The Roads and Traffic Control Act, provides for the control of traffic, and for the regulation of drivers. The sections of this Act relevant to the proposed Project are section 14 (2) which provides that building owners shall provide service roads to give access to the buildings; Section 110 which provides for the need for all drivers to have driving licenses; section 198 which provides for the conviction of a person driving under the influence of drink and drugs and section 201 which provides that no person shall use or permit to be used a vehicle in dangerous conditions.

**Relevance:** The Roads and Road Traffic Act No. 2 of 2011 is relevant to the Project as construction and operation of the water supply improvement system will involve movement of construction vehicles, equipment, and materials along public and service roads. The Act ensures safe access, road use, and traffic management, reducing risks to workers, road users, and nearby communities.

**Compliance:** The developer shall ensure that all construction and operational vehicles are roadworthy and driven by licensed operators. Service roads and access routes shall be maintained to provide safe access to Project sites. Any roads disturbed during construction will

be repaired to their original condition. When a road is temporarily blocked, the developer will facilitate alternative access or provide adequate signage and warnings to ensure safe and uninterrupted traffic flow for road users.

#### **2.1.3.8 The Workers' Compensation Act No. 10 of 1999**

This Act provides for the welfare of persons at work. The sections of this Act relevant to the proposed Project are: part I, section 8 which provides that where any injury is caused to a worker by the negligence, breach of statutory duty or other wrongful Act or omission of the employer, or of any person for whose Act or default the employer is responsible, nothing in this Act shall limit or in any way affect any civil liability of the employer independently of this Act; part III, section 12 which provides for the functions of the Workers' Compensation Fund Control Board to administer fund for the compensation of workers disabled by accident occurring, or diseases contracted in the course of employment and; part v, section 41 which provides for the compensation of workers for disabilities suffered or diseases contracted during the course of employment.

**Relevance:** The proposed Project's activities have potential to cause injury, illness or death to site workers and hence the relevance of the Act.

**Compliance:** Workers will be compensated in an event of injury, illness or death as a result of the proposed Project activities.

#### **2.1.3.9 Solid Waste Regulations & Management Act No. 20 of 2018**

This Act provides for the regulation of solid waste and management. The sections of this Act relevant to the proposed Project are part ii which provides for the management of solid waste; part iii which provides for the regulation of solid waste and part iv which provides for the provision of solid waste services by licensed solid waste service providers.

**Relevance:** The proposed development will result in the generation of solid waste at all phases of the Project which should be managed according to the provisions of this Act.

**Compliance:** Solid waste will be collected in bins at various locations on site and then disposed of by an approved local council licensed transporter and also in possession of all the valid waste licenses from ZEMA. At all phases of the Project there shall be no burning of waste and the bins to be used for waste will be leak proof and contained preventing scatter of waste.

#### **2.1.3.10 The Lands Act No. 20 of 1996 read as one with the Lands Amendment Act No 20 of 2015**

This Act was enacted in 1995 following the repeal of the Land (Conversion of Titles) Act of July, 1975. The section the Act relevant to the proposed Project is part II section 9 (1) which prohibits unauthorised occupation of land.

**Relevance:** The land falls under statutory land.

**Compliance:** The developer will ensure that all permits for the use of the proposed Project site are in place. Appended to this document are land documents showing compliance to this Act.

#### **2.1.3.11 The Public Roads Act No. 12 of 2002**

This is an Act to establish the Road Development Agency and to define its functions; to provide for the care, maintenance and construction of public roads in Zambia; to regulate maximum weights permissible for transmission on roads; and to provide for matters connected with and incidental to the foregoing. The sections of this Act relevant to the proposed Project are;

Section 33 (1) Subject to and in conformity with such general or other directions as may be given by the agency, a road authority may cause or permit traffic signs to be placed on or near any road in its area; section 33 (2) Traffic signs shall be of the prescribed size, colour & design except the agency authorises the erection or retention of a sign to another character; section 55 (a) no person shall encroach on any road or road reserve by making or erecting any building, fence, ditch or other obstacle or by planting trees or otherwise; section 55 (b) leave or place or negligently allow to fall on or over any road any timber, stones or other material so as to obstruct the road or endanger person using the road or deposit rubbish, debris or other material on any road.

**Relevance:** This Act is relevant to the Project as construction and operation of the water supply improvement system will intersect or run alongside public roads. The Act provides the legal framework for road care, maintenance, traffic signage, and protection of road reserves, ensuring that Project activities do not obstruct traffic, encroach on road reserves, or endanger road users.

**Compliance:** The developer shall ensure that construction and operational activities do not encroach on or obstruct public roads or road reserves. Any temporary traffic disruptions will be managed by installing approved traffic signs, barriers, and warnings in accordance with Road Development Agency requirements. Roads disturbed by construction will be rehabilitated, and all debris, materials, or equipment will be cleared promptly to maintain safe traffic flow and comply with statutory road use standards.

#### **2.1.3.12 The Employment Code Act No. 3 of 2019**

This is an Act to regulate the conditions of employment, prohibit discrimination at an undertaking; constitute the Skills and Labour Advisory Committees and provide for their functions; provide for the engagement of persons on contracts of employment and provide for the form and enforcement of the contracts of employment; provide for employment entitlements and other benefits; provide for the protection of wages of employees; provide for the registration of employment agencies; regulate the employment of children and young persons; provide for the welfare of employees at an undertaking and to provide for employment policies, procedures and codes in an undertaking. Several sections of this Act are relevant to the proposed Project:

- Part I which provides for equal employment opportunity and also prohibits forced labour.
- Part III which provides for employment relationship and gives guidelines for contract of employment, minimum employment benefit, suspension and termination of contract of employment.
- Part IV provides for the protection of wages.

- Part V provides for the employment of young children and young persons (prohibition of employment of child in industrial undertakings).
- Part VII provides for employee welfare

**Relevance:** For the proposed development, this will cover such matters as contracts of work for workers hired during the execution of the Project.

**Compliance:** The developer will ensure that the employees' conditions of service are humane and that all people that get employed will be employed on the basis of merit and skills and not race, gender or tribe. At all phases of the Project, child labour will not be entertained.

#### **2.1.3.13 National Council for Construction Act No. 10 of 2020**

This Act provides for the establishment of the National Council for Construction and also defines its functions to provide for the promotion and development of the construction Industry in Zambia and also to provide for the registration of contractors. The section of the Act relevant to the proposed Project is part II, section 5 which provides for the functions of the council to promote and develop the construction industry in Zambian companies; assess the performance of contractors and regulate the behaviour and promote minimum standards and best practice of contractors and all other guidelines for services in the construction industry.

**Relevance:** There will be construction works taking place on site which should be done in accordance with the regulations set by the National Council for Construction.

**Compliance:** All contractors engaged on site will be registered with the National Council for Construction, all construction material to be used on site will conform to the Standards Act and foreign firms to be engaged will be registered with the Council.

#### **2.1.3.14 The Factories Act cap 441 No. 2 of 1966**

An Act to make further and better provision for the regulation of the conditions of employment in factories and other places as regards the safety, health and welfare of persons employed therein and to provide for the safety, examination and inspection of certain plant and machinery. The parts of this Act relevant to this Project are; Part v - Health: General Provisions which provides for cleanliness of workplaces, overcrowding, general ventilation, lighting and sanitary conveniences at the work place; Part vi - Safety: General Provisions which provides for the training and Supervision of inexperienced works and safety access to site, fire prevention and fighting and means of escape and warning in case of fire; Part vii – Safety: Lifting Machinery which provides for the construction and maintenance of hoist and lifts; Part ix – Welfare: General Provisions which provides for drinking water, washing facilities, accommodation for clothing and change rooms, facilities for sitting, first aid and welfare regulations and; Part xi which provides for the notification and investigation of accidents, dangerous occurrences and industrial diseases.

**Relevance:** For the proposed Project, this will cover such matters as provision of protective clothing or uniforms; cleanliness of the work area and its surroundings.

**Compliance:** The developer will ensure compliance to this Act by ensuring that during construction phase, the contractors on site adhere to good housekeeping practices and comply with the safety provisions of this Act. Warning signs will be placed at appropriate locations on site. During operation the developer will ensure that the safety and health provisions of this Act are adhered to. At all phases of the Project there will be a system for notification and investigation of accidents and all works will be done in a conducive environment.

#### **2.1.3.15 The Gender Equity and Equality Act No.22 of 2015**

This Act provides for Gender Equity and Equality in all spheres of life and provides for the elimination of all forms of discrimination. The sections of the Act relevant to the proposed Project are part iv: which provides for Gender Equity and Equality - (a and b) both sexes shall enjoy equal rights and equal access to justice and protection before the law; and prohibits gender discrimination.

**Relevance:** The development will require that people be employed and will also involve the selling of products to people (individuals or company representatives) and procurement of raw materials from people (individuals or company representatives). This means the Project will interact with people of different genders.

**Compliance:** The developer will ensure that Project activities are carried out in compliance with this Act. Workers will be employed on the basis of merit and not gender, and gender discrimination will be strictly prohibited.

#### **2.1.3.16 The National HIV/AIDS/STI & TB Council Act No. 10 of 2002 read as one with The National HIV/AIDS/STI/TB Council (Amendment) Act, No. 8 of 2021**

This is an Act to establish the National HIV/AIDS/STI/TB Council, define its functions and provide for its composition and to constitute the Secretariat of the Council, define its functions and provide for its composition. The provision relevant to the proposed Project is **Provision 4:** The functions of the Council shall be to coordinate Council and support the development, monitoring and evaluation of the multi-sectoral national response for the prevention and combating of the spread of HIV, AIDS, STI AND TB in order to reduce the personal, social and economic impacts of HIV, AIDS, STI and TB.

**Relevance:** The proposed Project will involve people with different medical health conditions.

**Compliance:** The developer will promote health education on site.

#### **2.1.3.17 Metrology Act No.7 of 2017**

This Act provides for the keeping and maintenance of national measurement standards; provide for the use of measurement units of the International System of Units and other units and provide for consumer protection, health, safety and environmental management through legal metrology measures. The sections of this act relevant to the proposed Project are: part iii which provides the use of Standard unit of measurement, Units of measurement, Prohibition of use of certain units of measurement and Equivalence of certain units and part iv which provides the use of National measurement standards.

**Relevance:** The proposed Project will require that the implementation be done according to the plans which should be communicated to various specialists engaged on the Project.

**Compliance:** The developer will ensure that all units in the plans are presented according to the International System of Units. The developer will also ensure that all communication, drawings, designs and the actual construction is done in compliance to this Act.

#### **2.1.3.18 The Water Supply and Sanitation Act No. 28 of 1997**

An Act to establish the National Water Supply and Sanitation Council and define its functions; to provide for the establishment, by local authorities, of water supply and sanitation utilities; to provide for the efficient and sustainable supply of water and sanitation services under the general regulation of the National Water Supply and Sanitation Council. The part of this act relevant to this Project is section 10 (1) which states that a local authority shall provide water supply and sanitation services to the area falling under its jurisdiction.

**Relevance:** This Act is relevant as it mandates local authorities to provide water supply and sanitation services within their jurisdiction. For this Project, LWSC, as the Lusaka water utility, is responsible for ensuring efficient and sustainable water supply to areas including the Garden Park Ward 10, aligning with the objectives of the Act.

**Compliance:** The Project shall be implemented by LWSC, ensuring that water abstraction, treatment, and distribution meet the service obligations and standards prescribed under the Act. The developer shall follow the National Water Supply and Sanitation Council guidelines to maintain efficiency, sustainability, and regulatory compliance.

## **2.2 International Agreements and Conventions**

Zambia is a signatory to a number of international conventions which are related to the environment, the study referred to the conventions below to ensure that the Project does not violate any international agreements on environmental protection:

### **2.2.1 Paris Agreement - 2015**

The Paris Agreement strengthens the global response to climate change by promoting low-carbon and climate-resilient development pathways.

**Relevance:** The Agreement is relevant as the Project contributes to climate adaptation by improving water supply reliability while also consuming energy during operation.

**Compliance:** The developer shall promote energy efficiency and climate-smart infrastructure design to minimise greenhouse gas emissions and enhance resilience to climate change impacts.

### **2.2.2 Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and Their Disposal, 1989**

This Convention regulates the movement and disposal of hazardous wastes to protect human health and the environment.

**Relevance:** The Convention is relevant as construction and operation of the Project may generate hazardous waste, including oils, fuels and chemical residues.

**Compliance:** The developer shall ensure that hazardous waste is properly stored, handled and disposed of through licensed facilities in accordance with national regulations.

### **2.2.3 Stockholm Convention on Persistent Organic Pollutants (POPs), 2001**

This Convention seeks to eliminate or restrict the production and use of persistent organic pollutants that pose risks to human health and the environment.

**Relevance:** The Convention is relevant where chemicals or materials used during construction and operation could potentially contaminate water resources or soils.

**Compliance:** The developer shall avoid the use of restricted or banned substances and ensure safe chemical management practices are implemented throughout the Project lifecycle.

### **2.2.4 International Labour Organization (ILO) Core Conventions, 2022**

These conventions promote fundamental principles and rights at work, including occupational health and safety, fair labour practices and protection of workers.

**Relevance:** The Conventions are relevant as the Project will employ workers during construction and operation, exposing them to occupational health and safety risks.

**Compliance:** The developer shall ensure safe working conditions, fair labour practices, and compliance with national labour and occupational health and safety requirements.

### **2.2.5 African Charter on Human and Peoples' Rights, 1981**

This Charter provides for the protection of human rights, including the right to development, health and a clean environment.

**Relevance:** The Charter is relevant as the Project affects communities' access to safe water, livelihoods and environmental quality.

**Compliance:** The developer shall ensure meaningful stakeholder engagement, protection of community rights, and equitable access to Project benefits while minimizing adverse social impacts.

## **2.3 Institutional Framework**

A number of institutions will have a regulatory and monitoring role directly or indirectly under their respective pieces of legislation. The developer (Lusaka South Multi-Facility Economic Zone Limited) assisted by their Project Managers (Lusaka Water and Sanitation Company Limited) will ensure compliance with institutional provisions and guidelines issued by the following key institutions whose requirements will need to be complied with.

### **2.3.1 Zambia Environmental Management Agency**

ZEMA is an independent environmental regulator and coordinating body. It is governed by a board which provides strategic direction, develops policies as well as monitoring its functions as it relates to the administration of the EMA.

With respect to the proposed Project, ZEMA is responsible for reviewing the proposed Project Environmental and Social Impact Assessment (ESIA) report and make a decision on whether the proposed Project should be implemented or not.

### **2.3.2 The Ministry of Local Government**

The Ministry of Local Government is charged with the responsibility of promoting a decentralized and good local governance system, facilitating the delivery of quality municipal services in order to contribute to sustainable social economic development. The local government is an institution, which deals with matters concerning the people living in a particular locality. It represents the microscopic interests of the locality leading to the broader concept of welfare and happiness of its people. The local government institutions have allowed effective participation and involvement of local people in their affairs.

The Chilanga Town Council and the Lusaka City Council (a form of local government in the Project area) will review the Project plans and also help manage the solid waste generated on site by either approving the waste management contractor to be engaged or they manage the waste.

### **2.3.3 Water Resources Management Authority**

The Water Resources Management Authority is responsible for regulating the sustainable use and protection of Zambia's water resources.

For the proposed Water Supply Improvement Project, WARMA will be required to authorise the abstraction and use of water from the approved source(s) and issue the necessary water use and abstraction permits.

### **2.3.4 Road Development Agency**

The Road Development Agency (RDA) is responsible for regulating and overseeing activities affecting public roads and road reserves. For the proposed Water Supply Improvement Project, the developer shall submit detailed designs and method statements to RDA for approval where the pipeline routes, access roads or construction activities interface with public roads or road reserves. All works shall be implemented in compliance with Zambian road legislation, and any affected roads shall be reinstated to their original condition to ensure safe and uninterrupted transport networks.

### **2.3.5 The Labour Office**

For this Project, the labour office will be responsible for ensuring that workers conditions of service comply with the Employment Code Act of 2019.

The developer will ensure compliance with institutional provisions and guidelines issued by the above institutions in the process of implementing the Project.

#### **2.3.6 ZESCO Limited**

ZESCO Limited is a Zambian national power utility that is owned by the Government of the Republic of Zambia. Its mandate is to supply electricity and energy solutions within Zambia and the Sub-Saharan region.

ZESCO Limited's relevance is primarily associated with the need to identify and mitigate potential conflicts between the proposed water pipelines and existing or planned electricity infrastructure, and ensure full compliance with statutory safety and clearance requirements. Furthermore, the Project will require a reliable electricity supply for the operation of boreholes, pumping stations, and associated facilities, thereby making ZESCO Limited a critical partner in establishing and securing power supply arrangements. Accordingly, ZESCO Limited will be systematically engaged during the ESIA process and at the detailed design stage to verify the location of electrical assets, agree on appropriate protection or relocation measures where applicable, and facilitate the acquisition of all necessary permits and approvals, consistent with the Project's stakeholder engagement framework.

#### **2.3.7 Ministry of Infrastructure, Housing and Urban Development - Department of Valuation and Property Management**

The Ministry of Infrastructure, Housing and Urban Development is mandated to provide policy direction and oversight in the planning, development, and management of infrastructure, housing, and urban development in Zambia. Through the Department of Valuation and Property Management, the Ministry is responsible for property valuation, estate management, and the regulation of property-related matters for public institutions. The Department ensures that land and property assets are properly valued, managed, and utilized in accordance with national policies and statutory requirements.

For the proposed Project, the Department of Valuation and Property Management will provide guidance on property valuation matters where applicable, including assessment of land values, verification of property boundaries, and ensuring that any land acquisition or compensation processes comply with established legal and institutional frameworks.

## **2.4 International Best Practice Guidelines and Standards**

This Section outlines environmental performance standards which the developer will take into consideration for the development of the Project.

### **2.4.1 The Equator Principles**

The Equator Principles are a risk management framework, adopted by financial institutions, for determining, assessing and managing environmental and social risk. Equator Principle Financial Institutions (EPFIs) commit to implementing the Equator Principles in their internal environmental and social policies, procedures and standards for financing Projects.

There are ten Equator Principles as listed below:

- Principle 1: Review and Categorisation;
- Principle 2: Environmental and Social Assessment;
- Principle 3: Applicable Social and Environmental Standards;
- Principle 4: Environmental and Social Management System and Equator Principles Action Plan;
- Principle 5: Stakeholder Engagement;
- Principle 6: Grievance Mechanism;
- Principle 7: Independent Review;
- Principle 8: Covenants;
- Principle 9: Independent Monitoring and Reporting; and
- Principle 10: Reporting and Transparency.

### **2.4.2 IFC Environmental, Health and Safety Guidelines**

The IFC Environmental, Health and Safety (EHS) Guidelines outline the IFC's expectations for environmental, occupational health and safety, and community health and safety performance of Projects. For the proposed Water Supply Improvement Project, the most relevant IFC EHS Guidelines to be considered include:

- IFC General Environmental, Health and Safety (EHS) Guidelines (2007);
- IFC EHS Guidelines for Water and Sanitation (2007); and
- IFC EHS Guidelines for Electric Power Transmission and Distribution (2007) (where pumping stations and power supply infrastructure are involved).

### **2.4.3 IFC Performance Standards**

The IFC's Environmental and Social Performance Standards (PSs) provides an international benchmark for identifying and managing environmental and social risk.

- Performance Standard 1: Assessment and Management of Environmental and Social Risks and Impacts - Establishes the requirement for an integrated process to identify, assess, and manage environmental and social risks and impacts. The Project will apply this standard through the ESIA process, stakeholder engagement, and implementation

of mitigation, monitoring, and adaptive management measures throughout the Project life cycle.

- Performance Standard 2: Labour and Working Conditions - Applicable to ensure fair treatment, non-discrimination, and safe working conditions for Project workers. The Project will implement occupational health and safety measures, worker grievance mechanisms, and compliance with national labour laws and international good practice.
- Performance Standard 3: Resource Efficiency and Pollution Prevention - Applicable due to construction activities that may generate dust, noise, waste, and emissions. The Project will implement measures to minimise pollution, promote efficient use of materials and water, and manage waste in accordance with regulatory requirements and good practice.
- Performance Standard 4: Community Health, Safety, and Security - Applicable due to potential construction-related risks to surrounding communities. Key risks include traffic disruptions along Mumbwa Road, open trench hazards, restricted access, noise, dust, and temporary disturbance of informal structures within the pipeline corridor. The Project will implement traffic management plans, safe trenching and barricading, controlled access to work areas, community awareness programmes, and phased construction to maintain access and protect public safety.
- Performance Standards 5: Land Acquisition and Involuntary Resettlement - The Project is not expected to require permanent land acquisition or physical displacement. Scoping identified makeshift and informal structures along portions of the pipeline corridor that may experience temporary disturbance during phased construction. These impacts will be short-term and reversible, and access will be restored upon completion of works. A Resettlement Action Plan (RAP) is therefore not anticipated. The ESIA will confirm this and apply disturbance management and livelihood restoration measures consistent with PS5 principles where temporary impacts occur.
- Performance Standard 6: Biodiversity Conservation and Sustainable Management of Living Natural Resources - Applicable to ensure that vegetation clearance and construction activities do not result in significant biodiversity loss. The Project will minimise habitat disturbance and implement rehabilitation measures.
- Performance Standard 7: Indigenous Peoples - Not applicable, as there are no Indigenous Peoples, as defined by the standard, present within the Project area of influence.
- Performance Standard 8: Cultural Heritage - Applicable due to the potential for chance finds during excavation. A Chance Finds Procedure will be implemented to protect any cultural or archaeological resources encountered.

#### **2.4.4 World Bank Environmental and Social Standards**

The World Bank Environmental and Social Framework (ESF) establishes a set of Environmental and Social Standards (ESS) designed to help borrowers manage environmental and social risks in investment projects and improve sustainable development outcomes. These standards promote the avoidance, minimisation, and mitigation of adverse impacts while enhancing project benefits for affected communities.

The standard applicable to this Project is the Environmental and Social Standard 5 (ESS5): Land Acquisition, Restrictions on Land Use and Involuntary Resettlement which provides guidance on avoiding or minimising involuntary resettlement and ensuring that affected persons are compensated and assisted in restoring livelihoods where land acquisition or access restrictions occur.

#### **2.4.5 World Bank Safeguard Policies**

The World Bank Safeguard Policies were developed to prevent and mitigate undue harm to people and the environment during the development process.

The policy relevant to the proposed project is the Environmental Assessment (OP 4.01) which requires environmental assessment of projects to identify potential impacts and define mitigation measures. The ESIA process for the Project aligns with OP 4.01 by evaluating environmental and social risks, assessing alternatives, and recommending mitigation and monitoring measures.

#### **2.4.6 World Health Organization Global Air Quality Guidelines (2021)**

The World Health Organization Global Air Quality Guidelines provide evidence-based recommendations on air quality levels necessary to protect public health. The guidelines establish threshold values for major air pollutants and support governments and project developers in reducing exposure risks.

The guidelines provide recommended limits for key air pollutants such as particulate matter (PM<sub>2.5</sub> and PM<sub>10</sub>), nitrogen dioxide, sulphur dioxide, and ozone. These benchmarks will inform the assessment and management of construction-related air emissions, particularly dust generation along pipeline routes and at construction sites.

#### **2.4.7 Japan International Cooperation Agency Guidelines for Environmental and Social Considerations (2022)**

The Japan International Cooperation Agency Guidelines for Environmental and Social Considerations provide a framework for integrating environmental and social safeguards into projects supported by JICA. The guidelines emphasise transparency, stakeholder engagement, environmental protection, and social equity throughout the project life cycle.

These guidelines outline requirements for environmental and social assessment, stakeholder engagement, biodiversity conservation, and involuntary resettlement. They will support the Project in aligning with internationally recognised practices, particularly where development partners or co-financing institutions are involved.

### 3.0 PROJECT DESCRIPTION

#### 3.1 Location

The proposed Water Supply Improvement Project is located in Lusaka Province and traverses between two districts that is Lusaka and Chilanga District. The project will originate from groundwater sources (boreholes) located in Kalundu Area, Chilanga District, approximately 18 km west of the Lusaka Main Post Office and about 28.5 km northwest of the Chilanga Post Office.

From this point, the transmission pipeline will follow existing public road reserves, primarily along Mumbwa Road (M9), passing through Garden Park area and terminating in Garden Park Ward 10 in Lusaka District. The termination point is situated approximately 12 km from the Lusaka Main Post Office and about 26 km northwest of the Chilanga Post Office.

The proposed project is a linear project. The spatial extent of the project includes the borehole sites in Chilanga District, the transmission pipeline corridor along Mumbwa Road, and the termination point in Garden Park, Lusaka District.

The major Landmarks in the project area are:

- Lucky Chance located at approximately 870m south east of the Termination Point (Garden Park, Lusaka District)
- Along the Pipeline Route from the proposed water source (Kalundu Area, Chilanga District) to the termination point are residential units; commercial units including shops, service stations, block making facilities, trade stalls, lodges and recreational facilities; Schools; health facilities and churches.
- The water source is surrounded by undeveloped land characterised by grass vegetation.

The GPS coordinates of the site are as follows:

Table 10: GPS Coordinates of the Proposed Site

| Label                                                   | Coordinates  |              |           |
|---------------------------------------------------------|--------------|--------------|-----------|
| Point                                                   | Latitude     | Longitude    | Elevation |
| Source of Water (start point and location of boreholes) | 15°24'23.1"S | 28°09'07.7"E | 1238m     |
| Termination Point (elevated storage water tanks site)   | 15°23'50.8"S | 28°13'16.3"E | 1269m     |



Figure 2: Satellite Map Showing the proposed Transmission Pipeline Route

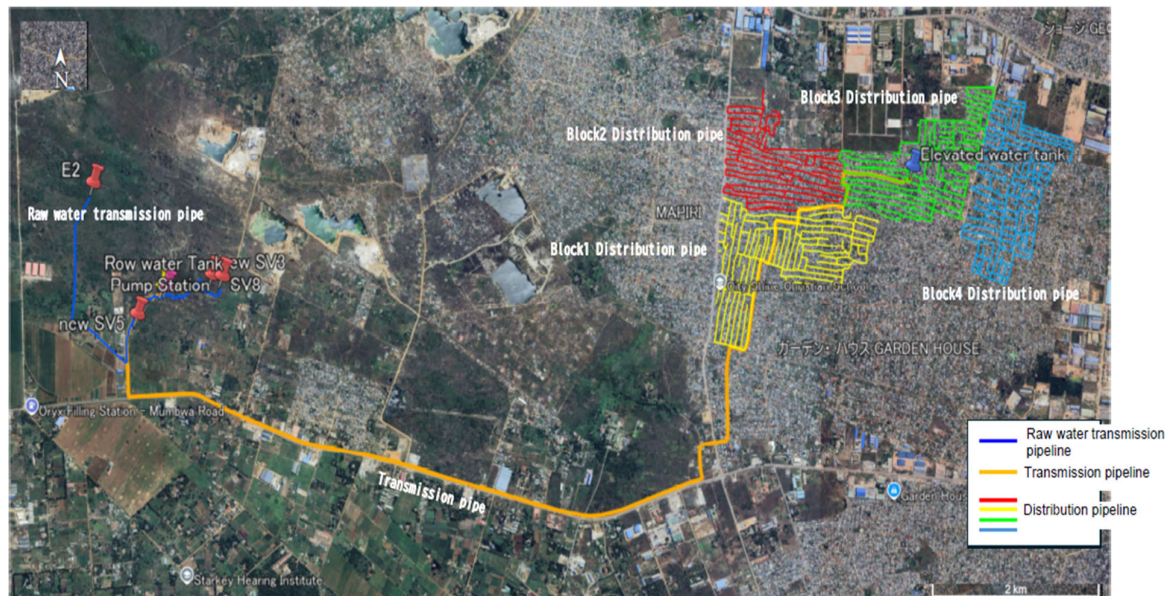


Figure 3: Proposed Water Supply Improvement System Layout

The satellite map above illustrates the raw water transmission pipeline, transmission pipeline along Mumbwa Road, the raw water tank and pump station, the elevated water storage tank, and the distribution network block (Blocks 1–4) that will supply water to the surrounding residential areas.

### 3.2 Nature of the Project

The nature of the proposed Project is the development of groundwater-based water supply infrastructure aimed at improving access to safe and reliable potable water for residents of Garden Park Ward 10 and surrounding peri-urban areas of Lusaka city. The Project, to be implemented by Lusaka Water Supply and Sanitation Company with support from the Japan International Cooperation Agency (JICA), will involve the abstraction of groundwater from boreholes in the Kalundu area, temporary storage and pumping of raw water through transmission pipelines, and distribution through elevated storage tanks and a piped network to the target communities.

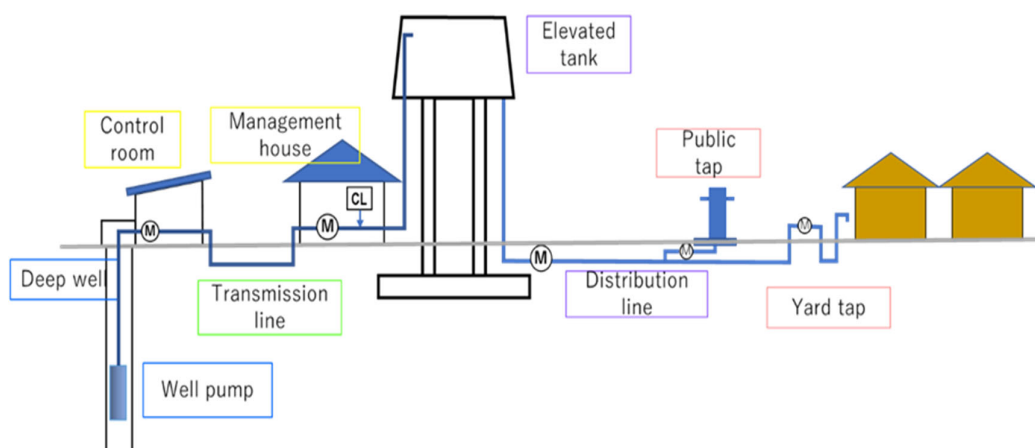


Figure 4: Project Overview

The proposed Project involves the development of a raw water transmission pump station and storage facility at the well field, alongside a distribution reservoir station at Garden Park Ward 10. It is designed to abstract, temporarily store, and pump raw water through transmission pipelines for distribution to Garden Park and surrounding peri-urban areas.

The Project comprises two main sites:

- i. Well field transmission pump station site (water source) this includes raw water receiving tank, pump house, and associated infrastructure.
- ii. Garden Park distribution reservoir site (termination point) this includes elevated storage tanks, distribution pipelines, flow measurement facilities, and administrative buildings.

The infrastructure will support reliable water transmission and distribution through reinforced concrete structures, underground pipelines, electrical installations, drainage systems, and security facilities. The proposed Project Sites/Components includes:

- Well field transmission pump station and raw water storage facility (water source)
  - Raw water receiving tank: A reinforced concrete ground-level tank (118.8 m<sup>2</sup>) that receives water from boreholes before pumping;

- Transmission pumping station: Houses pumps, control panels, and electrical equipment, directly connected to the storage tank and transmission pipeline;
  - Office building: Operational control and staff workspace;
  - Guard house: Security control at entrance (approx. 16 m<sup>2</sup>);
  - Transmission pipelines: Underground pipelines connecting the well field to the distribution reservoir;
  - Sanitation system: Underground septic tank;
  - Parking: Area - Crushed stone paved surface; and,
  - Perimeter infrastructure which will be 2.0 m high block wall with barbed wire and 4.0 m × 2.0 m electric sliding gate.
- Garden Park distribution reservoir station (termination point)
    - Elevated storage tanks: Two reinforced concrete tanks (1,000 m<sup>3</sup> each) providing gravity-based water distribution;
    - Administration building: Staff offices and operational management space;
    - Flowmeter room: Houses bulk flow measurement equipment (approx. 40 m<sup>2</sup>);
    - Main distribution pipeline: DN 400 pipeline distributing water to the network;
    - Transmission pipeline: DN 350 pipeline conveying water from the pumping station to the reservoir.
    - Drainage infrastructure: DN 150 rainwater drainage pipes with crushed stone permeation areas;
    - Sanitation facilities: Septic and rock absorption tanks.
    - Parking area; and,
    - Security infrastructure: 2.0 m high block wall with barbed wire, electric sliding gate, and guard house.

The Project will also include associated infrastructure such as pumping stations, guard houses, and ancillary works required for effective water supply operations. Construction activities will include the installation of submersible pumps, excavation and trenching for pipelines, concrete works for foundations and structures, and the installation of mechanical and electrical equipment.

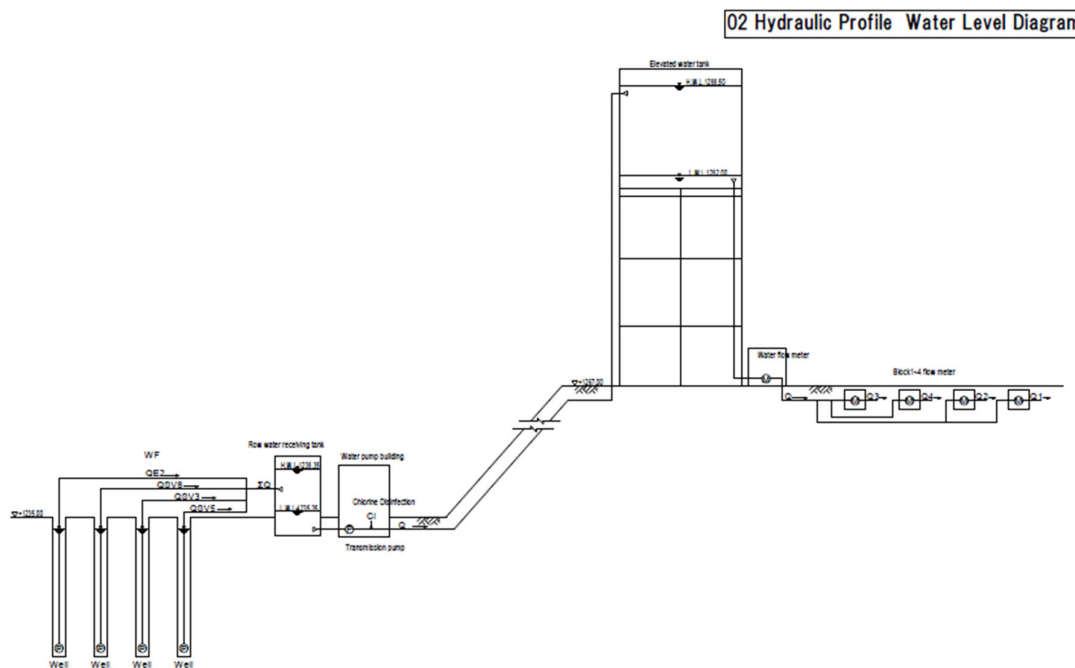


Figure 5: Hydraulic Profile of the Proposed Water Supply System

The hydraulic profile diagram above shows how water will move through the proposed water supply system from the boreholes to the communities that will receive the water. Groundwater will first be pumped from several boreholes at the well field and directed into a raw water receiving tank, which will serve as a temporary storage facility before the water is pumped into the main transmission pipeline.

From the receiving tank, pumps will push the water through a transmission pipeline to the elevated water storage tank located at the Garden Park reservoir site. Along the pipeline, equipment such as flow meters and a chlorination unit will be installed to measure the amount of water flowing through the system and to disinfect the water to ensure it is safe for consumption. Once the water reaches the elevated storage tank, it will be distributed by gravity through the main distribution pipelines to the surrounding residential areas, including Blocks 1 to 4. This system allows water to flow naturally from the elevated tank to households while maintaining sufficient pressure within the network.

The proposed Project will be done in three phases namely: preparation phase, construction phase and operation phase. In terms of technology and raw material implementation, the proposed Project will be constructed in accordance with all relevant Zambia Standards.

Specialized local contractor(s) will be engaged for construction work. As far as possible, priority will be given by the contractor to the employment of labour from local communities around the Project area, although a number of the Contractors permanent skilled staff may be brought in from other areas.

### 3.2.1 Raw Materials and Equipment

The raw materials that are expected to be used during the construction and operation phase of the project will include the following:

Table 11: Raw Materials to be used for Construction

|                           | Material                                                               | Source                                   | Storage on Site                                                         | Mode of Delivery                       |
|---------------------------|------------------------------------------------------------------------|------------------------------------------|-------------------------------------------------------------------------|----------------------------------------|
| <b>CONSTRUCTION PHASE</b> |                                                                        |                                          |                                                                         |                                        |
| 1                         | River sand and quarry sand                                             | Local approved suppliers                 | Heaped in designated construction areas                                 | Road truck                             |
| 2                         | Aggregates, concrete blocks and crushed stone                          | Local approved suppliers                 | Heaped in designated construction areas                                 | Road truck                             |
| 3                         | Cement                                                                 | Local                                    | Stored in a temporal storage container on site                          | Road truck                             |
| 4                         | Ready-mix concrete                                                     | Local batching plants                    | Delivered as required                                                   | Concrete mixer trucks                  |
| 5                         | DN450mm HDPE/DI bulk water pipes                                       | Local approved suppliers and/or imported | Stacked on level ground within secured laydown areas along the wayleave | Flatbed truck                          |
| 6                         | Valves, hydrants, meters, tees, bends, air valves, washout fittings    | Local approved suppliers and/or imported | Secured storage containers                                              | Road truck                             |
| 7                         | Steel reinforcement bars, formwork materials (timber/steel shuttering) | Local approved suppliers                 | Stacked in designated areas at reservoir and tank sites                 | Road truck                             |
| 8                         | Diesel, petrol and lubricants (for construction machinery)             | Licensed local fuel suppliers            | No storage on site                                                      | Delivered by licensed fuel transporter |
| 9                         | Water for construction (dust suppression, concrete works)              | LWSC supply and/or existing borehole     | Temporary water storage tanks                                           | Water bowser / pipe connection         |
| 10                        | Electrical equipment                                                   | Local approved suppliers and/or imported | Secured storage containers                                              | Road truck                             |
| 11                        | Elevated tank structural components                                    | Local fabricators or imported            | Secured laydown area at the borehole and tank sites                     | Flatbed truck                          |
| <b>OPERATION PHASE</b>    |                                                                        |                                          |                                                                         |                                        |

|   | <b>Material</b>                                                                      | <b>Source</b>                                                | <b>Storage on Site</b>                              | <b>Mode of Delivery</b>                       |
|---|--------------------------------------------------------------------------------------|--------------------------------------------------------------|-----------------------------------------------------|-----------------------------------------------|
| 1 | Bulk water                                                                           | Boreholes                                                    | large ground reservoir and elevated tank            | Bulk transmission pipeline and pumping system |
| 2 | Electricity (for pumps, controls and lighting)                                       | ZESCO Limited with standby generators at critical facilities | Electrical control rooms and switch panels          | ZESCO power reticulation network              |
| 3 | Spare parts and maintenance materials (valves, gaskets, fittings, electrical spares) | Local and international suppliers                            | Maintenance store at booster station/reservoir site | Road truck                                    |
| 4 | Cleaning and maintenance materials                                                   | Local suppliers                                              | Storage room within facility                        | Road truck                                    |

### 3.2.2 Process and Technology and Services

#### 3.2.2.1 Process and Technology

The infrastructure will be constructed using reinforced concrete and appropriate pipeline materials, with associated drainage, electrical, and mechanical installations, and site reinstatement upon completion.

Construction machinery and equipment to be used for the project will generally include the following:

- Earthmoving equipment: excavators, loaders, graders, and trenchers;
- Hauling and transport equipment: dump trucks and tippers;
- Material handling equipment: cranes, forklifts, and hoists;
- Construction and installation equipment: concrete mixers, batching equipment, compactors, welding machines, pipe-laying equipment, road-making and reinstatement machinery, and spraying and plastering machines.

The civil works to be carried out on site will include the movement of machinery to site it according to architectural layout and also the driveway construction. The mechanical works to be carried out will include installation of the water reticulation system. The electrical works to be carried out will include the installation of power cables and connecting to the ZESCO power supply.

The construction process will involve excavation works of trenches not exceeding 1.2 metre in depth, followed by pipe laying and subsequent backfilling. Excavation activities will be undertaken using a combination of mechanical equipment and manual labour where necessary to ensure efficiency and minimize disturbance to surrounding infrastructure.

Although pipe jacking is commonly considered a viable trenchless method for pipeline installation, its application is highly dependent on the availability and accuracy of information regarding the location of existing underground utilities, which is limited within the Project area.

Similarly, horizontal directional drilling is highly sensitive to prevailing geological and subsurface conditions. Due to these constraints, both pipe jacking and horizontal directional drilling have not been considered as feasible trenchless construction methods for this Project.

The following assumptions have therefore been adopted for trenchless pipe construction where necessary: All major road crossings will be carried out using trenchless construction methods in order to minimise disruption to traffic flow and surrounding infrastructure.



Figure 6: Process Flow Chart

### **3.2.2.2 Services**

#### **➤ Water Supply**

The project area is currently not serviced by a formal reticulated water supply system operated by Lusaka Water Supply and Sanitation Company Limited or other providers. Water demand is met through self-supply sources, including boreholes and shallow wells. These sources are often unreliable and pose potential risks to water quality due to contamination from surrounding land uses, particularly during the rainy season. Limited access to safe and reliable potable water remains a key constraint within the area.

During construction water supply will be from existing boreholes and a water bowser were necessary, and during operation water supply will be from LWSC (proposed project).

#### **➤ Power**

Electrical power for the project will be sourced from the national grid operated by ZESCO Limited, with existing infrastructure located within feasible connection distance. Temporary power during construction will be provided through generators.

During operation, a reliable electricity supply will be required to support borehole pumping, water transmission, and storage systems.

#### **➤ Sewerage and Sanitation Services**

The project area is not connected to a centralized sewerage system and relies on on-site sanitation facilities such as pit latrines and septic tanks. These systems present potential environmental risks, including groundwater contamination, particularly in areas with high water tables or during periods of heavy rainfall.

During construction, sanitation facilities for workers will be provided through hired portable chemical toilets, strategically placed at active work sites. These facilities will be regularly serviced and maintained by licensed service providers to ensure hygienic conditions and prevent environmental contamination.

During operation, sewage waste will be managed by the use of modern flushable toilets connected to septic tanks and scheduled pump-out systems constructed at key installation sites (pumping station and the elevated water reservoir sites), designed in accordance with the local authority requirements.

### **3.2.3 Products and By-products**

#### **3.2.3.1 Products of the Project**

The main output of the Project is a groundwater-based bulk water supply transmission and distribution system designed to provide safe, reliable, and sustainable potable water to Garden Park Ward 10 and surrounding peri-urban areas in Lusaka.

### **3.2.3.2 By-products during Preparation and Construction**

The various waste products expected to be generated during the project preparation and construction phase and their disposal or management methods are as follows:

- Solid waste - will include packaging materials, off-cuts from pipes and fittings, concrete debris, excavated surplus material, and general domestic waste from construction personnel. Waste will be collected in designated, leak-proof bins at construction sites and along the pipeline corridor and disposed of through local authority-approved waste collection companies. Open burning of waste will not be permitted.
- Excavated material (spoil) - excavation works for trenching, reservoirs, pump stations, and foundations will generate spoil material. Suitable excavated material will be reused for backfilling and reinstatement, while excess spoil will be transported to approved disposal sites in consultation with the local authority.
- Sewage and domestic wastewater - sanitary waste generated by construction workers will be managed using temporary mobile toilets or existing sewer connections where available. Mobile toilets will be serviced regularly by licensed waste handlers to prevent pollution and public health risks.
- Hydrocarbon waste and spills - Limited quantities of hydrocarbon waste, including used oils, lubricants, and fuel residues, may arise from construction machinery and vehicles. Equipment will be well maintained to prevent leaks, and any waste oils will be collected and stored in clearly labelled containers for disposal by approved hazardous waste management companies.
- Hazardous waste (limited quantities) - this waste may include contaminated soil from accidental spills, and chemical containers (if any). Such waste will be segregated, securely stored, and disposed of at licensed hazardous waste facilities in accordance with national environmental regulations. The developer will also ensure that contractor(s) on site will have well trained supervisors who will ensure proper maintenance and handling of machinery to prevent spills/leakages of hydrocarbons to the environment.

### **3.2.3.3 By-Products during Operation**

During the operation phase of this Project, a number of wastes and by-wastes may be generated, although in relatively small quantities as follows:

- Sewage and waste water: Sanitation requirements associated with the operation of pumping stations and storage facilities will be minimal. Sewage waste will be managed by the use of septic tanks and a scheduled pump-out systems constructed at key installation sites (pumping station and the elevated water reservoir sites), designed in accordance with the local authority requirements.
- Solid waste: Collection and disposal will be contracted out to the approved Local Council contractor for the area and disposed of in accordance with the local authority requirements.

### 3.2.4 Production Capacity

The Project is designed to benefit an estimated 73,200 people, with a planned water supply capacity of approximately 6,400 cubic metres per day. During operation, the system will abstract groundwater at approximately 98–100 litres per second, store it in the elevated tanks, and distribute it through the piped network.

### 3.2.5 Schedule and Lifetime of the Project

This project is expected to commence in the first quarter of 2027 and is scheduled to be completed within a period of 24 - 28 months. The project is expected to have a lifespan of 50 years.

Table 12: Schedule of Project Activities

| Phase                        | Duration                | Main Activities                                                                                                                                                   |
|------------------------------|-------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Preparation Phase            | 4 months<br>(Tentative) | Obtaining all relevant approvals                                                                                                                                  |
| Construction Phase           | 2 years                 | Drilling of boreholes, laying of raw water transmission pipeline, distribution pipeline, putting up elevated water tanks and construction of auxiliary facilities |
| Operation Phase by Developer | 50 years                | Operation and maintenance of a centralized water system                                                                                                           |
| Decommissioning Phase        | 3 months                | Restoring the site to pre-project status                                                                                                                          |

## 3.3 Main Activities

### 3.3.1 Activities during Site Preparation Phase

The main activities envisaged during this phase are:

- Appointment of Project team;
- Site Investigation (compressive geotechnical investigations), Foundation design and groundwater reservoir design;
- Engineering drawings;
- Architectural Building Plans;
- Concern/ commitment/approval from relevant institutions;
- Environmental and social impact assessment and management plan; and,
- Obtaining of approvals/permits from relevant authorities including the ZEMA

Equipment that will be used during this phase will include: bulldozers, excavators, cranes, tipper trucks and other small tools including hoes and picks etc.

### **3.3.2 Activities during Construction**

The following will be done during the construction phase

- **Site preparation:** This will include corridor demarcation along the pipeline route, clearing of vegetation where necessary, surveying and setting out of the pipeline alignment, mobilization of contractors, machinery and construction materials, and establishment of temporary site facilities such as storage areas and worker amenities.
- **Civil works:** Civil construction activities will include excavation of trenches for pipeline installation, construction of concrete chambers and valve boxes, development of the booster or pump station infrastructure, and construction of the distribution reservoir and associated foundations. Trenching will generally be shallow and will be undertaken using both mechanical equipment and manual labour. Upon completion of pipe installation, excavated areas will be backfilled and disturbed surfaces including roads, shoulders, and verges will be reinstated.
- **Mechanical installation:** This will involve installation of the transmission pipelines, distribution pipelines, valves, fittings, and pump systems within the pump station and reservoir facilities. These components will enable the abstraction, conveyance, and controlled distribution of groundwater to the service area.
- **Electrical and instrumentation works:** Electrical infrastructure will be installed to support the operation of the pumping system. This will include power supply connections, installation of control panels, cabling, monitoring instruments, and automation systems used to regulate pumping operations and monitor system performance. Provision will also be made for standby power supply such as a backup generator set or solar power system to ensure operational continuity in the event of power outages.
- **Testing and commissioning:** After installation of all system components, pressure testing of the pipelines will be conducted to confirm structural integrity and leak tightness. The pipelines and reservoirs will then undergo cleaning and disinfection before the system is commissioned and prepared for operational use.
- **Rehabilitation and demobilization:** Following completion of construction works; temporary facilities will be dismantled and removed from the site. Construction areas, access routes, and any disturbed land will be rehabilitated and restored to their original condition or to an agreed standard.

### **3.3.3 Activities during Operation**

During the operational phase, the project will focus on the abstraction, transmission, storage, and distribution of groundwater to Garden Park and surrounding communities. Routine operational activities will include continuous operation of pumping systems, monitoring of water levels and system performance, management of minor wastes generated from maintenance activities, and regular inspection, servicing, and repair of mechanical and electrical equipment such as pumps, valves, pipelines, and control systems to ensure reliable service delivery.

### **3.3.4 Decommissioning Phase**

Decommissioning of the project infrastructure may occur at the end of the project lifespan or if operations are permanently discontinued. At that stage, a detailed closure and site rehabilitation plan will be prepared in accordance with applicable environmental management requirements to guide the safe dismantling of project infrastructure and restoration of the affected areas.

The following activities will be undertaken during the decommissioning phase:

- Formal notification will be issued to all employees and relevant stakeholders regarding the planned decommissioning process.
- All operational activities at the facility will be gradually stopped and the system safely shut down.
- Project infrastructure including pumps, pipelines, reservoirs, electrical installations, and ancillary structures will be dismantled or decommissioned as appropriate, and all waste materials will be removed from the site for proper disposal or recycling.
- The project site and pipeline corridors will subsequently be rehabilitated to restore the land to an acceptable condition or for alternative future land use.

## **4.0 PROJECT ALTERNATIVES**

The following considerations have been made in terms of project implementation alternatives during the ESIA study undertaken.

### **4.1 Project Alternatives**

The proponent considered two main project alternatives, namely the no-action alternative and the proposed project alternative.

#### **4.1.1 Identification and Justification/analysis of Alternatives**

- i. No-action alternative - Under this alternative, the proposed water supply infrastructure would not be developed, and the existing water supply situation in Garden Park Ward 10, Lusaka City, would remain unchanged. While this option would result in no additional environmental or social impacts, it would perpetuate inadequate access to safe and reliable water for approximately 73,200 people. Furthermore, it would constrain socio-economic development, limit improvements in public health, and eliminate opportunities for employment and infrastructure development.
- ii. The proposed project alternative - The proposed project involves the construction and operation of a groundwater-based water supply system. The system is designed to produce approximately 6,400 m<sup>3</sup>/day. The project will significantly improve access to clean and safe water, enhance public health, and support socio-economic development within Garden Park Ward 10. In addition, it will generate employment during the construction phase and contribute to long-term water security. By utilizing groundwater sources that meet drinking water standards, the project minimizes the need for complex treatment technologies, thereby ensuring cost-effectiveness and operational sustainability

#### **4.1.2 List of Chosen Alternatives in Order of Preference**

- i. The proposed project
- ii. The no-action alternative

#### **4.1.3 Reasons for Choosing the Preferred Alternatives and Rejecting the Other Alternatives**

The proposed project has been selected as the preferred alternative because it provides a reliable, sustainable, and cost-effective solution to the water supply challenges in Garden Park Ward 10.

The no-action alternative was rejected because it would maintain the current inadequate water supply conditions and fail to deliver socio-economic and public health benefits. In contrast, the proposed project improves water access, supports economic activities, and enhances living conditions for the target population.

## **4.2 Technology and / or Design Alternatives**

The proponent evaluated various technology and design alternatives for water abstraction, treatment, and transmission to identify the most appropriate and sustainable solution.

### **4.2.1 Identification and Justification/Analysis of Alternatives**

#### **i. Borehole development configuration**

Two borehole development configurations were considered:

- Four high-yield boreholes (Preferred Option) - This option involves developing four boreholes to produce approximately 6,400 m<sup>3</sup>/day. It reduces infrastructure requirements, simplifies operation and maintenance, and lowers overall lifecycle costs.
- Thirteen boreholes - This option involves developing thirteen boreholes to achieve the same yield. While technically feasible, it increases capital costs, operational complexity, and maintenance requirements.

#### **ii. Water treatment technology alternatives**

- Chlorine disinfection only (Preferred Option) - This option is appropriate where groundwater meets drinking water standards. It is simple, cost-effective, and easy to operate and maintain.
- Advanced treatment (Ion exchange or Reverse Osmosis) - This option would be required if groundwater quality is compromised (e.g., elevated nitrate levels). However, it involves high capital and operational costs, technical complexity, and waste management requirements.

#### **iii. Transmission system design alternatives**

- Conventional pumped transmission system (Preferred Option) - This design conveys water from the borehole field to the demand area using pumps and a transmission pipeline sized for approximately 6,400 m<sup>3</sup>/day. It is reliable, widely used, and suitable for the project conditions.
- Alternative short-distance system with intensive treatment - This configuration reduces pipeline length but relies on lower-quality water sources requiring advanced treatment. While technically feasible, it results in higher overall system costs.

### **4.2.2 List of Chosen Alternatives in Order of Preference**

- i. Four high-yield boreholes with chlorine disinfection and conventional pumped transmission system.
- ii. Thirteen boreholes with advanced treatment system

### **4.2.3 Reasons for Choosing the Preferred Alternatives and Rejecting the Other Alternatives**

The preferred design option consists of a simplified system using a limited number of high-yield boreholes, chlorine disinfection, and a conventional pumped transmission system. This configuration was selected because it provides a cost-effective, reliable, and operationally manageable solution.

The alternative involving multiple boreholes and advanced treatment was rejected due to higher capital and operational costs, increased technical complexity, and greater maintenance requirements.

## **4.3 Site Alternatives**

### **4.3.1 Identification and Justification/Analysis of Alternatives**

- i. Option 1: Distant Borehole Site with Pipeline along M9 Road Reserve and Garden Park Inner Roads (Preferred Option)  
This option involves locating boreholes in the Kalundu Area in an undeveloped area away from the densely populated supply area (Garden Park) where groundwater quality is relatively high and less susceptible to contamination. The pipeline is routed along the M9 road reserve and extends into Garden Park through the internal road network.

The selection of this site supports the use of simple chlorine disinfection technology (see Section 4.2) by ensuring good raw water quality. Routing the pipeline along existing road corridors minimizes land acquisition, reduces environmental disturbance, and simplifies construction and maintenance. Within Garden Park, the use of inner roads enables efficient distribution to consumers. Although this option requires a longer transmission pipeline (approximately 12 km), it provides a sustainable and practical solution when both site and design considerations are taken into account.

- ii. Option 2: Nearby Borehole Site with Short Pipeline Route (Approximately 2 km)  
This option involves locating boreholes in Garden Park (the demand area), thereby reducing the required pipeline length.

However, groundwater in these areas is more likely to be affected by human activities, increasing the risk of contamination. As discussed in Section 4.2, this would necessitate advanced treatment technologies, significantly increasing capital and operational costs. In addition, more boreholes may be required, increasing system complexity.

### **4.3.2 List of Chosen Alternatives in Order of Preference**

- i. Distant borehole site (Kalundu Area) with pipeline along the M9 road reserve and Garden Park inner roads.
- ii. Nearby borehole site (Garden Park Area) with short pipeline route.

### **4.3.3 Reasons for Choosing the Preferred Alternatives and Rejecting the Other Alternatives**

The preferred alternative combines a distant borehole site and routing along existing road corridors, as it ensures access to high-quality groundwater and supports the use of simple, cost-effective treatment technology (as outlined in Section 4.2).

Although the pipeline is longer, the use of road reserves minimizes environmental and social impacts, reduces land acquisition requirements, and facilitates easier construction and maintenance.

The nearby borehole option was rejected due to the higher risk of contamination and the associated need for advanced treatment technologies, which would significantly increase costs and operational complexity. The no-action alternative was rejected because it does not meet the objective of improving access to safe and reliable water supply.

## **4.4 Water Supply Alternatives**

### **4.4.1 Identification and Analysis of Alternatives**

- i. Continued reliance on existing boreholes (groundwater abstraction only)  
Currently, the area relies on individual and localized boreholes for water supply. While groundwater provides a readily available local source, continued and increasing abstraction without a coordinated bulk supply system may lead to declining groundwater levels, reduced borehole yields, and potential deterioration in water quality over time. In addition, this option does not adequately meet the growing demand of the population and associated developments for safe water.
- ii. Bulk water supply system from dedicated borehole field (Proposed Option)  
Under this option, water will be abstracted from strategically located boreholes outside the densely populated area, treated using chlorine disinfection, and conveyed through a bulk transmission pipeline along the M9 road reserve into Garden Park, where it will be distributed through the internal road network.  
This option provides a centralized, reliable, and sustainable water supply capable of meeting the estimated demand of approximately 6,400 m<sup>3</sup>/day for about 73,200 people. It also reduces pressure on scattered borehole systems, improves water quality control, and ensures consistent supply for both domestic and future urban development needs.  
In addition, the system enhances water security for surrounding developments along the transmission corridor through potential future off-takes.

### **4.4.2 List of Alternatives in Order of Preference**

- i. Bulk water supply system from dedicated borehole field with transmission along M9 road reserve.
- ii. Continued reliance on individual boreholes within Garden Park.

#### **4.4.3 Reasons for Selecting the Preferred Alternative**

The bulk water supply system has been selected as the preferred alternative because it provides a reliable, sustainable, and long-term solution to the water supply challenges in Garden Park Ward 10.

Continued reliance on individual boreholes was rejected because it is unable to sustainably meet increasing demand and may result in over-abstraction of groundwater resources, leading to declining yields and potential long-term resource depletion.

The proposed bulk water supply system ensures controlled abstraction, improved water quality management through centralized treatment, and reliable distribution to the entire service area. It also supports planned urban growth and development while reducing the cumulative environmental pressure associated with dispersed borehole systems.

#### **4.5 Sewage Management**

The project area is not connected to a municipal sewerage network and therefore lies outside the service coverage of the Lusaka Water Supply and Sanitation Company (LWSC) centralized sewer system. As a result, existing sanitation practices in the area rely on on-site sanitation solutions, including pit latrines, septic tanks, and in some cases small-scale on-site treatment systems.

The project will adopt a dual sanitation approach that considers both construction and operational requirements, in line with applicable LWSC sanitation and environmental management guidelines.

##### **4.5.1 Identification and Analysis of Alternatives**

- i. Continued reliance on existing on-site sanitation systems (No formal intervention / No-action alternative) - Under this option, the project would rely entirely on existing sanitation systems within the project area, which include pit latrines and septic tanks. While this approach requires no additional investment, it is not suitable for construction activities or operational facilities due to hygiene concerns, limited capacity, and the risk of environmental contamination, particularly in areas with shallow groundwater.
- ii. Use of LWSC-managed centralized sewer connection (where applicable) - This option considers connection to the existing LWSC sewerage network where infrastructure is available. However, the project area is currently outside the LWSC sewer coverage, and no existing trunk sewer lines are available in close proximity. Therefore, this option is not immediately feasible for the project and would require future network expansion.
- iii. Portable chemical toilets for construction and on-site septic systems for operations (Preferred Option) - During the construction phase, sanitation will be managed through the provision of hired portable chemical toilets at active work areas along the pipeline corridor and associated sites. These facilities will be regularly serviced by licensed waste management providers to ensure hygienic conditions and prevent environmental contamination. During the operational phase, permanent sanitation facilities will be provided at key installations such as the pumping station and reservoir site. These facilities

will consist of waterborne toilets connected to properly designed septic tanks with scheduled desludging. Waste will be managed in accordance with LWSC sanitation guidelines and disposed of at approved treatment facilities.

This integrated approach ensures safe, hygienic, and environmentally sound sanitation management throughout the project lifecycle.

#### **4.5.2 List of Alternatives in Order of Preference**

- i. Portable chemical toilets (construction phase) combined with septic tank systems for operational facilities (Preferred Option).
- ii. Future connection to LWSC centralized sewer network (where infrastructure becomes available).
- iii. Continued reliance on existing on-site sanitation systems without project intervention

#### **4.5.3 Reasons for Selecting the Preferred Alternative**

The preferred sanitation approach combines portable chemical toilets during construction and septic tank systems for operational facilities. This option was selected because it is practical, immediately implementable, and appropriate for an area not currently served by the LWSC sewer network.

Portable chemical toilets ensure hygienic conditions during construction activities, while septic tank systems provide a safe and compliant solution for permanent facilities such as pumping stations and reservoirs. Both systems will be managed in accordance with LWSC sanitation and environmental guidelines, including regular servicing and safe disposal of wastewater at approved facilities.

The option of relying solely on existing on-site sanitation systems was rejected due to hygiene risks and limited capacity to support construction and operational needs. Direct connection to the LWSC sewer network is not currently feasible due to the absence of nearby sewer infrastructure, although it remains a potential long-term option as urban services expand.

### **4.6 Power Supply**

#### **4.6.1 Identification and Justification/Analysis of Alternatives**

The following power supply options were considered:

- i. Grid Connection (ZESCO Only) – This option involves connecting the project infrastructure to the national electricity grid operated by ZESCO Limited. The national grid provides a stable and established power supply network capable of supporting the operational requirements of the project. However, occasional power interruptions may occur, which could affect operations if no contingency measures are in place.
- ii. Diesel Generators Only – This option would involve powering the project infrastructure entirely through diesel generators. While this option provides independence from the national grid and ensures immediate power availability, it is associated with high operational costs, increased fuel consumption, and negative environmental impacts such as air emissions and noise.

- iii. Grid Connection with Backup Generators – This option involves using the national grid as the primary power source while installing diesel generators to provide backup power for critical infrastructure in the event of grid outages. This approach ensures reliability of operations while minimizing reliance on diesel fuel under normal operating conditions.

#### **4.6.2 List of Chosen Alternatives in Order of Preference**

- i. Grid Connection (ZESCO) with Backup Generators for critical infrastructure
- ii. Grid Connection (ZESCO) Only
- iii. Diesel Generators Only

#### **4.6.3 Reasons for Choosing the Preferred Alternative**

Power required for the operation of associated infrastructure such as valves, control systems, and pumping facilities will primarily be supplied through the national electricity grid operated by ZESCO Limited. Backup generators may be incorporated for critical infrastructure to ensure continuity of water supply in the event of power outages.

This option was selected because it provides a reliable and cost-effective power supply while minimizing environmental impacts associated with continuous diesel generator use. The use of backup generators ensures operational resilience and continuity of water supply in the event of interruptions to the national grid.

## 5.0 ENVIRONMENTAL BASELINE STUDY

This section presents the general climatic conditions of the project area in Lusaka District of the Lusaka Province.

### 5.1 Climate

Zambia experiences a predominantly sub-tropical climate characterized by three distinct seasons: a hot and dry season (mid-August to mid-November), a wet rainy season (mid-November to April) and a cool dry season (May to mid-August). Rainfall is strongly influenced by the movement of the Inter-Tropical Convergence Zone (ITCZ) as well as the El Niño/Southern Oscillation (ENSO) phenomenon and varies from an annual average of 600 mm in the lower south up to 1,300 mm in the upper north of the country. Climate is tropical by location near the equator. The annual rainfall in Zambia averages between 700 mm in the south and 1,400 mm in the north. The hot months are very dry, receiving almost no rainfall between May and August. The wet season (September-April) rainfall is controlled by the passage of the tropical rain belt (also known as the Inter-Tropical Conversion Zone, ITCZ) which oscillates between the northern and southern tropics over the course of a year, bringing rain between October and April of 150-300 mm per month.

For the Project area, the climate is typical of the regional climatic conditions for Zambia, defined by three major seasons: a cool dry season from April to August, a hot dry season from August to November and a warm wet season from November to April. For Lusaka, climate is classified as warm and temperate. In winter, there is much less rainfall than in summer.

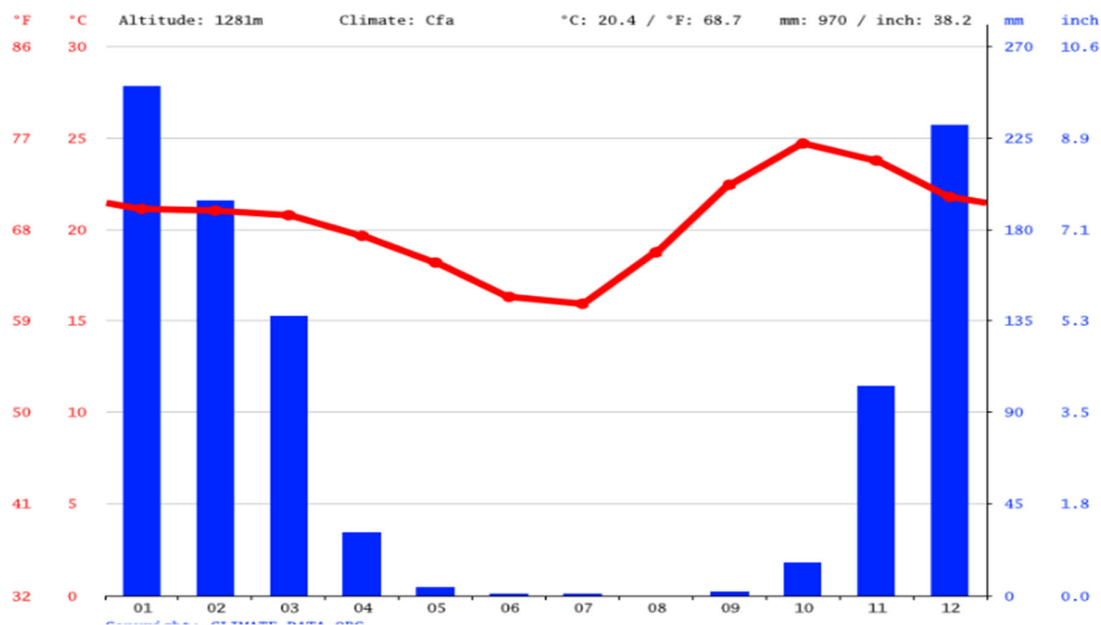


Figure 7: Climate/Weather by Month

Source: <https://en.climate-data.org/africa/zambia/lusaka-province/lusaka991497/>

### 5.1.1 Rainfall

The proposed Project area has an average annual rainfall of 970mm. The least amount of rainfall occurs in August. The average in this month is 0mm. On average, the highest amount of rainfall occurs during January with a mean value of 250mm monthly.

### 5.1.2 Temperature

The Project area has an average annual temperature of 20.4°C. The temperatures are highest on average in October at around 24.7 °C. On average, the month of July is considered to be the coldest time of the year with temperatures averaging at around 16.0°C.

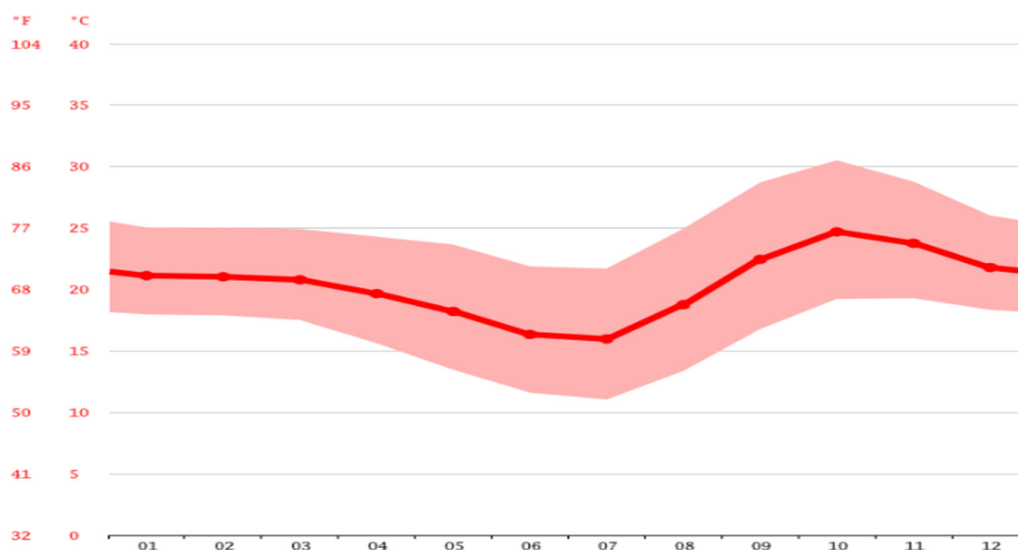


Figure 8: Graph Showing Temperature by Month

### 5.1.3 Humidity

The proposed Project area has an average relative humidity of 61% annually. Average monthly relative humidity ranges from 36% in September to 83% in February.

### 5.1.4 Wind

The wind in the project area is characterized by notable seasonal variations, with the windiest and driest conditions typically occurring between July and November. During this period, prevailing winds generally originate from the Southeast (SE) to South-Southeast (SSE) direction. Average wind speeds during the windy season commonly exceed 9.6 miles per hour (mph), with October usually recorded as the windiest month, experiencing average hourly wind speeds of approximately 12.4 mph. These seasonal wind patterns are influenced by the region's climatic conditions, particularly the dry season which is associated with increased atmospheric movement.

In contrast, the period between November and July is relatively calmer, with January typically recorded as the calmest month, where average wind speeds are approximately 6.7 mph. On a daily basis, wind conditions are generally light to moderate, averaging between 8 and 10 mph, with slightly stronger gusts often occurring during the afternoon hours. Observations also indicate that

wind speeds tend to increase later in the day due to temperature differences and atmospheric pressure changes. During the late dry season, particularly between September and November, stronger winds may occasionally occur and are often associated with dust movement, which can influence local air quality conditions within the area.

### 5.1.5 Sunshine

In Lusaka, October is the sunniest month, with an average of 10.67 hours of sunshine per day, totaling approximately 330.74 hours of sunshine throughout the month. Conversely, January experiences the least sunshine, averaging 8.45 hours per day, with a total of 261.99 hours for the month.

Annually, Lusaka receives approximately 3,234.54 hours of sunshine, averaging 269.54 hours per month, making it a region with significant solar exposure year-round.

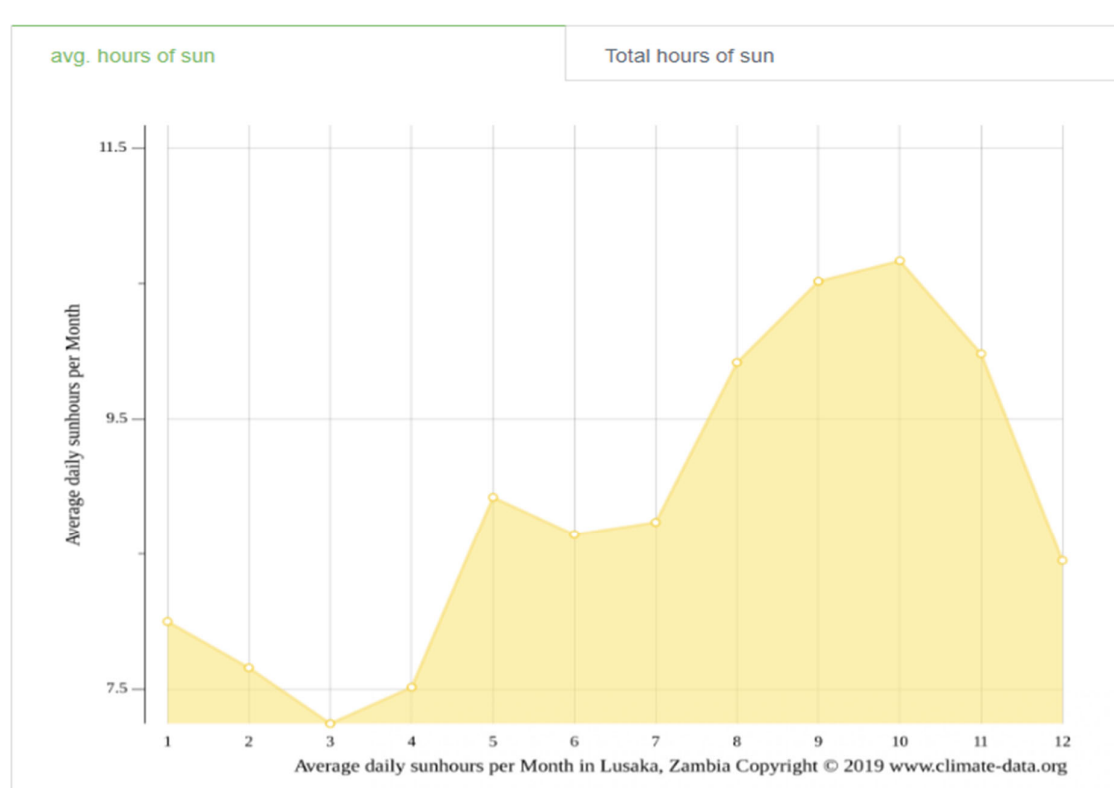


Figure 9: Average Daily Sun Hours per Month

|                                     | January              | February             | March                | April                | May                  | June                 | July                 | August               | September            | October              | November             | December             |
|-------------------------------------|----------------------|----------------------|----------------------|----------------------|----------------------|----------------------|----------------------|----------------------|----------------------|----------------------|----------------------|----------------------|
| Avg. Temperature °C<br>(°F)         | 20.6 °C<br>(69) °F   | 20.7 °C<br>(69.3) °F | 20.6 °C<br>(69.1) °F | 20.5 °C<br>(68.9) °F | 20.2 °C<br>(68.3) °F | 18.5 °C<br>(65.3) °F | 18.3 °C<br>(64.9) °F | 21 °C<br>(69.9) °F   | 24.1 °C<br>(75.4) °F | 24.9 °C<br>(76.8) °F | 22.1 °C<br>(71.7) °F | 20.7 °C<br>(69.3) °F |
| Min. Temperature °C (°F)            | 17.1 °C<br>(62.8) °F | 17.1 °C<br>(62.8) °F | 16.9 °C<br>(62.5) °F | 16.1 °C<br>(60.9) °F | 14.5 °C<br>(58.1) °F | 12.4 °C<br>(54.4) °F | 11.8 °C<br>(53.3) °F | 14.3 °C<br>(57.8) °F | 17.5 °C<br>(63.4) °F | 18.9 °C<br>(66.1) °F | 17.6 °C<br>(63.7) °F | 17.1 °C<br>(62.7) °F |
| Max. Temperature °C<br>(°F)         | 25.5 °C<br>(77.9) °F | 25.8 °C<br>(78.4) °F | 25.8 °C<br>(78.4) °F | 25.9 °C<br>(78.7) °F | 26.7 °C<br>(80) °F   | 25.5 °C<br>(77.9) °F | 25.6 °C<br>(78.1) °F | 28.5 °C<br>(83.4) °F | 31.4 °C<br>(88.5) °F | 31.5 °C<br>(88.8) °F | 27.8 °C<br>(82) °F   | 25.7 °C<br>(78.3) °F |
| Precipitation / Rainfall<br>mm (in) | 282<br>(11)          | 232<br>(9)           | 191<br>(7)           | 46<br>(1)            | 4<br>(0)             | 0<br>(0)             | 0<br>(0)             | 0<br>(0)             | 2<br>(0)             | 29<br>(1)            | 150<br>(5)           | 268<br>(10)          |
| Humidity(%)                         | 83%                  | 82%                  | 82%                  | 68%                  | 49%                  | 44%                  | 40%                  | 33%                  | 29%                  | 38%                  | 70%                  | 82%                  |
| Rainy days (d)                      | 20                   | 18                   | 17                   | 6                    | 1                    | 0                    | 0                    | 0                    | 1                    | 4                    | 15                   | 20                   |
| avg. Sun hours (hours)              | 8.1                  | 7.7                  | 7.1                  | 7.9                  | 9.9                  | 10.1                 | 10.2                 | 10.5                 | 10.8                 | 10.8                 | 9.4                  | 7.8                  |

Figure 10: Summary of the Weather Pattern by Month

### 5.1.6 Agro Ecological Zone

Zambia is divided into three major agro-ecological regions (**Regions I, II and III**), which are primarily based on rainfall amount but also incorporate soils and other climatic characteristics. The Project Area falls within Region IIa.

Region I:

- Receives less than 800 mm of rainfall annually
- Constitutes 12% of Zambia's total land area.

Region II:

- Receives between 800 mm and 1,000mm of annual rainfall
- Covers 42% of the country.
- Sub – divided into IIa and IIb.

Region III:

- Receives between 1,000 mm and 1,500 mm of rainfall annually
- Constitutes 46% of the country's total land area

The proposed project site is in Agro ecological **Region IIa**:

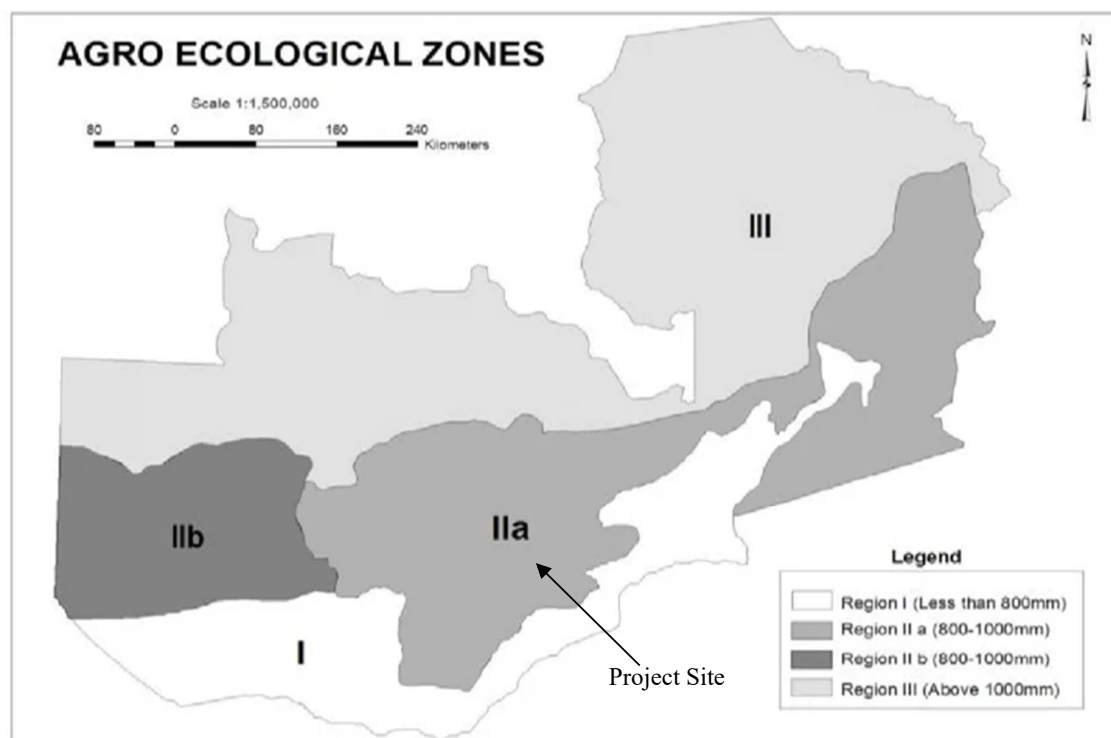


Figure 11: Map of Zambia Showing Agro – Ecological Zones in Relation to Project Area

## 5.2 Air Quality and Noise Levels

### 5.2.1 Air Quality

The baseline ambient air was measured from 15 to 16<sup>th</sup> April 2026 and from 17 to 18<sup>th</sup> April for Nitrogen Dioxide (NO<sub>2</sub>), Sulfur Dioxide (SO<sub>2</sub>), Particulate Matters (PM<sub>2.5</sub> and PM<sub>10</sub>) and Carbon Monoxide (CO) for one hour, 10 minutes, 24 hours and 15 minutes respectively.

Measurement of carbon monoxide (CO), sulphur dioxides (SO<sub>x</sub>), and nitrogen dioxides (NO<sub>x</sub>), was conducted using the Safewill ES60A Portable Multi-Gas Detector. Monitoring of particulate matter (PM<sub>2.5</sub> and PM<sub>10</sub>) was carried out using the Aeroqual Series 500 portable air quality monitor, manufactured by Aeroqual. The geographical information of the measurement locations is summarized in the table and figure below.

Table 13: Measurement Locations of Ambient Air Baseline Survey/Noise level monitoring

| Measurement Location                 | Latitude     | Longitude    |
|--------------------------------------|--------------|--------------|
| A. Borehole Area (Chilanga District) | 15°24'23.1"S | 28°09'07.7"E |
| B. Water Supply Area (Lusaka City)   | 15°23'50.8"S | 28°13'16.3"E |



Figure 12: Google Earth Image of Air Quality and Noise Level Sampling Points

The air quality results were compared with Zambia standards for ambient air emissions and WHO ambient air quality guidelines as shown in the following table:

ESIS – LWSC – Water Supply Improvement Project – Garden Park Ward 10, Lusaka

Table 14: Air Quality Results

| Parameters | Measurement Duration   | Unit  | Standards* |               | Location | Morning |      |      | Afternoon |      |      | Night |     |     | 24hour |     |     |
|------------|------------------------|-------|------------|---------------|----------|---------|------|------|-----------|------|------|-------|-----|-----|--------|-----|-----|
|            |                        |       | Domestic   | International |          | Min     | Max  | Avg  | Min       | Max  | Avg  | Min   | Max | Avg | Min    | Max | Avg |
| NOx        | One (1) hour           | µg/m3 | 400        | 200           | A        | 0.03    | 0.76 | 0.59 | 0.04      | 0.46 | 0.38 | 0     | 0   | 0   | -      |     |     |
|            |                        |       |            |               | B        | 0       | 0    | 0    | 0         | 0    | 0    | 0     | 0   | 0   | -      |     |     |
| SOx        | Ten (10) minutes       | µg/m3 | 500        | 500           | A        | 0       | 0    | 0    | 0         | 0    | 0    | 0     | 0   | 0   | -      |     |     |
|            |                        |       |            |               | B        | 0       | 0    | 0    | 0         | 0    | 0    | 0     | 0   | 0   | -      |     |     |
| PM2.5      | Twenty-four (24) hours | µg/m3 | N/A        | 15            | A        | -       |      |      | -         |      |      | -     |     |     | 2      | 27  | 5   |
|            |                        |       |            |               | B        | -       |      |      | -         |      |      | -     |     |     | 0      | 79  | 2   |
| PM10       | Twenty-four (24) hours | µg/m3 | 70         | 45            | A        | -       |      |      | -         |      |      | -     |     |     | 4      | 334 | 12  |
|            |                        |       |            |               | B        | -       |      |      | -         |      |      | -     |     |     | 3      | 373 | 29  |
| CO         | Fifteen (15) minutes   | mg/m3 | 100        | 100           | A        | 0       | 0    | 0    | 0         | 0    | 0    | 0     | 0   | 0   | -      |     |     |
|            |                        |       |            |               | B        | 0       | 0    | 0    | 0         | 0    | 0    | 0     | 0   | 0   | -      |     |     |

Note: The standards are sourced from 2013 Zambia Environmental Management Licensing Regulations and 2021 World Health Organization (WHO) global air quality guidelines

The baseline ambient air quality indicates that the current air quality conditions are generally within acceptable limits as prescribed by both national and international standards.

For ambient air quality, gaseous pollutants including Carbon Monoxide (CO) and Sulphur Dioxides (SO<sub>x</sub>) were not detected at both sampling locations, while Nitrogen Dioxides (NO<sub>x</sub>) were recorded at very low concentrations, all of which were significantly below the applicable guideline thresholds. Particulate Matter (PM<sub>2.5</sub> and PM<sub>10</sub>) exhibited some variability, with occasional elevated short-term values attributed to localized activities such as construction works, vehicular movement on unpaved roads, and quarry operations. However, the average concentrations for both PM<sub>2.5</sub> and PM<sub>10</sub> remained within the permissible limits set by both national and international standards, indicating overall compliance.

### 5.2.2 Noise Levels

Noise levels were measured using a portable sound level meter with a measuring range of 30 - 130 dBA. Data for noise levels was collected from two sampling points at the exact air quality monitoring points on one week day 17th April, 2026 and on one weekend day 18th April, 2026.

Noise levels are presented in the ensuing table below. Each table represents noise levels measured for a particular site compared with the WHO Guidelines as there are no Zambian Standards for noise.

Table 15: Comparison of Ambient Noise Baseline Survey Results with Standards for a weekday

| Parameters             | Unit | Standards* |               | Measurement Location |      |
|------------------------|------|------------|---------------|----------------------|------|
|                        |      | Domestic   | International | A                    | B    |
| Noise LAeq (8-9am)     | dBA  | -          | 55            | -                    | 46.5 |
| Noise LAeq (9-10am)    | dBA  | -          | 55            | -                    | 44.5 |
| Noise LAeq (12-1pm)    | dBA  | -          | 70            | 37.9                 | -    |
| Noise LAeq (1-2pm)     | dBA  | -          | 70            | 36.5                 | -    |
| Noise LAeq (10-11pm)   | dBA  | -          | 45            | -                    | 44.0 |
| Noise LAeq (11pm-12am) | dBA  | -          | 45            | -                    | 46.1 |
| Noise LAeq (4-5am)     | dBA  | -          | 70            | 36.2                 | -    |
| Noise LAeq (5-6am)     | dBA  | -          | 70            | 38.7                 | -    |

Note: LAeq and dBA stand for Equivalent Continuous Sound Level and A-weighted decibels respectively. Daytime is from 7am – 10pm and Night time is from 10pm – 7am. The International Standards referred to in the table above are WHO Guidelines for Community Noise (1999).

Table 16 Comparison of Ambient Noise Baseline Survey Results with Standards for a weekend day

| Parameters             | Unit | Standards* |               | Measurement Location |      |
|------------------------|------|------------|---------------|----------------------|------|
|                        |      | Domestic   | International | A                    | B    |
| Noise LAeq (5-6am)     | dBA  | -          | 70            | 36.2                 | -    |
| Noise LAeq (6-7am)     | dBA  | -          | 70            | 35.4                 | -    |
| Noise LAeq (9-10am)    | dBA  | -          | 55            | -                    | 48.4 |
| Noise LAeq (10-11am)   | dBA  | -          | 55            | -                    | 37.5 |
| Noise LAeq (1-2pm)     | dBA  | -          | 70            | 44.2                 | -    |
| Noise LAeq (3-4pm)     | dBA  | -          | 70            | 38.7                 | -    |
| Noise LAeq (10-11pm)   | dBA  | -          | 45            | -                    | 36.5 |
| Noise LAeq (11pm-12am) | dBA  | -          | 45            | -                    | 34.3 |

Note: LAeq and dBA stand for Equivalent Continuous Sound Level and A-weighted decibels respectively. Daytime is from 7am – 10pm and Night time is from 10pm – 7am

As summarized in the preceding tables, the noise levels at both locations remained within permissible limits, with the sole exception of Location B, which recorded a marginal exceedance during weekday nighttime hours between 11pm – 12am.

### 5.3 Geology

The geology surrounding the project area is a basement complex-undifferentiated from the period mainly older Precambrian. The lithology is metamorphosed rocks; gabbro, basalt, granite, dolerite, aplite, andesite. The structure is quartz veins; faulted, folded and jointed. The lithology of the project site is metamorphic rock – gneiss and granite –gneiss.

The Lusaka West region, including areas such as Makeni, is located on the Lusaka Plateau and is underlain predominantly by carbonate rocks of the Katanga Supergroup, formed during the Neoproterozoic era and structurally modified during the Lufilian Orogeny. The dominant lithologies comprise dolomitic limestone, limestone, and marble, which are typically thick-bedded, laterally continuous, and of high intact strength. These rocks frequently occur at shallow depths or crop out at surface across much of Lusaka West, providing generally favorable conditions for engineering development. However, their performance is strongly influenced by the presence of discontinuities such as joints, fractures, and bedding planes, which control rock mass quality rather than intact rock strength alone.

The overburden in Lusaka West typically consists of a thin layer (0–5 m) of residual soils derived from the weathering of the underlying carbonate rocks. These soils are commonly described as sandy clays or clayey sands, with moderate plasticity, moderate moisture content, and variable density. While they may be suitable for supporting light structures, they are generally compressible and moisture-sensitive, and therefore not ideal for heavy foundation loads without improvement. In many cases, the shallow depth to rock allows for economical excavation and founding directly on competent bedrock, which is the preferred engineering solution.

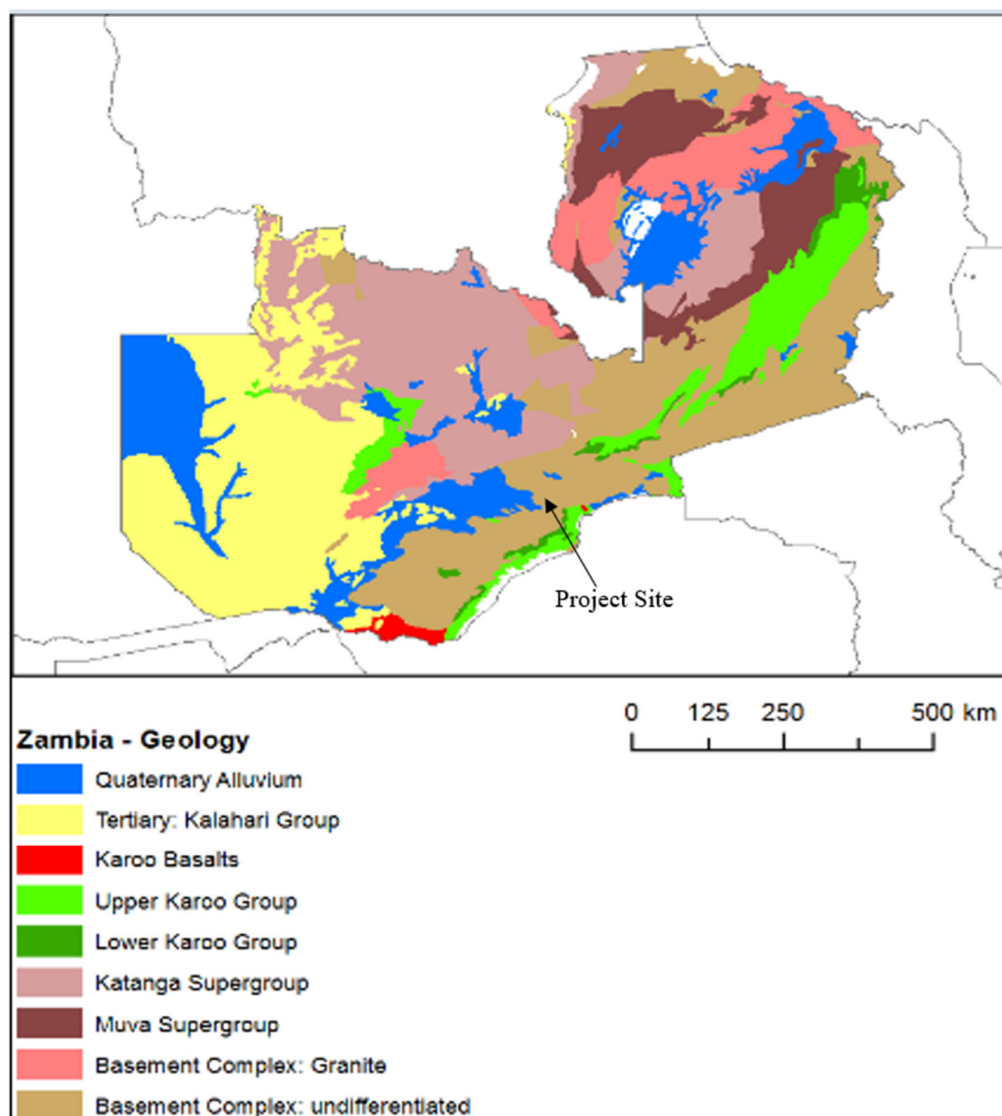


Figure 13: Map Showing the Geology for Zambia

## 5.4 Hydrology

The project area lies within the Upper Kafue River Catchment and is characterized by a combination of groundwater resources and seasonal surface water drainage systems. Surface drainage is generally limited and consists predominantly of ephemeral streams, drainage channels, and dambos that convey runoff during the rainy season. These drainage features ultimately discharge into the Mwembeshi River system, a tributary of the Kafue River.

The source area is situated on the Lusaka Plateau, which is underlain predominantly by carbonate rocks of the Lusaka Dolomite Formation. These geological formations host important groundwater aquifers characterized by secondary permeability resulting from fractures, joints, and solution channels. Groundwater recharge occurs primarily through direct infiltration of rainfall, facilitated by the highly permeable nature of the underlying karstic formations.

No major perennial surface water bodies occur within the immediate footprint of the proposed borehole field or along most sections of the transmission pipeline route. Surface runoff within the project area is therefore largely seasonal and influenced by local topography, existing drainage infrastructure, and rainfall patterns.

#### Implications for the Project

The Project will involve the development of new production boreholes in the Kalundu area to abstract groundwater for water supply purposes. As groundwater constitutes the primary water resource in the project area, sustainable abstraction will be essential to prevent excessive drawdown of groundwater levels and to maintain the long-term productivity of the aquifer. Hydrogeological investigations, pumping tests, and groundwater monitoring will be required to establish sustainable abstraction rates and inform borehole operation.

Given the karstic nature of the underlying aquifer, groundwater resources in the area are particularly vulnerable to contamination. Construction and operational activities therefore have the potential to affect groundwater quality if fuels, oils, lubricants, cement, or other contaminants are improperly managed. Appropriate pollution prevention measures and good construction practices will be required to safeguard groundwater resources.

The installation of the transmission pipeline is not expected to significantly alter natural drainage patterns because the pipeline will be constructed primarily within existing road reserves. However, temporary impacts such as localized erosion, sediment generation, and disruption of stormwater flows may occur during trench excavation, particularly during the rainy season. These impacts can be effectively mitigated through erosion control measures, proper reinstatement of disturbed areas, and maintenance of existing drainage structures.

Overall, the Project is expected to have minimal impacts on surface water hydrology and manageable impacts on groundwater resources, provided that sustainable groundwater abstraction practices and appropriate environmental management measures are implemented. The Project will result in a positive impact through improved access to reliable and safe potable water supply for communities within Lusaka and Chilanga Districts.

## 5.5 Hydrogeology

### 5.5.1 Regional and Site Hydrogeological Setting

The hydrogeology of Lusaka is primarily influenced by a highly productive but environmentally sensitive aquifer system that plays a critical role in supplying water to the city and surrounding areas. Within the project area, however, the aquifer type is classified as basement aquifer of low to moderate productivity, as shown in the figure below. This aquifer is composed mainly of crystalline basement rocks, predominantly granitic formations, with occasional occurrences of gabbro and other rock types. The groundwater potential of crystalline basement aquifers is largely controlled by the thickness of the weathered profile (regolith) and the degree of fracturing within the underlying bedrock. While fractured bedrock facilitates groundwater movement, sustainable groundwater yields depend on the storage capacity provided by the overlying weathered zone.

At a regional scale, groundwater occurrence in Lusaka is associated with both basement formations and the extensive carbonate rocks of the Katanga Supergroup, particularly the Lusaka Dolomite. These carbonate formations have undergone varying degrees of dissolution, resulting in localized karst features that enhance groundwater storage and transmission and contribute significantly to the city's water supply.

Hydrogeologically, Lusaka West, which forms part of the project area, exhibits groundwater conditions controlled primarily by weathering and fracturing of the underlying rock mass. As a result, groundwater occurrence can be highly variable across the area, ranging from relatively dry zones to locations with significant seepage or perched water tables. According to the geotechnical investigation undertaken for the project, borehole yields within the project area range from approximately 4 L/s to 39 L/s. Groundwater conditions may influence both the degree of weathering and the development of secondary permeability and could present challenges during construction, including excavation instability and groundwater inflows.

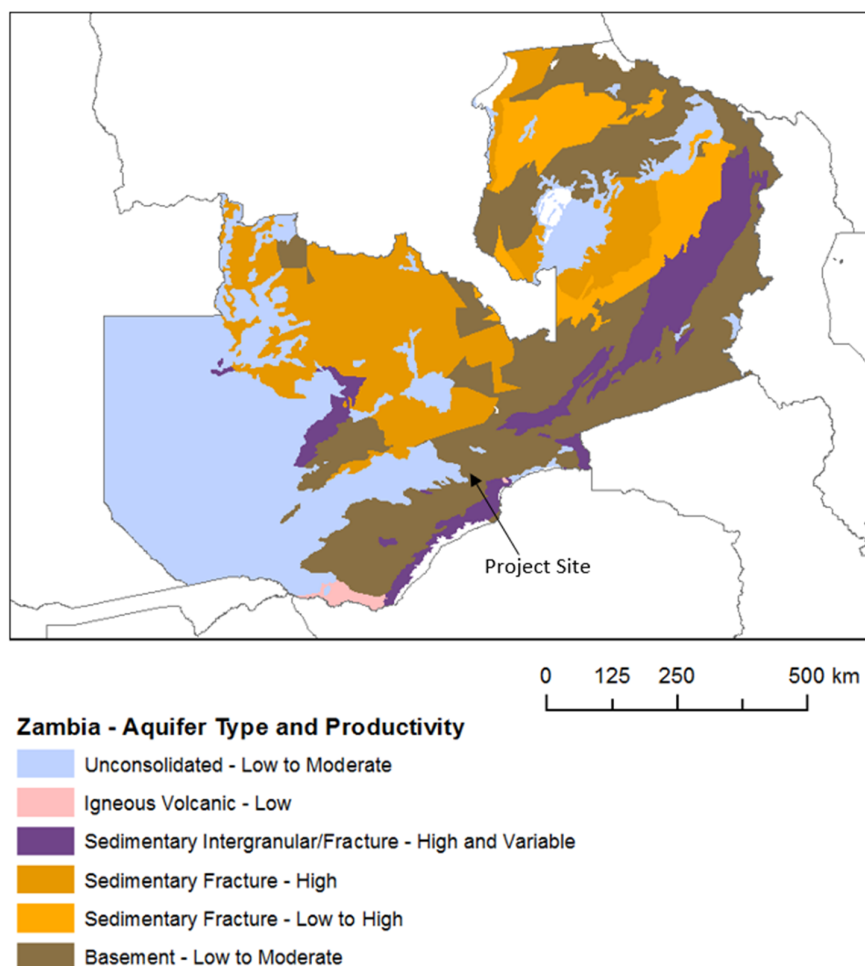


Figure 14: Hydrogeology Map for Zambia

## 5.5.2 Groundwater

The baseline ambient groundwater was sampled on 4 and 13 January 2026. The geographical information of the sampling locations is summarized in the table and figure below.

Table 17 Sampling Locations of Groundwater Baseline Survey

| Measurement Location | Latitude      | Longitude     |
|----------------------|---------------|---------------|
| C. SV 3              | 15°24'20.78"S | 28° 9'24.44"E |
| D. SV 5              | 15°24'32.43"S | 28° 8'59.71"E |



Figure 15: Sampling Locations of Groundwater Baseline Survey

Table 18 Comparison of Groundwater Baseline Survey Results with Standards

| Parameters                   | Unit          | Standards*      |                 | Sampling Location |          |
|------------------------------|---------------|-----------------|-----------------|-------------------|----------|
|                              |               | Domestic        | International   | C                 | D        |
| pH                           | -             | 6.5 – 8.0       | 6.5 - 8.5       | 7.34              | 7.72     |
| Electrical Conductivity (EC) | μS/cm         | 1500            | -               | 815               | 557      |
| Total Dissolved Solids (TDS) | mg/L          | 1000            | 1000            | 407               | 269      |
| Total Solids 105 °C (TS)     | mg/L          | -               | -               | -                 | -        |
| Turbidity                    | NTU           | 5.0             | 5.0             | 0.5               | 3.4      |
| Temperature                  | °C            | -               | -               | 25.6              | 24.8     |
| Color                        | Pt-Co (Hazen) | 15              | 15              | 5                 | 10       |
| Odor                         | -             | unobjectionable | unobjectionable | Odorless          | Odorless |

| Parameters                                                      | Unit      | Standards* |               | Sampling Location |          |
|-----------------------------------------------------------------|-----------|------------|---------------|-------------------|----------|
|                                                                 |           | Domestic   | International | C                 | D        |
| Taste                                                           | -         | No taste   | No taste      | No taste          | No taste |
| Calcium                                                         | mg/L      | 200        | -             | 106               | 66       |
| Magnesium                                                       | mg/L      | 150        | -             | 21                | 19       |
| Sodium                                                          | mg/L      | 200        | -             | 124               | 36       |
| Potassium                                                       | mg/L      | -          | -             | 40                | 12       |
| Bicarbonate                                                     | mg/L      | -          | -             | 310               | 354      |
| Carbonate                                                       | mg/L      | -          | -             | Nil               | 76       |
| Sulphate                                                        | mg/L      | 400        | 500           | 103               | 18       |
| Chloride                                                        | mg/L      | 250        | 250           | 188               | 55       |
| Total Hardness (as CaCO <sub>3</sub> )                          | mg/L      | 500        | -             | 352               | 244      |
| Alkalinity (as CaCO <sub>3</sub> )                              | mg/L      | -          | -             | 340               | 230      |
| Nitrate (as NO <sub>3</sub> <sup>-</sup> or N)                  | mg/L      | 10         | 50            | 7                 | 3        |
| Nitrite (as NO <sub>2</sub> <sup>-</sup> or N)                  | mg/L      | 1.0        | 3.0           | <0.0001           | <0.0001  |
| Ammonia (as NH <sub>3</sub> /NH <sub>4</sub> <sup>+</sup> or N) | mg/L      | -          | -             | <0.0001           | <0.0001  |
| Fluoride                                                        | mg/L      | 1.5        | 1.5           | 0.24              | 0.25     |
| Silicon dioxide (as SiO <sub>2</sub> )                          | mg/L      | -          | -             | 3.81              | 2.94     |
| Arsenic                                                         | mg/L      | 0.01       | 0.01          | <0.01             | <0.01    |
| Lead                                                            | mg/L      | 0.01       | 0.01          | <0.01             | <0.01    |
| Cadmium                                                         | mg/L      | 0.003      | 0.003         | <0.002            | <0.002   |
| Total Chromium                                                  | mg/L      | 0.05       | 0.4           | <0.002            | <0.002   |
| Mercury                                                         | mg/L      | 0.001      | 2.0           | <0.001            | <0.001   |
| Iron                                                            | mg/L      | 0.3        | -             | 0.07              | 0.01     |
| Manganese                                                       | mg/L      | 0.1        | 0.08          | <0.01             | <0.01    |
| Copper                                                          | mg/L      | 1.0        | 2.0           | <0.003            | <0.003   |
| Zinc                                                            | mg/L      | 3.0        | -             | <0.001            | <0.001   |
| Selenium                                                        | mg/L      | 0.01       | 0.04          | <0.001            | <0.001   |
| Total Coliforms                                                 | CFU/100ml | 0          | 0             | 0                 | 0        |
| Escherichia coli (E. coli)                                      | CFU/100ml | 0          | 0             | 0                 | 0        |

*Note:* The domestic standards above are extracted from ZS 190: 2024 Drinking Water Quality – Specification (Replaced ZS 190: 2010) Prescribes requirements for potable (drinking) water suitable for human consumption, , pages 3-7 of <https://www.zabs.org.zm/standards> while the international standards above are taken from WHO Drinking Water Quality Guidelines, 2022, 4th Edition, specifically from the Summary Tables starting on page 471 (Annex 3: Chemical Summary Tables) and page 485 (Annex 4: Analytical Methods and Achievable Performance) of the full document (<https://www.ncbi.nlm.nih.gov/books/NBK579461/>).

As summarized in the table above, all measured parameters were within the standards at both Sampling Locations C and D.

## 5.6 Topography

The topography of the project area, spanning parts of Chilanga District and Lusaka District, is characteristic of the broader Central African Plateau, featuring a gently undulating landscape. Elevations within the project corridor generally range between approximately 1,200 and 1,300 metres above sea level. The borehole field in Chilanga lies at a slightly lower elevation (1237m) compared to the termination area (1269m) in Lusaka, creating a modest elevation gradient along the pipeline route.

The terrain along the proposed pipeline alignment is predominantly flat to gently rolling, with localized variations influenced by existing road corridors and developed areas. Slopes are generally mild. Surface drainage within the project area follows natural gradients toward seasonal streams and drainage channels that ultimately form part of the Kafue River catchment. While the overall gradient is gentle, localized low-lying areas may be prone to temporary water accumulation during the rainy season, which will require consideration during construction planning and stormwater management

## **5.7 Soils**

The dominant soil types in the area consist mainly of deep red to brownish-red ferralsols and nitosols, which typically occur on the relatively elevated and well-drained parts of the plateau. These soils are generally well weathered and moderately fertile, supporting a range of vegetation and land uses. In contrast, low-lying areas, particularly within seasonal wetland systems commonly referred to as dambos, are characterized by greyish to dark clay-rich soils that tend to be more alkaline and poorly drained. The district is underlain by geological formations comprising schist, limestone, and dolomite, which influence soil development, drainage characteristics, and in some areas contribute to the formation of karst features such as sinkholes.

Within the proposed project area, particularly along Mumbwa Road and around Garden Park, soils are typically composed of clayey to sandy loam materials, often associated with dambo environments and adjacent upland areas. These soils may range from slightly acidic nitosols in well-drained zones to more alkaline luvisols in areas influenced by underlying carbonate geology. In lower-lying sections, cracking clay soils are common and are generally associated with higher calcium content typical of the region's limestone and dolomite formations. While these soils can support vegetation and development, they often present certain limitations for construction and land use, including heavy texture and reduced workability in clay-dominated areas, as well as lower nutrient retention in sandy soils.

## **5.8 Land Use and Land Tenure**

### **5.8.1 Land Use**

Land use within the project area, covering parts of Chilanga District and Lusaka District, is predominantly residential, interspersed with commercial activities, small-scale enterprises, and limited light industrial developments. The area also includes social and community infrastructure such as schools, health facilities, churches, and recreational spaces. This mix of land uses reflects a transitioning urban environment characterized by increasing densification and mixed-use development along key transport corridors, particularly the Mumbwa Road (M9).

### **5.8.2 Land Tenure**

Land in Zambia is classified as either State Land or Customary Land. The proposed project area falls within State Land, which is administered under a formal leasehold system. Both the groundwater abstraction sites in Chilanga District and the terminal distribution area in Lusaka District are located on State Land, with the pipeline largely routed along existing public road reserves or service lane.

## 5.9 Built Environment

The project is situated within a developed and rapidly urbanizing corridor extending from the Kalundu area in Chilanga District to Garden Park Ward 10 in Lusaka District. The transmission pipeline will primarily follow existing road reserves along Mumbwa Road (M9), passing through areas with established infrastructure and services.

The neighbouring land use in close proximity to the Project site includes:

- Several fuel service stations located along Mumbwa Road, operated by different Oil Marketing Companies (OMCs), including Puma Energy, Karan Petroleum, Simba Oil, and UNO Energy Zambia, as well as additional service stations currently under construction;
- Block-making factories and other small-scale industrial operations;
- Health and educational institutions serving the surrounding communities;
- Factories and warehouses owned and operated by various companies;
- Recreational facilities within the broader project area;
- Small-scale informal trading units along the road reserve, including mobile money booths, makeshift stalls, sheds, and small restaurants;
- Formal commercial trading units such as auto spare parts shops, car-wash facilities, mechanical workshop sheds, tyre-repair services, and metal fabrication workshops;
- The Rosedale Police Post and several churches serving the local population and,
- Established residential areas, including Kalundu and Garden Park.

## 5.10 Fauna

Fauna species observed on site and around the project area include:

### 5.10.1 Terrestrial Species

- Mammals

No wild mammals were directly sighted during the survey. Interviews with local inhabitants indicated the presence of both domestic and wild mammals in the vicinity as shown in the table below:

Table 19: Species of Mammals Reported in the Project Area

| Common Name | Type               | Scientific Name                         | IUCN Category                         |
|-------------|--------------------|-----------------------------------------|---------------------------------------|
| Cattle      | Domestic           | <i>Bos taurus</i>                       | Not Evaluated (NE)                    |
| Goat        | Domestic           | <i>Capra hircus</i>                     | Not Evaluated (NE)                    |
| Chicken     | Domestic           | <i>Gallus gallus domesticus</i>         | Not Evaluated (NE)                    |
| Duck        | Domestic           | <i>Anas platyrhynchos domesticus</i>    | Not Evaluated (NE)                    |
| Guinea Fowl | Domestic / Managed | <i>Numida meleagris</i>                 | Least Concern (LC) (Wild counterpart) |
| Rabbit      | Domestic           | <i>Oryctolagus cuniculus domesticus</i> | Not Evaluated (NE)                    |
| Cat         | Domestic           | <i>Felis catus</i>                      | Not Evaluated (NE)                    |
| Dog         | Domestic           | <i>Canis lupus familiaris</i>           | Not Evaluated (NE)                    |

|                              |                    |                                |                    |
|------------------------------|--------------------|--------------------------------|--------------------|
| Monkey (e.g., Vervet Monkey) | Wild (Walled Area) | <i>Chlorocebus pygerythrus</i> | Least Concern (LC) |
| Waterbuck                    | Wild (Walled Area) | <i>Kobus ellipsiprymnus</i>    | Least Concern (LC) |

- Reptiles and Amphibians

During the site survey, no reptiles or amphibians were observed, and no visible evidence such as animal tracks, burrows, or direct sightings was recorded. However, interviews with local inhabitants indicated the presence of snakes.

Table 20: Species of Reptiles Reported in the Project Area

| Group    | Scientific Name               | English or Local Common Name | IUCN Category |
|----------|-------------------------------|------------------------------|---------------|
| Reptiles | <i>Psammophis mossambicus</i> | Olive Grass Snake (Muswema)  | Least Concern |
|          | <i>Naja annulifera</i>        | Snouted Cobra                | Least Concern |

- Insects

Insects are a fundamental component of terrestrial ecosystems, playing critical roles in pollination, decomposition, pest control, and serving as prey for higher trophic levels. During the field assessment butterflies, specifically *Acraea* species and Caper Whites (*Belenois species*), Ants and grasshoppers were identified. These butterflies belong to the order Lepidoptera and are commonly associated with open grasslands. Due to the presence of excavated pits containing stagnant water, the project area has been reported to have mosquitoes.



Figure 16: Jewel Beetle Confirmed Onsite



Figure 17: Ants Onsite

The following insects are reported in the project area:

Table 21: Species of Insects Reported in the Project Area

| No. | Scientific name                 | Common name               | Order       |
|-----|---------------------------------|---------------------------|-------------|
| 1.  | <i>Odontotaenius disjunctus</i> | Bess beetle               | Coleoptera  |
| 2.  | <i>Pheropsophus spp</i>         | Bombardier beetle         | Coleoptera  |
| 3.  | <i>Oxya velox</i>               | Short horned grasshopper  | Orthoptera  |
| 4.  | <i>Gryllotalpa spp.</i>         | Mole cricket              | Orthoptera  |
| 5.  | <i>Gryllus bimaculatus</i>      | Field cricket             | Orthoptera  |
| 6.  | <i>Melanotus spp</i>            | Click beetle              | Coleoptera  |
| 7.  | <i>Meranoplus bicolor</i>       | Ant                       | Hymenoptera |
| 8.  | <i>Aphidius colemani</i>        | Wasp                      | Hymenoptera |
| 9.  | <i>Riptortus pedestris</i>      | Bean bug                  | Hemiptera   |
| 10. | <i>Spodoptera exigua</i>        | Small mottled willow moth | Lepidoptera |

### 5.10.2 Identification of Rare or Endangered Fauna Species

The following are some of the fauna species in Zambia that are classified as Endangered on the IUCN Red List: The African Wild Dog (*Lycaon pictus*), Shoebill Stork (*Balaeniceps rex*), and Ansell's Shrew (*Crocidura ansellorum*). Further, the Common Hippopotamus (*Hippopotamus amphibius*) is yet another highly recognizable animal native to Zambia's waterways that faces significant threats, currently holding a Vulnerable status on the Red List.

In relation to the proposed Project site, no rare or endangered fauna species on the IUCN Red List were observed or reported.

## 5.11 Flora

### 5.11.1 Flora Species

The project site is characterized by sparse tree cover, comprising a few scattered mature trees and several immature trees. This is primarily a result of extensive anthropogenic activities, including stone blasting, soil extraction, and general land disturbance, which have significantly altered the natural landscape. Originally, the area was covered by miombo and munga woodlands, two vegetation types characteristic of the region. Observed and reported flora species are shown in the table below:

Table 22: Summary of Reported Flora Species within the Project Area

| Group      | Scientific Name                 | English Common Name             | IUCN Category |
|------------|---------------------------------|---------------------------------|---------------|
| Tree Cover | <i>Brachystegia Boehmii</i>     | Prince of Wales Feathers        | Least Concern |
|            | <i>Mangifera indica</i>         | Mango                           | Not Evaluated |
|            | <i>Psidium guajava</i>          | Guava                           | Not Evaluated |
|            | <i>Combretum molle</i>          | Velvet-leaved Combretum         | Least Concern |
|            | <i>Brachystegia longifolia</i>  | Long-leafed Brachystegia        | Least Concern |
|            | <i>Azdirachta indica</i>        | Neem                            | Least Concern |
|            | <i>Brachystegia spiciformis</i> | Zebrawood                       | Least Concern |
|            | <i>Piliostigma thonningii</i>   | Camel's Foot                    | Least Concern |
|            | <i>Vachellia sieberiana</i>     | Paperbark Thorn                 | Least Concern |
|            | <i>Vachellia tortilis</i>       | Umbrella Thorn                  | Least Concern |
| Grassland  | <i>Hyparrhenia spp.</i>         | Thatching Grass                 | Least Concern |
|            | <i>Aristida adscensionis</i>    | Six-weeks Three-awn Grass       | Least Concern |
|            | <i>Cynodon dactylon</i>         | Bermuda Grass / Couch Grass     | Least Concern |
|            | <i>Panicum maximum</i>          | Guinea Grass                    | Least Concern |
|            | <i>Digitaria eriantha</i>       | Finger Grass                    | Least Concern |
|            | <i>Setaria sphacelata</i>       | Golden Bristle Grass            | Least Concern |
|            | <i>Urochloa mosambicensis</i>   | Bushveld Signal Grass           | Least Concern |
|            | <i>Eragrostis superba</i>       | Maasai Love Grass               | Least Concern |
| Shrubland  | <i>Bauhinia petersiana</i>      | Coffee Bauhinia / Mupondo-pondo | Least Concern |
|            | <i>Dichrostachys cinerea</i>    | Sickle Bush                     | Least Concern |
|            | <i>Lantana camara</i>           | Lantana (Invasive Shrub)        | Not Evaluated |
|            | <i>Flueggea virosa</i>          | White Berry Bush                | Least Concern |
|            | <i>Maytenus senegalensis</i>    | Red Spike Thorn                 | Least Concern |
|            | <i>Vernonia amygdalina</i>      | Bitter Leaf                     | Least Concern |
|            | <i>Acanthospermum hispidum</i>  | Bristly Starbur (Annual Herb)   | Least Concern |
|            | <i>Bidens pilosa</i>            | Blackjack (Common Ruderal Herb) | Least Concern |
|            | <i>Sida cordifolia</i>          | Flannel Weed                    | Least Concern |
|            | <i>Hibiscus micranthus</i>      | Wild Hibiscus                   | Least Concern |



Figure 18: *Vegetation Characteristics of the Shrubland*



Figure 19: *Opportunistic Plants on Site*

#### **5.11.2 Identification of Threatened, Rare and Endangered Flora Species**

Zambia has the following individual trees classified as endangered on the IUCN Red List; Pod mahogany (*Azania quanzensis*), African teak (*Pterocarpus angolensis*), East African mahogany

(*Khaya nyasica*) and African linden (*Mitragyna Stipulosa*). Further, more recently, Mukula tree (*Pterocarpus chrysotrix*) has been reported to be the most endangered tree species in Zambia. This may be attributed to its rosewood properties, which makes it particularly desirable for furniture processing, with a significant demand from China.

In relation to the proposed project site, no rare or endangered flora species on the IUCN Red List were observed or reported to exist.

## 5.12 Avifauna (Birds)

### 5.12.1 Bird Species

The study identified approximately five bird species through direct observation, with an additional seven species reported. The Table below presents the bird species observed on site.

Table 23: Observed Bird Species on the Project Site

| Group | Scientific Name                | English or Local Common Name      | IUCN Category |
|-------|--------------------------------|-----------------------------------|---------------|
| Birds | <i>Pycnonotus barbatus</i>     | Common Bulbul (Black-eyed Bulbul) | Least Concern |
|       | <i>Acrocephalus baeticatus</i> | African Reed Warbler              | Least Concern |
|       | <i>Nectarinia kilimensis</i>   | Bronze Sunbird                    | Least Concern |
|       | <i>Crithagra striolata</i>     | Streaky Seedeater                 | Least Concern |
|       | <i>Ploceus cucullatus</i>      | Village Weaver                    | Least Concern |

The following bird species were reported within the project area: Pied Crow (*Corvus albus*), Common Quail (*Coturnix coturnix*), Little Green Woodpecker (*Campethera abingoni*), Barn Swallow (*Hirundo rustica*), Grey-headed Sparrow (*Passer griseus*), and White Wagtail (*Motacilla alba*). These species are generally associated with open grassland, scattered vegetation, and human-influenced environments typical of the study area.

### 5.12.2 Identification of Threatened, Rare and Endangered Bird Species

It should be noted that the birds observed or reported in the project vicinity are in the least concern category under the IUCN Red List database.

*Appended to this document is a detailed Biodiversity Report*

## 5.13 Archaeological and Cultural Environment

The project site has no known sites that have been confirmed as cultural or archaeological sites. While no known archaeological sites exist directly within the project footprint, any excavation or construction activity will adhere to the relevant national heritage and conservation regulations. In the event that any cultural or historical artifacts are discovered during the course of development, appropriate measures will be taken in consultation with the National Heritage Conservation Commission (NHCC) to ensure their protection and documentation.

Lusaka and Chilanga Districts are multilingual areas. English is the official language and is used in government, education, and formal communication. However, Nyanja is widely spoken as a common local language in the project area, facilitating informal communication across diverse communities.

## 5.14 Social-Economic Set up

### 5.14.1 Economic Activities

The project area, extending across parts of Chilanga District and Lusaka District, supports a diverse range of economic activities characteristic of a rapidly urbanising corridor. Commercial activities are concentrated along the Mumbwa Road (M9), where retail outlets, service stations, and small businesses provide goods and services to surrounding communities and road users.

Light industrial activities are present within the area, including block-making enterprises, workshops, and warehouses that support construction and local supply chains. These activities reflect the area's emerging role as a service and logistics corridor within Lusaka's expanding urban fringe.

Service-oriented activities are also prominent, supported by institutions such as schools, health facilities, lodges, and places of worship. In addition, informal trading and small-scale enterprises contribute significantly to local livelihoods and economic resilience.

The presence of essential infrastructure, including electricity supplied by ZESCO Limited and telecommunications networks, further supports business operations and economic growth within the project area.

### 5.14.2 Population

The proposed Project is located in Lusaka Province and spans two administrative districts, namely Lusaka and Chilanga. Lusaka Province, which hosts the capital city, is the most densely populated province in Zambia and serves as the country's principal economic and administrative centre.

The general demographical data of the Project Sites (Lusaka and Chilanga District) are shown in the table below:

Table 24 Demography of Project Sites

| Venue                 | Area (ha) | Population | Density (Person/km <sup>2</sup> ) | Gender ratio |
|-----------------------|-----------|------------|-----------------------------------|--------------|
| Lusaka Province       | 2,189,600 | 3,079,964  | 140.7                             | 93.4         |
| Chilanga District     | 135,400   | 225,276    | 166.4                             | 94.6         |
| Chilanga Constituency | 135,400   | 225,276    | 166.4                             | 94.6         |
| Lusaka District       | 41,800    | 2,212,301  | 5,292.6                           | 92.8         |
| Lusaka City           | 36,000    | 1,985,000  | 5,513.9                           | 92.5         |
| Kanyama Constituency  | 3,003     | 231,148    | 7,697.2                           | 94.1         |

Source: Zambia Statistics Agency (ZamStats), 2022 Census of Population and Housing National Analytical Report (Published 2024/2025)

The settlement pattern in the major part of the Project area is a clustered type, meaning houses are situated close to each other.

### **5.14.3 Growth Rate, Population Density and Distribution**

#### **5.14.3.1 Growth Rate**

According to the 2022 Census of Population and Housing conducted by the Zambia Statistics Agency, Lusaka Province recorded a total population of 3,079,964 persons in 2022, reflecting sustained demographic growth over the intercensal period from 2010 to 2022.

During this period, Lusaka Province registered an average annual population growth rate of 2.9%, slightly below the national growth rate of 3.4%. This growth reflects continued urbanisation, rural-urban migration, and expansion of peri-urban settlements around the provincial capital.

At district level, Chilanga district experienced a significantly higher growth rate of approximately 6.4% per annum, indicating rapid spatial expansion and increasing population pressure, particularly in areas located along major transport corridors such as the Mumbwa Road. In contrast, Lusaka district recorded a comparatively lower growth rate of about 2.0%, reflecting the maturation of the urban core and limited available space for large-scale residential expansion.

#### **5.14.3.2 Population Distribution**

Population distribution within Lusaka Province is highly uneven, with the majority of residents concentrated in Lusaka District, which alone accounts for over 70% of the provincial population. This concentration reflects the district's role as the national administrative, commercial, and industrial hub.

Chilanga District, while significantly smaller in population, has emerged as an important growth corridor due to:

- availability of relatively affordable land,
- expansion of industrial and logistics activities,
- and improved road infrastructure connecting it to Lusaka's central business areas.

The spatial distribution of population also reflects broader national trends, where over 81% of Lusaka Province's population resides in urban areas, making it one of the most urbanised regions in Zambia.

### **5.14.4 Administration**

The project area falls under the administrative jurisdiction of Lusaka City Council and Chilanga Municipal Council. Areas within Lusaka District are administered by Lusaka City Council, while those within Chilanga District fall under Chilanga Municipal Council.

At the national level, the project area is represented through relevant parliamentary constituencies, each led by elected Members of Parliament. Administrative oversight is further provided through the Provincial and District Administrations under the Office of the President, which coordinate government programmes and ensure policy implementation.

Local governance structures include ward councillors, Ward Development Committees, and sectoral government institutions responsible for service delivery, physical planning, environmental

management, and regulatory enforcement. Development planning and coordination are facilitated through the Provincial and District Development Coordinating Committees (PDCC and DDCC), while development applications are reviewed by Standing Planning Committees within the respective local authorities.

Table 25: Administrative and Institutional Structure in Lusaka Province

| Level                     | Structure                 | Key Offices/Entities                            | Main Functions                         | Relevance to Project                  |
|---------------------------|---------------------------|-------------------------------------------------|----------------------------------------|---------------------------------------|
| National                  | Central Government        | Office of the President                         | Policy direction and oversight         | Strategic oversight                   |
| Provincial                | Provincial Administration | Lusaka Provincial Administration                | Programme coordination and supervision | Inter-district coordination           |
| Coordination (Provincial) | PDCC                      | Multi-sector stakeholders                       | Programme harmonisation                | Project review platform               |
| District                  | District Administration   | Lusaka & Chilanga Districts                     | Sector coordination and planning       | Local coordination                    |
| Local Government          | Local Authorities         | Lusaka City Council; Chilanga Municipal Council | Service delivery, planning, regulation | Permits and approvals                 |
| Coordination (District)   | DDCC                      | Sector representatives                          | Plan alignment                         | Integration with district plans       |
| Council                   | Planning Committee        | Standing Planning Committee                     | Development review                     | Planning clearance                    |
| Community                 | Participation Structures  | Ward Development Committees                     | Community engagement                   | Consultations and grievance interface |

Hierarchical Flow

Central Government → Provincial Administration → District Administration → Local Councils → Ward Development Committees

#### 5.14.5 Social Services and Amenities

The project area is generally well-served, particularly within established urban areas of Lusaka District, where a range of social infrastructure supports the resident population. These include educational institutions, health facilities, markets, places of worship, and commercial centres.

However, the level and quality of service provision vary across the project area. Peri-urban parts of Chilanga District experience increasing demand for services due to rapid population growth and urban expansion, resulting in capacity constraints in some locations.

Overall, the distribution of social amenities reflects an urban–peri-urban gradient, with relatively higher service coverage in central areas and more limited access in outlying and developing zones. This variation is an important consideration for infrastructure planning and service delivery associated with the proposed project

#### **5.14.5.1 Literacy Levels**

Literacy levels in Lusaka Province vary between formal urban areas and peri-urban settlements, reflecting disparities in access to educational infrastructure, household income, and the spatial distribution of schools. According to the 2022 Census of Population and Housing, Lusaka Province recorded the highest literacy rate in Zambia at 78.5% for the population aged 5 years and above, with male literacy at 80.3% and female literacy at 76.9%.

At district level, Lusaka District remains the most urbanised and densely populated district, with an estimated population of approximately 2.21 million people, while Chilanga District had a population of about 227,844 in 2022. These demographic patterns influence access to education, with Lusaka District benefiting from a higher concentration of secondary schools and tertiary institutions, while Chilanga District's rapidly expanding peri-urban settlements continue to face infrastructure gaps.

Despite relatively high literacy levels at the provincial level, progression through the education system remains uneven. Census analytical reports indicate that although basic literacy is widespread among youth, a smaller proportion of the population completes secondary education, particularly in peri-urban and informal settlements. Nationally, youth literacy (ages 15–24) was estimated at 77.1%, with significantly higher rates in urban areas (89.8%) compared to rural areas (66.7%), highlighting an urban–rural divide that is also evident between central Lusaka and fringe areas such as parts of Chilanga.

Educational attainment data further indicate that a substantial proportion of the adult population in both districts has completed only primary education, with fewer individuals progressing to senior secondary or tertiary levels. This reflects historical constraints in school infrastructure, rapid population growth, and the cost of secondary education, which remains a barrier for low-income households despite policy reforms aimed at expanding access to free education.

The continued reliance on community schools and informal education systems in parts of Lusaka and Chilanga highlights the need for sustained investment in formal education infrastructure, particularly in rapidly growing peri-urban areas where population growth has outpaced the provision of classrooms, trained teachers, and learning materials. Improving access to secondary education and strengthening adult literacy programmes will be critical for enhancing human capital development in the province.

#### **5.14.5.2 Education**

Lusaka District, as the provincial capital and most urbanised district, accommodates the majority of educational institutions, with more than 700 schools across public, private, and tertiary levels. Key tertiary institutions include University of Zambia, Evelyn Hone College, and Lusaka Apex Medical University. Secondary schools within the wider project area include Muchinga Combined School, Chunga Secondary School, Nelson Mandela Secondary School, and Diana Kaimba Secondary School, while major primary schools include Lilanda Primary School and Kizito Basic School.

Despite this concentration of facilities, rapid population growth and increased enrolment following the introduction of the Free Education Policy have placed significant pressure on existing

infrastructure. National statistics indicate average primary school pupil–classroom ratios of 41.5:1 and pupil–teacher ratios of 56.5:1, reflecting overcrowding and resource constraints in many urban schools.

In Chilanga District, education infrastructure has expanded but remains unevenly distributed. The district has approximately 26 government primary schools, 23 government secondary schools, and about 28 community schools, bringing the total to roughly 77 institutions. Notable facilities include Chilanga Secondary School, Shimabala Secondary School, Kalundu Primary School, Chilanga Primary School, and Shimabala Primary School. These institutions serve a rapidly growing peri-urban population and are supplemented by community schools operated by churches and local organisations.

Overall, while Lusaka Province has one of the most extensive education networks in Zambia, rapid urban growth in Lusaka District and peri-urban expansion in Chilanga District continue to strain infrastructure. This has resulted in overcrowding, spatial disparities in access to schools, and continued reliance on community-based education providers, highlighting the need for continued investment in infrastructure, teacher deployment, and equitable service distribution.

#### **5.14.5.3 Health**

Health services in Lusaka Province are delivered through a network of public health centres, first-level hospitals, tertiary referral hospitals, and community-based structures coordinated by District Health Management Teams. The province hosts the largest concentration of health facilities in Zambia due to its population size and status as the national capital.

Major referral facilities include Chipata Level 1 Hospital, Matero Level 1 Hospital, and Levy Mwanawasa University Teaching Hospital, which provides specialised services to Lusaka and surrounding districts. The Levy Mwanawasa University Teaching Hospital has an estimated bed capacity of approximately 1,100 and serves a catchment population exceeding 3.5 million people, underscoring its central role in the healthcare system.

In Chilanga District, the main public referral facility is Chilanga General Hospital, which provides inpatient, maternity, laboratory, and emergency services to the growing peri-urban population along the Lusaka–Kafue corridor.

Common public health challenges in both Lusaka and Chilanga Districts include malaria, diarrhoeal diseases, and respiratory infections, which are closely associated with inadequate sanitation, limited access to safe water, and overcrowded living conditions in informal settlements.

Community-based structures, such as Neighbourhood Health Committees and Community Health Workers, play an important role in health education, disease prevention, and outreach, particularly in peri-urban areas where access to formal health facilities may be limited.

#### **5.14.5.4 Gender Equity**

Gender disparities remain evident in Lusaka Province in relation to access to education, employment, and health services. Despite the province's relatively advanced economic profile, women are disproportionately represented in low-income and informal employment. National labour statistics indicate that women account for approximately 32.2% of formal employment, compared to 67.8% for men (Zambia Statistics Agency, 2021). This disparity is particularly pronounced in peri-urban areas, where formal employment opportunities are limited and women rely heavily on small-scale trading and informal economic activities.

In the education sector, gender disparities are reflected in progression and completion rates at secondary level. According to Ministry of Education Educational Statistical Bulletin and UNICEF Zambia (2020–2023). Education and Gender Equality Reports indicates that Zambia has achieved near-universal primary education, only about 67.5% of learners transition to secondary school, with girls more likely to drop out due to factors such as teenage pregnancy, early marriage, and domestic responsibilities. Data further indicate that 39% of women attain secondary education compared to 49% of men.

Access to health services has improved in Lusaka Province relative to national averages; however, women, particularly those from low-income households, continue to face barriers. Survey data indicate that over 50% of women in the lowest wealth quintile experience difficulties accessing healthcare, primarily due to cost, distance, and competing household responsibilities (Zambia Demographic and Health Survey, 2018 - 2022. ZDHS Report).

Despite these constraints, maternal and child health indicators in Lusaka Province remain relatively strong, with approximately 91% of births occurring in health facilities. This reflects the effectiveness of public health outreach and reproductive health programmes in urban and peri-urban districts such as Lusaka and Chilanga.

#### **5.14.6 Transport/Communication**

The proposed water supply project is located within Chilanga District and Lusaka District in Lusaka Province. The project will commence at groundwater abstraction points (boreholes) located in the Kalundu area. From this point, the transmission pipeline will follow existing public road reserves, predominantly along Mumbwa Road, through the Garden Park area, and terminate in Garden Park Ward 10. The site is well connected by an established road network, ensuring year-round accessibility.

Transport Networks:

- **Road Infrastructure** - The project area is served by a functional road network. Key routes include Mumbwa Road (M9), Mungwi Road, and various local access roads, which facilitate movement of goods and people. Road maintenance and upgrades are undertaken by the Roads Development Agency.
- **Public Transport** - Public transport is primarily provided by minibuses operating along established routes. Bus stations in Lusaka and Chilanga provide connectivity within and between districts.

- Taxis and Ride Services - Taxis are widely available through both formal operators and independent drivers. App-based ride services are also increasingly available in parts of the project area.
- Rail Transport - Rail infrastructure in the wider area is currently used mainly for freight. There are ongoing government initiatives to expand passenger rail services to improve connectivity.
- Air Transport - Kenneth Kaunda International Airport serves as the main air transport hub, providing domestic and international connectivity.

#### Communication Networks:

- Telecommunications - Mobile and fixed communication services are provided by major operators, including MTN Zambia, Airtel Zambia, and Zamtel.
- Internet Services - Broadband and wireless internet services are available through multiple providers, including Liquid Intelligent Technologies and other private operators.
- Postal Services - Postal and courier services are provided by the Zambia Postal Services Corporation (ZAMPOST).
- Media - The project area has access to a wide range of media platforms, including radio, television, and print media. Popular radio stations include Hot FM, ZNBC Radio 4, Radio Phoenix, Komboni Radio, Lusaka Radio, and Radio Christian Voice, which play a key role in information dissemination.

### **5.14.8 Water Supply/Sanitation**

#### **5.14.8.1 Water Supply**

The project area is currently not served by a reticulated water supply network from Lusaka Water Supply and Sanitation Company or any other formal utility provider. Households, institutions, and commercial entities rely on self-supply systems, including communal boreholes, private boreholes, and shallow hand-dug wells.

This reliance on decentralised water sources results in uneven access to safe and reliable potable water. Availability is influenced by seasonal groundwater fluctuations, equipment reliability, and the financial capacity of users to develop and maintain private water sources. Shallow wells and inadequately protected boreholes are particularly vulnerable to contamination from sanitation systems, surface runoff, and flooding during the rainy season, posing risks to public health.

The absence of a formal water supply network also constrains service delivery to institutions such as schools and health facilities and increases the burden on households, particularly women and children, responsible for water collection.

#### **5.14.8.2 Sewage and Sanitation Services**

The project area is not connected to a municipal sewer network and falls outside the service coverage of formal sewerage systems managed by the Lusaka Water Supply and Sanitation Company. As a result, sanitation is primarily managed through on-site systems, including pit latrines, septic tanks, and, in limited cases, small-scale treatment units.

These systems provide basic sanitation but are often associated with challenges such as poor construction standards, inadequate maintenance, and limited desludging services. There is also a risk of groundwater contamination, particularly in areas with high water tables or during periods of heavy rainfall.

#### **5.14.9 Power Generation and Supply**

The project area is connected to the national electricity grid ZESCO for all power supply needs. Some facilities also have backup power supply in form of generators, solar system, torches, lamps and candles to be used in case of ZESCO power interruption.

#### **5.14.10 HIV/AIDS in the Project Area**

The proposed project site is located in Chilanga and Lusaka districts of Lusaka Province. The HIV prevalence of Lusaka Province is 16.1%. It is reported that the increase in the prevalence rates in the project area has been due to few numbers of people attending counselling and changing lifestyles of both young and old people. Both young and old people have engaged in risky behaviors that lead to HIV/AIDS. These factors combined with little or no sexual reproductive health education, traditional gender roles, and strong peer pressure from a very young age, caused HIV/AIDS to be a particularly acute problem for young people.

The Government of Zambia has put up sensitization measures country-wide to ensure that people are knowledgeable about HIV prevention. Identified Measures Include:

- Introduction of HIV testing and Treatment Campaign;
- Introduction of HIV self-testing currently being piloted in selected districts around the country as part of the national strategy of scaling up the number of people receiving treatment;
- Radio and TV programs on HIV/AIDS;
- Voluntary counseling and testing made free and easily accessible; and,
- Posters and billboards encouraging safe acts to minimize the spread of HIV/AIDS.

#### **5.14.11 Traditional and Religious Practice**

The population within the project area is largely composed of internal migrants from across Zambia, resulting in a diverse socio-cultural profile. As a consequence, traditional practices are less pronounced than in rural areas; however, cultural values such as respect for elders, strong family structures, and community cohesion remain important aspects of social life.

##### **5.14.11.1 Religious Practices**

Religious affiliation in the project area is predominantly Christian, with a wide representation of denominations including Catholic, Protestant, Pentecostal, and Evangelical churches. Places of worship are widely distributed throughout residential areas and play a central role in community life. Regular activities such as church services, prayer meetings, and outreach programmes contribute significantly to social interaction and cohesion.

Other religions are present in smaller proportions, including Islam, Hinduism, and other faiths

Table 26 Religious Composition in the Project Area

| Venue                 | Muslim                  | Christian | Other | No Religion   |
|-----------------------|-------------------------|-----------|-------|---------------|
| Lusaka Province       | <1% (included in Other) | 96.5%     | 1.4%  | 2.1%          |
| Chilanga District     | <1% (included in Other) | 97.9%     | 2.1%  | Not specified |
| Chilanga Constituency | <1% (included in Other) | 97.9%     | 2.1%  | Not specified |
| Lusaka District       | <1% (included in Other) | 97.2%     | 2.8%  | 0.7%          |
| Lusaka City           | <1% (included in Other) | 97.2%     | 2.8%  | 0.7%          |
| Kanyama Constituency  | <1% (included in Other) | 97.1%     | 2.9%  | Not specified |

Source: Zambia Statistics Agency (ZamStats), 2022 Census of Population and Housing National Analytical Report (Finalized 2024/2025) Religion Descriptive Tables Final

Note: Other includes Muslim, Hindu, Bahá'í, African Traditional Religion, and others. Lusaka City is not separately disaggregated in the 2022 Census tables; therefore, Lusaka District (which is 100% urban) has been used as a proxy for the city

#### 5.14.11.2 Indigenous Peoples and Ethnic Composition

There are no communities within or adjacent to the project area that meet the international definition of Indigenous Peoples. Although the area historically falls within the ancestral lands of the Soli ethnic group, current conditions indicate no distinct or exclusive indigenous settlements within the project footprint. Stakeholder consultations with Lusaka City Council and Chilanga Municipal Council confirm that the population is predominantly mixed and urbanised. The project area is characterised by significant ethnic diversity, reflecting internal migration patterns.

Table 27: Ethnic Composition of the Project Area

| Venue                             | Bemba | Nyanja | Tonga | Other |
|-----------------------------------|-------|--------|-------|-------|
| Lusaka Province                   | 31.8% | 38.4%  | 8.2%  | 21.6% |
| Chilanga District                 | 24.5% | 32.1%  | 15.6% | 27.8% |
| Kalundu Area of Chilanga District | 23.8% | 33.4%  | 16.2% | 26.6% |
| Lusaka District                   | 33.1% | 40.2%  | 7.4%  | 19.3% |
| Lusaka City                       | 33.5% | 40.6%  | 7.1%  | 18.8% |
| Garden Park Area of Lusaka City   | 31.2% | 42.1%  | 6.8%  | 19.9% |

Source: Zambia Statistics Agency (ZamStats), 2022 Census of Population and Housing National Analytical Report (2024/2025). (<https://www.zamstats.gov.zm/publications/census-reports/>)

Other includes Soli, Lozi, Tumbuka, and minor ethnic groups.

Overall, the project area reflects a cosmopolitan urban setting characterized by high cultural diversity, strong Christian influence, and limited presence of traditional or indigenous settlement structures. These conditions are typical of rapidly urbanizing areas within Lusaka Province and have implications for stakeholder engagement, which should consider diverse cultural backgrounds and communication preferences.

#### 5.14.12 Need for Resettlement and Compensation

The proposed water supply project traverses Lusaka District and Chilanga District within Lusaka Province. The pipeline alignment will largely be located within existing public road reserves, with no requirement for permanent land acquisition or physical relocation of households.

The road reserve areas are characterized by informal and semi-formal economic activities, reflecting the high level of urbanization and mobility along major transport corridors. A total of 64 Project Affected Persons (PAPs) have been identified within the project footprint.

Findings from the socio-economic survey indicate that the Project will not result in any physical displacement or resettlement of Project Affected Persons (PAPs). However, some PAPs operating shops and other businesses along the road corridor and within the road reserve may experience temporary disruptions to their business activities during the construction of the underground water pipelines.

#### **5.14.12.1 Nature of Potential Socio-Economic Disruption**

The baseline assessment indicates the following categories of existing land use and exposure within the project corridor:

- **Informal Economic Activities within Road Reserves:**  
Approximately 59 PAPs operate informal or semi-formal businesses, including makeshift stalls, kiosks, booths, and small workshops. These activities are typically located within or immediately adjacent to the road reserve and are dependent on roadside visibility and customer flow.
- **Institutional and Commercial Facilities:**  
Five (5) institutional and commercial entities are present within the affected corridor, including fuel service stations, a primary school, a block-making facility, and a drilling company. These facilities generally occupy formal premises but have auxiliary infrastructure (e.g., paved areas, signage, and landscaping) extending into the road reserve.
- **Adjacent Sensitive Receptors:**  
Several sensitive receptors are located immediately adjacent to the pipeline alignment, including a government health facility, an NGO-operated health facility, and places of worship. Although these facilities are situated outside the road reserve and are not directly affected by land take, they rely on uninterrupted access along the corridor and are therefore sensitive to temporary disturbances during construction activities.

#### **5.14.12.2 Livelihood Dependence and Exposure**

Economic activities along the Mumbwa Road corridor are predominantly location-dependent, relying on high traffic volumes and pedestrian flow. These include retail kiosks, mobile money operators, food vendors, automotive services, and light industrial services. Any disruption to roadside access or visibility may therefore temporarily affect business operations.

Based on preliminary construction planning assumptions, potential disruption to these activities is anticipated to be short-term and localized, corresponding to trenching and pipe installation works along specific sections of the corridor.

#### **5.14.12.3 Land Tenure Context**

The affected area falls within public road reserves under state control, where occupation is predominantly informal and unregulated. Structures within this corridor are generally temporary or semi-permanent in nature and are not located on formally titled land. This land use context contributes to the predominance of temporary economic displacement rather than physical relocation.

Overall, the project area is characterised by intensive but informal roadside economic activity within existing road reserves, combined with adjacent formal institutional land uses. While no permanent physical displacement of households or community infrastructure is anticipated, the baseline conditions indicate a potential for temporary disruption of roadside economic activities and access-dependent services during construction works.

#### **5.14.13 Grievance Redress Mechanism**

The Zambian laws, Environmental Management Act No. 12 of 2011, and the Environmental Management (Environmental Impact Assessment) Regulations (SI No. 3 of 2026) legally stipulate the requirement for public consultation and the provision of mechanisms for stakeholders to seek redress for environmental and social impacts, but do not describe the procedure of grievance redress mechanism (GRM), so each ESIS report should suggest the procedure of GRM ( a detailed GRM document, for this project, is annexed). The procedure for the Grievance Redress Mechanism (GRM) for this Project is described below:

- (i) LWSC shall provide all the engaged stakeholders with the contact details of the responsible officers of LWSC in charge of complaint resolution.
- (ii) LWSC shall establish a grievance box at the Ward Development Committee (WDC) office, LWSC regional offices in Lusaka and Chilanga, and a website where any stakeholders (i.e. the existing or future ones) can post any comment / appraisal or complaint, which should be available prior to and during the construction phase, but also for two years of the operational phase of the Project. The analogue way for posting this kind of comment at the administration office of LWSC shall be also availed during the same period.
- (iii) The hybrid mechanism described in (i) and (ii) above will facilitate engagement with: (a) stakeholders identified during the baseline stakeholder consultations and environmental scoping activities conducted between February and May 2025, which informed the identification of Project Affected Persons (PAPs) and key stakeholder concerns; and (b) stakeholders engaged during the subsequent construction and operational phases of the Project.
- (iv) When a comment or grievance is received, it will be formally recorded in a centralized grievance register and assigned a unique identification number. LWSC will internally discuss the response methodology, screen the issue based on its nature and urgency, and consult ZEMA if technical or regulatory verification is necessary.
- (v) LWSC shall formally acknowledge the grievance within 48 hours, investigate the matter through site visits or consultations, and respond to the stakeholder within two (2) weeks (14 days) for straightforward, simple cases with a proposed countermeasure to resolve the complaint. For complex cases requiring detailed investigation, resolution will be provided within thirty (30) days.
- (vi) Subsequently, the stakeholder shall provide LWSC with feedback within two (2) weeks regarding their satisfaction with the resolution outcome.
- (vii) Where the complainant is dissatisfied with the proposed resolution, the grievance shall be escalated to LWSC senior management and the Project Grievance Committee for further review and mediation. Where resolution cannot be reached at this level, the

matter may be referred to relevant regulatory authorities, including ZEMA, or pursued through other legally recognized dispute resolution mechanisms

- (viii) Eventually, LWSC shall report the details of the dialogues (v) and (vi) above to JICA Zambia Office within one (1) month from the date when the comment was originally submitted by the stakeholder to LWSC.

The above-mentioned procedure for grievance mechanism is illustrated in the organizational chart below.

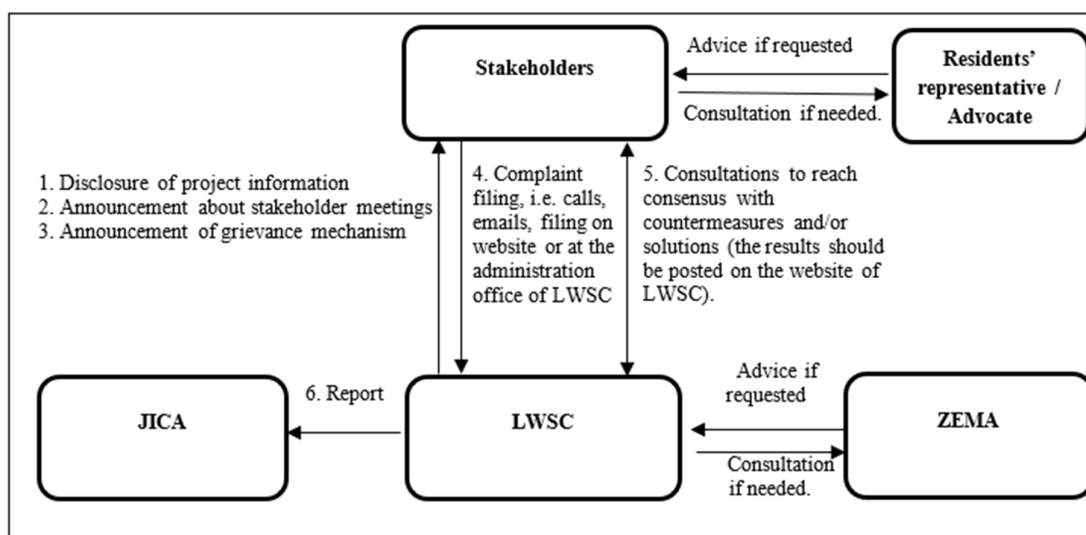


Figure 20 Grievance Mechanism and its Implementation Structure

A Grievance Redress Mechanism (GRM) will be established to provide an accessible, transparent, and timely platform for addressing complaints and disputes. Grievances will be recorded, screened, investigated, and resolved through community-based and institutional structures. Where a complainant is not satisfied with the proposed resolution, the grievance will be escalated through higher levels of project management and, where necessary, referred to relevant regulatory or legal dispute resolution mechanisms.

The GRM will be accessible to all stakeholders, including vulnerable groups. Information dissemination and feedback will be facilitated through public meetings, local leadership structures, and mass communication channels such as radio announcements to ensure continued transparency and stakeholder engagement.

Information dissemination and feedback will be facilitated through public meetings, local leadership structures, and mass communication channels such as radio announcements to ensure continued transparency and stakeholder engagement.

## **5.15 Consultations and Public Participation**

Stakeholder consultations and public participation for the proposed water supply project were conducted through a structured and inclusive engagement process designed to ensure broad representation and informed input into the ESIA.

The consultation process aimed to:

- Provide timely and accessible information on the proposed project to affected communities and stakeholders;
- Create opportunities for stakeholders to express views, concerns, and recommendations;
- Integrate stakeholder feedback into project design and the ESIA process; and
- Promote transparency, accountability, and stakeholder ownership.

### **5.15.1 Methods of Stakeholder Engagement**

A multi-tiered engagement approach was adopted to ensure effective participation:

- **Central Scoping Meeting**  
A formal meeting was held in Garden Park to engage community members, local leaders, and institutional stakeholders. A total of 120 stakeholders were invited, including institutional representatives and community members, with balanced gender representation.
- **Targeted Consultations (Door-to-Door and Cluster Meetings)**  
Focused consultations were conducted along the Mumbwa Road corridor to engage directly affected stakeholders, including traders, business operators, and residents unable to attend central meetings.

### **5.15.2 Central Scoping Meeting (Garden Park)**

A scoping meeting was held on 18 February 2026 at the Pentecostal Holiness Church in Garden Park, Lusaka. The meeting was attended by the Project Proponent, Lusaka Water Supply and Sanitation Company; environmental consultants; the Area Councillor; local leaders; and representatives from key government institutions, including the Disaster Management and Mitigation Unit, Lusaka City Council, and relevant sector departments.



Figure 21: Scoping Meeting in Progress

A total of 102 participants attended (64 females and 38 males), demonstrating inclusive representation. The meeting provided a platform to present the project, explain the ESIA process, and gather stakeholder input.

Key issues raised included:

- Cost of Household Water Connection
- Source and Reliability of Water Supply
- Project Implementation Timeline
- Land Availability for Project Infrastructure
- Integration with Existing Water Initiatives
- Immediate Water Supply Challenges
- Encroachment on Road Reserves
- Potential Disturbances During Construction
- Protection and Maintenance of Water Infrastructure
- Stakeholder Engagement and Transparency
- Road reinstatement after construction

#### 5.15.3 Targeted Mumbwa Road Consultations

Door-to-door and cluster consultations were conducted between 16 and 25 February 2026 along the proposed pipeline route to ensure inclusion of directly affected stakeholders.



Figure 22: Stakeholder Engagement in Progress

A total of 87 stakeholders were consulted (48 males and 39 females). Consultations focused on notifying stakeholders about the Project, the ESIA process, and the cut-off date of 19 February 2026. Key issues raised included:

- Maintaining 24/7 access for ambulances and emergency vehicles
- Ensuring adequate turning space for fuel tankers during construction
- Protecting underground fuel storage tanks at filling stations
- Restoring paved and concrete surfaces after construction
- Managing dust to prevent damage to goods in kiosks and shops

- Maintaining power supply for welding and other equipment
- Preventing obstruction of customer access to businesses
- Protecting private gates, walls, and sewer lines from damage
- Safeguarding children from open trenches, especially at night
- Preventing vibration-related cracks in nearby buildings
- Managing fire risks near fuel storage areas
- Ensuring reinstated ground can support heavy vehicles
- Clarifying opportunities for local employment
- Indicating the duration of trenching in front of premises
- Preventing worker loitering that may discourage customers
- Confirming that routine property maintenance remains permitted after the cut-off date.

#### **5.15.4 Public Disclosure Meeting**

A public disclosure meeting held on 24 March 2026 at the Pentecostal Holiness Church in Garden Park. The meeting formed part of the statutory ESIA process and provided stakeholders with an opportunity to review the findings of the environmental and social studies, seek clarification, and provide final input prior to submission of the ESIA report to the Zambia Environmental Management Agency.

The session was attended by 46 participants (30 females and 16 males) representing community members, government agencies, utility providers, and local leadership. Discussions focused on key issues such as land acquisition for project infrastructure, affordability of household connections, access to water for vulnerable households, protection of public health, coordination with road authorities during construction, and the establishment of a grievance redress mechanism.

The meeting confirmed strong stakeholder support for the project, particularly due to its potential to improve water access and reduce waterborne disease risks in the area. It also provided a platform for the project team to clarify implementation procedures, outline mitigation measures, and assure participants of continued engagement throughout the project lifecycle.



Figure 23: Public Disclosure Meeting in Progress

*Attached as an annex, are the minutes of the public consultation exercises and disclosure meeting.*

## **6.0 IMPACTS**

This section discusses the Impacts the proposed project will have. An impact is said to be any change to the existing condition of the environment caused by anthropogenic activities or an external influence. Therefore, impacts may be positive (beneficial) or negative (adverse). They may also be direct or indirect, long-term or short-term, and extensive or local in effect. Impacts are termed cumulative when they add incrementally to existing impacts. Both positive and adverse environmental impacts could arise during the site preparation, construction and the operation phase of the proposed project.

Therefore, this section outlines and discuss the anticipated positive and negative impacts of the proposed project due to project location and during construction, operation and decommissioning phases.

### **6.1 Biophysical Environment**

#### **6.1.1 Positive Impacts during Construction Phase**

The proposed project is expected to generate several positive socio-economic impacts during the construction phase. The development of the water supply infrastructure within the study area will contribute to local economic growth, employment creation, and improved business opportunities. Anticipated positive impacts include:

##### **6.1.1.1 Employment Creation and Income Generation**

During the construction phase, the Project is expected to employ a significant number of workers, with an estimated 50 to 100 individuals engaged per day during peak construction periods. Preference will be given to recruiting local labour from communities located along the pipeline corridor and near the proposed borehole and reservoir sites.

The creation of employment opportunities is expected to improve household incomes, support short-term livelihoods, and stimulate local economic activity through increased spending within surrounding communities.

##### **6.1.1.2 Growth of Local Businesses and Service Demand**

Construction activities and the presence of workers within the Project area are expected to increase demand for local goods and services, including food supplies, transportation services, equipment hire, fuel, and temporary accommodation.

This increased demand is anticipated to stimulate local commerce and provide business opportunities for small and medium enterprises, informal traders, and service providers operating along the Mumbwa Road corridor and surrounding areas.

##### **6.1.1.3 Skill Transfer and Capacity Building**

The engagement of local workers during construction will provide opportunities for skills development and transfer of technical knowledge associated with modern water supply infrastructure development.

Workers involved in activities such as pipeline installation, welding, concrete works, mechanical assembly, and site supervision will gain practical experience in industry-standard construction practices. The acquired skills and experience are expected to strengthen the local skills base and improve the long-term employability of individuals engaged on the Project, particularly within the infrastructure and utilities sectors.

#### **6.1.1.4 Provision of Market for Supply of Building Materials**

Implementation of the proposed Project will require substantial quantities of construction materials, many of which are expected to be procured locally. These materials may include sand, quarry stone, cement, steel, timber, electrical cables, pipes, fuel, paint, glass, and water storage equipment.

The procurement of locally available materials will create market opportunities for local suppliers, contractors, transporters, and manufacturers, thereby contributing to the growth of the local economy. The Project will also promote the use of locally manufactured construction products where feasible, including cement, concrete products, timber, and electrical materials.

In addition, the purchase and consumption of construction materials and related services will contribute to government revenue through applicable taxes such as Value Added Tax (VAT) and other statutory levies. Consequently, the Project is expected to make a positive contribution to economic growth and local business development during the construction phase

### **6.1.2 Negative Impacts during Construction Phase**

#### **6.1.2.1 Ecological Resources (Flora and Fauna)**

Construction activities will require vegetation clearance along the proposed pipeline corridor and at sites designated for boreholes, pump stations, and storage reservoirs. This will result in the removal of grass cover, shrubs, and scattered immature trees, leading to temporary habitat disturbance for small terrestrial fauna and localized alteration of the landscape. Given that the Project area is predominantly urbanized and disturbed by existing human activities, impacts on biodiversity are expected to be localized and of low significance

#### **6.1.2.2 Soil Erosion and Land Degradation**

Excavation, trenching, and earthworks will disturb existing soil profiles and expose loose soils to erosion, particularly during periods of heavy rainfall. Surface runoff from disturbed areas may transport sediments into nearby drainage systems, potentially affecting soil stability and local drainage patterns. Inadequate reinstatement and compaction of excavated areas may also contribute to localized land degradation and surface instability.

#### **6.1.2.3 Dust and Air Quality Impacts**

Construction activities such as site clearing, excavation, trenching, transportation of materials, and operation of heavy machinery are expected to generate dust emissions and localized deterioration in air quality. Movement of trucks and construction vehicles along unpaved or disturbed surfaces may loosen soils and generate fugitive dust, particularly during dry and

windy conditions. In addition, exhaust emissions from vehicles and construction equipment may contribute to localized air pollution.

Sensitive receptors, including nearby residents, businesses, schools, and health facilities along the Mumbwa Road corridor, may experience temporary nuisance from dust and emissions. However, these impacts are expected to be short-term and manageable through implementation of dust suppression measures such as regular watering of exposed surfaces and proper maintenance of equipment and vehicle.

#### **6.1.2.4 Noise and Vibration Impacts**

The operation of heavy machinery, drilling equipment, generators, and transport vehicles will generate noise and vibration during the construction period. These disturbances may temporarily affect nearby residential areas, businesses, schools, churches, and health facilities located adjacent to the Project corridor.

Although the impacts are expected to be temporary and localized, excessive noise may cause inconvenience and disruption to normal community activities. Noise levels will therefore be minimized through the use of properly maintained equipment and adherence to approved working hours

#### **6.1.2.5 Traffic Disruption and Restricted Access**

Pipeline installation works along the Mumbwa Road corridor and adjoining roads may result in temporary obstruction of traffic lanes, pedestrian pathways, and access routes to residential, commercial, and institutional premises.

Construction activities such as trench excavation, stockpiling of materials, and movement of heavy machinery may lead to:

- Traffic congestion and increased travel times;
- Restricted pedestrian movement;
- Temporary disruption to business operations; and
- Reduced access to public and private facilities.

Particular concern was raised during stakeholder consultations regarding uninterrupted access to critical facilities, including:

- A Government Hospital providing emergency and maternity services;
- An NGO-operated health facility;
- Service stations requiring continuous access for fuel tankers and customers;
- Educational and religious institutions; and
- Residential and commercial properties adjacent to the pipeline route.

Without appropriate mitigation, restricted access to these facilities could interfere with emergency response, delivery of essential services, and daily economic activities. The impact is therefore considered potentially significant but manageable through phased construction

scheduling, traffic management plans, provision of temporary access arrangements, and continuous stakeholder engagement.

#### **6.1.2.6 Occupational Health and Safety**

Construction activities will expose workers to a range of occupational health and safety hazards associated with civil works and operation of construction equipment. Potential risks include:

- Injuries from moving vehicles and heavy machinery;
- Falls from heights;
- Accidents associated with excavation works and open trenches;
- Exposure to dust and excessive noise;
- Injuries during welding, grinding, and cutting operations;
- Fire hazards associated with open flames and fuel handling; and
- Manual handling injuries.

There is also potential exposure to vector-borne diseases such as malaria due to mosquito prevalence within certain sections of the Project area.

Without proper safety controls, these hazards could result in injuries, illnesses, or fatalities among workers and contractors

#### **6.1.2.7 Public Health and Safety Risk**

Construction activities may pose health and safety risks to surrounding communities and road users. Open excavations, movement of heavy vehicles, operation of machinery, falling objects, and construction-related traffic may increase the risk of accidents involving pedestrians, motorists, and nearby residents.

The impacts are expected to be temporary; however, inadequate safety management could result in injuries, restricted mobility, and disruption to community activities. Vulnerable groups such as school children, patients accessing health facilities, elderly persons, and informal traders may be particularly affected.

Implementation of appropriate safety measures, warning signage, barricading, public awareness programs, and supervision will be necessary to minimize these risks

#### **6.1.2.8 Waste Generation**

During this phase, the expected waste types include: excavated material (soil and spoil) from trenching activities, sewage waste, construction waste such as scrap metal, off-cuts of pipes, packaging materials, and timber, general waste from construction workers (e.g., food waste, plastics, paper). If not properly managed, these waste streams may lead to poor site housekeeping, creating safety hazards (e.g., tripping risks), result in localized soil contamination, attract pests and create unsanitary conditions. However, these impacts are temporary and confined to active work areas.

Limited hazardous waste will mainly arise from used oils, lubricants, and fuel residues associated with construction machinery, as well as contaminated materials such as rags used

for cleaning spills. Minor quantities of maintenance-related hazardous waste may also be generated during the operational phase. If not properly handled and disposed of, such waste could result in soil and groundwater contamination, as well as localized environmental pollution. However, given the relatively small volumes anticipated, these impacts can be effectively managed through appropriate storage, handling, and disposal at approved facilities.

#### **6.1.2.9 Increased Risk of HIV/AIDS and Communicable Diseases**

The influx of construction workers and the availability of disposable income during the construction phase may lead to increased social interactions between workers and local communities. This may elevate the risk of spread of HIV/AIDS and other sexually transmitted infections (STIs), particularly if awareness and prevention measures are not implemented. However, given the short-term and linear nature of the project, the risk is expected to be moderate and manageable through sensitization programs.

#### **6.1.2.10 Soil Contamination**

It is worth noting that poor management of fresh and used oils and oil spillage from construction material and vehicles around the construction site may contaminate the soil to the extent where it disturbs the growth of the vegetation growth on. This impact will be local as it will affect the proposed project site only.

#### **6.1.2.11 Disturbance to Informal Traders, Businesses, and Livelihoods**

Construction activities within the Mumbwa Road servitude may temporarily affect informal traders and businesses operating within or adjacent to the road reserve.

Affected activities may include:

- Roadside vending;
- Mobile money services;
- Agricultural produce trading;
- Tyre repair and auto-related services;
- Metal fabrication; and
- Small retail kiosks and semi-permanent trading structures.

The Project may require temporary removal or disturbance of:

- Makeshift stalls and sheds;
- Kiosks and trading booths;
- Semi-permanent business structures; and
- Minor fixed assets such as concrete pavers and signposts.

In addition, certain institutional and commercial entities, including two legally operating service stations, a government school, and a private drilling company, may experience partial impacts such as temporary access restrictions, disturbance to paved surfaces, and removal or reinstatement of signage and related infrastructure.

Temporary relocation of businesses, reduced customer access, and disruption of daily trading activities may result in short-term loss of income.

#### **6.1.2.12 Damage to Existing Infrastructure and Utilities**

The proposed pipeline route along Mumbwa Road passes in front of two health facilities, including a Government Hospital. During stakeholder consultations, representatives from these facilities raised concerns about potential disruption to:

- Ambulance access for emergency patient transport.
- Maternity cases requiring urgent access.
- Staff and patient access to essential health services.
- Supply deliveries of medical goods and oxygen.

Without appropriate mitigation, construction activities such as trenching, excavation, and material storage could temporarily block or impede access to these critical facilities, posing serious risks to public health and safety. This impact is considered high significance given the potential consequences of delayed emergency response.

The project has therefore developed specific mitigation measures to ensure uninterrupted access, as detailed in Section 7.1.2.13.

#### **6.1.3 Positive Impacts during Operation Phase**

It is envisioned that the following positive impacts are associated with the proposed project during its operation phase:

- Long-Term Employment Opportunities;
- Employment of Women and Youth;
- Increased Local Public Revenue/Taxes;
- Improved Access to Safe and Reliable Water Supply;
- Improved Public Health and Sanitation; and,
- Economic Development and Increase in Property Values.

##### **6.1.3.1 Long – Term Employment Opportunities**

The operation and maintenance of the boreholes, pump stations, storage facilities, and distribution networks will require a permanent workforce, creating long-term employment opportunities for technicians, operators, and maintenance personnel. These facilities will be managed primarily by the existing staff of the LWSC, with the possibility of additional recruitment for specialized technical roles as required.

##### **6.1.3.2 Employment of Women and Youths**

The project will adopt a deliberate and structured approach to promote the employment, skills development, and meaningful participation of women and youths throughout both the construction and operational phases. Recognizing that these groups are often under-represented in infrastructure development projects, the project proponent will implement targeted measures

to ensure equitable access to employment opportunities and to contribute to broader socio-economic empowerment within the host communities.

#### **6.1.3.3 Increased Local Public Revenue/Taxes**

During the operational phase, the project will contribute to national revenue through the company's compliance with statutory obligations, including the payment of corporate taxes and other regulatory fees. Ongoing operations will require a permanent workforce, resulting in continued remittance of Pay-As-You-Earn (PAYE) to the Zambia Revenue Authority (ZRA) and pension contributions to the National Pension Scheme Authority (NAPSA). These activities will generate sustained public revenue and support broader economic stability through formal employment and associated fiscal contributions.

#### **6.1.3.4 Improved Access to Safe and Reliable Water Supply**

Once operational, the project will significantly enhance the availability and reliability of potable water supply in Garden Park Ward 10 and surrounding areas, benefiting an estimated population of approximately 73,200 residents. This improved water supply will reduce dependence on unsafe or unreliable sources and contribute to improved household welfare and resilience to water shortages.

#### **6.1.3.5 Improved Public Health and Sanitation**

Reliable access to safe water will enable households to maintain better hygiene and sanitation practices, thereby reducing the incidence of waterborne diseases such as cholera, diarrhoea, and dysentery. Improved public health outcomes will translate into reduced healthcare costs, improved productivity, and enhanced quality of life for the local population.

#### **6.1.3.6 Economic Development and Increase in Property Values**

Reliable water infrastructure is a key determinant of urban development and investment. The improved water supply resulting from the project will enhance the attractiveness of the area for residential, commercial, and institutional development, potentially leading to increased property values and expanded economic opportunities for local communities.

#### **6.1.4 Negative Impacts during Operational Phase**

It is envisioned that the following negative impacts are associated with the proposed project during its operation phase:

- Groundwater Resource Depletion;
- Risk of Water Contamination and Leakage;
- Energy Consumption and Greenhouse Gas Emissions;
- Safety Risks Associated with Water Supply Infrastructure;
- Solid waste Generation;
- Impacts on HIV/AIDS;
- Archaeology and Cultural Sites
- Landscape and Visual Characteristics

#### **6.1.4.1 Groundwater Resource Depletion**

Continuous abstraction of groundwater to meet increasing urban demand has the potential to place pressure on the underlying aquifer if not properly managed. Over-abstraction could lead to declining groundwater levels, reduced borehole productivity, and possible long-term impacts on surrounding users and ecosystems that depend on groundwater.

#### **6.1.4.2 Risk of Water Contamination and Leakage**

Leakages or structural failures in pipelines, valves, and storage tanks may result in localized flooding, soil erosion, or contamination of surrounding soils and shallow groundwater. In addition, negative pressure in damaged pipelines could allow contaminants to enter the distribution system, posing public health risks.

#### **6.1.4.3 Energy Consumption and Greenhouse Gas Emissions**

The operation of electrically powered pumps and associated infrastructure will result in increased energy consumption and indirect greenhouse gas emissions associated with electricity generation, particularly where grid power is derived from fossil fuel-based or mixed energy sources.

#### **6.1.4.4 Safety Risks Associated with Water Supply Infrastructure**

Water supply infrastructure such as elevated storage reservoirs, ground-level tanks, pump stations, and electrical control panels may pose safety risks to the public if access is not adequately controlled. Unauthorized entry into these facilities could result in accidents such as falls, drowning, electrical shock, or vandalism of critical equipment.

#### **6.1.4.5 Solid Waste Generation**

During the operation phase, solid waste impacts are expected to be minor but their impact may be significant in the absence of a proper waste management plan and improper disposal of waste which may have adverse environmental effects. However, the developer will engage relevant Authorities to ensure there is an effective waste management system.

#### **6.1.4.6 Impacts on HIV/AIDS**

With increased economic activity in the area, people may engage in illicit behaviour likely to increase the prevalence of HIV/AIDS and other sexually transmitted infections. The practice could continue and this habit could lead to more cases of HIV/AIDS and consequently death.

In terms of magnitude, likelihood, extent and frequency, the impact is considered significant, possible, confined to the project site surrounding and a daily occurrence respectively.

#### **6.1.4.7 Archaeology and Cultural Sites**

The project site has no historical, cultural and archaeological sites within the area. The nearest historical sites are located far away from the area and will not be affected by the project implementation. Therefore, this impact is very negligible.

#### **6.1.4.8 Landscape and Visual Characteristics**

It is worth noting that construction of new infrastructure will certainly result in change in aesthetics of the project site. The clearing of certain portions of flora, shrubs and coming up with a different development will certainly have an impact on the landscape and visual characteristic at the proposed project site. This impact will be local. The landscape and visual characteristics are likely to change.

#### **6.1.5 Positive Impacts during Decommissioning Phase**

In the event that the infrastructural development is to be relocated, found to be economically unviable, meet the expected life span or condemned as structurally unstable. It can be abandoned and/or demolished. The following are expected positive impacts associated with decommissioning of the proposed project.

##### **6.1.5.1 Rehabilitation**

It is worth noting that decommissioning phase of the proposed development will involve phasing out the expected operations of the project. This may involve conversion of the facility to other uses or rehabilitation of the project site in line with the projected plans. This may involve new landscaping schemes and demolition of some structures within the facility.

##### **6.1.5.2 Employment Opportunities**

For demolition to take place properly and in good time, several people will be involved. As a result, large number of jobs will be created to the local and regional skilled, semi-skilled and unskilled personnel.

#### **6.1.6 Negative Impacts during Decommissioning Phase**

The developer and its management structure will oversee activities during the Decommissioning Phase. However, it is envisioned that the following negative impacts are associated with the proposed project during its decommissioning phase:

- Air Quality;
- Noise and Vibration;
- Solid waste Generation;
- Sewerage Waste;
- Public Health and Safety;
- Soil Erosion; and,
- Land Use.

##### **6.1.6.1 Air Quality and Noise Pollution**

Dust will be generated during demolition works of the proposed project from the demolition activities. This will mainly affect demolition workers. In addition, soil will be used in rehabilitation and re-instatement to pre-project status, this will add to the amount of dust that will be generated during rehabilitation. However, it will be minimal. Exhaust emission will

also be experienced during decommissioning from the trucks that will be transporting the demolished objects to the disposal sites and storage areas. Large quantities of dust will be generated during demolition works. This will affect both demolition staff as well as the neighbouring establishments.

The demolition works will lead to significant deterioration of the auditory environment within the proposed Project site and the surrounding areas. This will be as a result of the noise and vibrations that will be experienced during demolition.

#### **6.1.6.2 Waste Generation**

Demolition of the proposed project will result in large quantities of solid waste. Although demolition waste is generally considered as less harmful to the environment since they are composed of inert materials, there is growing evidence that large quantities of such waste may lead to release of certain hazardous chemicals into the environment. Domestic waste generation will continue but at very minimal scale as the population at the facility will drastically reduce. The facility will be placed under care and maintenance after the closure period.

After decommissioning and closure phase, the use of toilets and sewer facilities will only be restricted to the selected individuals hence the impact will be very minimal considering the number of occupants. It is noted that this may possibly affect ground water quality in the vicinity by increasing the traces of total and faecal coliforms likely to result from sewer waste.

#### **6.1.6.3 Public Health and Safety**

Boreholes, electricity lines and other equipment to be used for decommission may pose physical danger to locals who may illegally enter the proposed project site after closure.

#### **6.1.6.4 Soil Erosion**

It is worth noting that during decommissioning of the proposed project if the roads and drainages are poorly maintained within the facility may result into soil erosion. Soil erosion may be caused by storm water and or high velocity winds. This impact will be local as it will be restricted to the proposed project site. Soil erosion will eventually result into poor soil fertility as the nutrients will be leached out.

#### **6.1.6.5 Land Use**

Land use will certainly change after decommissioning and closure. After rehabilitation and re-vegetation, land use may be restored to the original state or up to a certain acceptable standard.

## 6.2 Characterization and Assessment of Impact Significance

Characterization and assessment of impact significance was based on a criterion that took into account the *frequency* of occurrence of the source of impact, *duration* of the impact, *severity* of the impact, *spatial extent* of the impact and *Sensitivity* of the element being impacted.

Characterization of impact significance involved consideration of the following factors:

- Beneficial or detrimental (Positive, Negative);
- Severity of the impact (Very High, High, Moderate, Low);
- Spatial extent of the impact (Local, regional)
- Duration of the impact (Short-term, Medium-term, Long-term);
- Timing of the impact (Construction, Operation, Post Decommissioning/Closure);
- Frequency of impact occurrence (Continuous, Frequent, Infrequent, Occasional);
- Probability of impact occurrence (Unlikely, Possible, Probable, Certain); and,
- Significance of Impact (Very high, High, Moderate, Low). The significance weightings

For each potential impact are as follows:

- Low (i.e. where this impact would not have a direct influence on the decision to develop in the area);
- Medium (i.e. where the impact could influence the decision to develop in the area unless it is effectively mitigated);
- High (i.e. where the impact must have an influence on the decision process to develop in the area.

Impacts were also characterized as direct or indirect in order to have a full appreciation of the impacts and facilitate effective management of the impacts. The process of impact identification and assessment involved all study team members and with each consultant presenting their findings within their specialist area of study for discussions.

Table 28: Impact Criteria Used

| Impact Criteria                      | Description                                                                  | Criteria Classification |                                          |
|--------------------------------------|------------------------------------------------------------------------------|-------------------------|------------------------------------------|
|                                      |                                                                              | Term                    | Description                              |
| Positive or Negative Impact          | Will the impact have a beneficial or detrimental effect on the environment?  | Positive                | A beneficial effect                      |
|                                      |                                                                              | Negative                | A detrimental effect                     |
| Intensity or amplitude of the Impact | To what degree will the effect be felt or how good or bad will the effect be | Very high               | Very good or very bad effect             |
|                                      |                                                                              | High                    | Good or bad effect                       |
|                                      |                                                                              | Moderate                | Relatively good or relatively bad effect |
|                                      |                                                                              | Low                     | Slightly good or slightly bad effect     |
| Extent of Impact                     | What is the geographical extent of the impact?                               | Local                   | Impact limited to Project footprint      |

| Impact Criteria        | Description                                                                             | Criteria Classification |                                                                                        |
|------------------------|-----------------------------------------------------------------------------------------|-------------------------|----------------------------------------------------------------------------------------|
|                        |                                                                                         | Term                    | Description                                                                            |
|                        |                                                                                         | Limited                 | Impact limited to Project footprint & immediate neighborhood                           |
|                        |                                                                                         | Regional                | Impact felt beyond neighborhood                                                        |
| Duration of Impact     | For how long will the impact continue to manifest or be felt?                           | Short-Term              | Impact will cease once the project activities stop                                     |
|                        |                                                                                         | Medium-Term             | Impact will last for a limited period after project activities (eventually reversible) |
|                        |                                                                                         | Long-Term               | Impact will be permanent & irreversible                                                |
| Timing of Impact       | At what point in time will the impact occur or be felt?                                 | During Preparation      | Impact will occur during preparation phase                                             |
|                        |                                                                                         | During Construction     | Impact will occur during construction phase                                            |
|                        |                                                                                         | During Operations       | Impact will occur during operation phase                                               |
|                        |                                                                                         | Post decommissioning    | Impact will occur after the life time of the project                                   |
| Frequency of Impact    | What is the likely frequency of occurrence?                                             | Continuous              | Impact will be continuous                                                              |
|                        |                                                                                         | Frequent                | Impact will occur frequently                                                           |
|                        |                                                                                         | Infrequent              | Impact will occur infrequently                                                         |
|                        |                                                                                         | Occasional              | Impact will occur occasionally                                                         |
| Probability            | What is the probability of Impact occurrence?                                           | Certain                 | Impact is certain to occur                                                             |
|                        |                                                                                         | Probable                | Impact is likely to occur                                                              |
|                        |                                                                                         | Possible                | Impact may possibly occur                                                              |
|                        |                                                                                         | Unlikely                | Impact is unlikely to occur                                                            |
| Significance of Impact | What is the Magnitude of impact (will the impact be of high, moderate or low severity?) | Very High               | Very high Impact                                                                       |
|                        |                                                                                         | High                    | High Impact                                                                            |
|                        |                                                                                         | Moderate                | Moderate                                                                               |
|                        |                                                                                         | Low                     | Low Impact                                                                             |

Table 29: Environmental Impact Assessment Matrix

| Potential Environmental Impact                                                                                                                                                          | Environmental Impact Characterization |                     |                  |                    |                                         |                     |                                |                        |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------|---------------------|------------------|--------------------|-----------------------------------------|---------------------|--------------------------------|------------------------|
|                                                                                                                                                                                         | Positive / Negative Impact            | Intensity of Impact | Extent of Impact | Duration of Impact | Timing of Impact                        | Frequency of Impact | Likelihood of Impact Occurring | Significance of Impact |
| <b>Bio-Physical Environment</b>                                                                                                                                                         |                                       |                     |                  |                    |                                         |                     |                                |                        |
| Enhancement of the Site Ecology                                                                                                                                                         | Positive                              | Moderate            | Regional         | Long term          | Operation phase                         | Continuous          | Certain                        | High                   |
| Site Rehabilitation and Environmental Restoration                                                                                                                                       | Positive                              | Moderate            | Regional         | Long term          | Decommissioning phase                   | Continuous          | Certain                        | High                   |
| Clearing of Vegetation (climate change and habitat destruction and loss)                                                                                                                | Negative                              | Very high           | Regional         | Short term         | Construction phase                      | Occasional          | Certain                        | High                   |
| Soil Erosion and Land Degradation (earthworks, excavation and removal of vegetation cover may expose soils to erosion by wind and stormwater, potentially leading to land degradation). | Negative                              | Moderate            | Limited          | Short term         | Construction and decommissioning phases | Occasional          | Probable                       | Medium                 |
| Dust and Air Quality (Demolition and construction activities are expected to generate dust and emissions, potentially affecting local air quality and visibility).                      | Negative                              | Moderate            | Limited          | Short term         | Construction and decommissioning phases | Occasional          | Probable                       | Medium                 |
| Noise and vibration (Operation of heavy machinery and demolition equipment may result in elevated noise levels).                                                                        | Negative                              | Moderate            | Limited          | Short – term       | Construction and decommissioning phases | Occasional          | Probable                       | Medium                 |

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|                                                                                                                                                   |          |          |                |               |                       |            |          |               |
|---------------------------------------------------------------------------------------------------------------------------------------------------|----------|----------|----------------|---------------|-----------------------|------------|----------|---------------|
| Depletion of the Water Resource (Abstraction of groundwater to support project activities may reduce groundwater levels if not properly managed). | Negative | Moderate | Local          | Medium - term | Operation phase       | Continuous | Probable | Medium - high |
| Soil Contamination (Improper handling of fuels, lubricants, or construction materials may results in localized soil contamination).               | Negative | Low      | Limited        | Short term    | Operation phase       | Occasional | Probable | Low           |
| Risk of Water Contamination and Leakage (accidental contamination may pose risks to soil and groundwater quality if not properly managed).        | Negative | Low      | Limited        | Short term    | Operation phase       | Occasional | Probable | Low           |
| Energy Consumption and Greenhouse Gas Emissions                                                                                                   | Negative | Moderate | Local          | Short term    | Operation phase       | Continuous | Probable | Medium        |
| Solid Waste Generation (construction debris, operational waste, and demolition materials may accumulate if not properly managed).                 | Negative | Moderate | Limited        | Medium - term | All project phases    | Continuous | Probable | Low - medium  |
| Sewerage Waste and Potential Groundwater Contamination                                                                                            | Negative | High     | Local          | Long term     | Decommissioning phase | Occasional | Probable | Medium        |
| Landscape and Visual Impacts                                                                                                                      | Negative | Medium   | Limited        | Long term     | Operational phase     | Continuous | Certain  | High          |
| <b>Socio-economic and Cultural Environment</b>                                                                                                    |          |          |                |               |                       |            |          |               |
| Increase in Employment Opportunities                                                                                                              | Positive | Moderate | Local-regional | Long term     | All project phases    | Continuous | Certain  | Medium        |
| Employment of Women and Youth                                                                                                                     | Positive | Moderate | Local-regional | Long term     | All project phases    | Continuous | Certain  | Medium        |

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|                                                                                                                                                                                       |          |          |                  |              |                                         |            |          |        |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------|----------|------------------|--------------|-----------------------------------------|------------|----------|--------|
| Capacity Building and Skills Transfer                                                                                                                                                 | Positive | Moderate | Limited          | Long term    | All project phases                      | Continuous | Certain  | Medium |
| Economic Growth                                                                                                                                                                       | Positive | Moderate | Local - Regional | Long term    | All project phases                      | Continuous | Certain  | Medium |
| Creation of a Market for Supply of Building Materials                                                                                                                                 | Positive | Moderate | Local - Regional | Short - term | Construction phase                      | Occasional | Certain  | Medium |
| Improved Access to Safe and Reliable Water Supply                                                                                                                                     | Positive | High     | Limited          | Long term    | Operation phase                         | Continuous | Certain  | High   |
| Improved Public Health and Sanitation (reliable water supply is expected to reduce the prevalence of waterborne diseases and improve hygiene standards).                              | Positive | High     | Limited          | Long term    | Operation phase                         | Continuous | Certain  | High   |
| Increase in Public Revenue and Economic Growth (The project will contribute to government revenue through taxes, statutory payments and multiplier effects within the local economy). | Positive | High     | Regional         | Long term    | All project phases                      | Continuous | Certain  | High   |
| Occupational Health and Safety Risks                                                                                                                                                  | Negative | High     | Local            | Short term   | Construction and decommissioning phases | Occasional | Probable | High   |
| Public Health and Safety Risks                                                                                                                                                        | Negative | High     | Limited          | Medium term  | All project phases                      | Occasional | Probable | High   |
| Disruption to Traffic and Local Access                                                                                                                                                | Negative | High     | Limited          | Medium term  | Construction phase                      | Occasional | Probable | Medium |
| Impacts on Informal Traders (Construction activities along the Mumbwa road servitude may                                                                                              | Negative | High     | Limited          | Medium term  | Construction Phase                      | Occasional | Certain  | High   |

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|                                                                                                                                                                                                            |          |      |                 |            |                       |            |          |        |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------|------|-----------------|------------|-----------------------|------------|----------|--------|
| disrupt the operations of informal traders, potentially affecting their livelihoods).                                                                                                                      |          |      |                 |            |                       |            |          |        |
| Spread of STI's and HIV/AIDS                                                                                                                                                                               | Negative | High | Regional        | Long term  | All project phases    | Occasional | Certain  | High   |
| Archaeology and Cultural Heritage                                                                                                                                                                          | Negative | High | Local - Limited | Long term  | Construction phase    | Occasional | Probable | Low    |
| Land Use Change (Following closure, the site may undergo land use transition, which may alter previous land use patterns and require careful planning to ensure compatibility with surrounding land uses). | Negative | High | Local           | Short term | Decommissioning phase | Occasional | Probable | Medium |

## **7.0 ENVIRONMENT AND SOCIAL MANAGEMENT PLAN (ESMP)**

The Environmental Impact Assessment Regulations require the developer to provide an Environmental and Social Management Plan. An ESMP is a document where all the measures that are required for environmental protection, which will include the mitigation measures and the monitoring plan, will be found for easy reference. The aim of an environmental management plan is to avoid, minimize, or ameliorate effects or impacts resulting from project implementation and where possible, enhance beneficial effects.

This EMP seeks to limit the interaction of disturbed with undisturbed lands at the facility and through the various processes of project implementation, restore the disturbed land to a predetermined form of land-use or to a productivity level similar to that occurring prior to disturbance.

The Environmental Management Plan for the management of the identified environmental impacts associated with this project consists of three main components:

- Implementing the Impact Mitigation Plan.
- Monitoring the implementation of the EMP.
- Institutional Framework for Monitoring, reporting and supervision of the EMP.

### **7.1 Enhancement and Mitigation Measures**

#### **7.1.1 Enhancement Measures for Positive Impacts during Construction Phase**

To maximise the socio-economic and environmental benefits associated with the proposed development, the project will implement targeted enhancement measures alongside standard mitigation actions. Enhancement measures are designed to strengthen, sustain, and expand the positive outcomes of the project beyond their natural occurrence, ensuring that local communities, district authorities, and the broader Lusaka Province derive long-term value from project activities. The key components of the proposed impact mitigation plan are: -

- Employment Creation and Income Generation;
- Growth of Local Businesses and Service Demand;
- Skills Transfer and Capacity Building; and,
- Creation of a market for supply of building materials.

##### **7.1.1.1 Employment Creation and Income Generation**

To maximize these socio-economic benefits, the project will prioritize recruitment of local labour in accordance with the Employment Code Act, No. 3 of 2019 of the Laws of Zambia, which promotes fair labour practices, citizen employment, and non-discrimination in hiring. Inclusive employment practices will be implemented to encourage participation of women and youth in line with the Gender Equity and Equality Act, No. 22 of 2015 of the Laws of Zambia, thereby promoting equitable access to project-related opportunities. Transparent recruitment procedures will be adopted, including public advertisement of job opportunities within the project area and collaboration with local leadership to ensure fair community representation. In addition, short-term skills training, safety induction, and basic technical orientation

programmes will be provided to all recruited workers to enhance their competence, productivity, and future employability beyond the lifespan of the project.

#### **7.1.1.2 Growth of Local Businesses and Service Demand**

To strengthen this positive economic ripple effect, the contractor will implement a local procurement strategy that prioritizes sourcing of goods, materials, and services from businesses operating within the host communities, provided they meet required quality and safety standards. Supplier databases will be developed in consultation with local authorities and community representatives to identify eligible local vendors and service providers. Where feasible, small-scale and informal traders will be integrated into the project's supply chain through fair contracting arrangements and timely payment mechanisms to avoid financial strain on small enterprises. The project will also encourage the establishment of temporary market stalls or designated trading areas near construction sites, where appropriate, to enable local vendors to safely and efficiently provide services to workers.

#### **7.1.1.3 Skills Transfer and Capacity Building**

To ensure that this skills transfer is structured and measurable, the contractor will implement formal on-the-job training programmes supported by experienced supervisors and technical specialists. Training modules will cover areas such as pipeline installation techniques, equipment handling, occupational health and safety, quality control procedures, and environmental management practices. Attendance registers, competency assessments, and training completion records will be maintained to document the skills acquired by workers, thereby providing them with verifiable experience that may support future employment opportunities. Where possible, the project will also explore partnerships with local vocational training institutions to align training content with nationally recognized skills standards, thereby enhancing the credibility and transferability of the acquired competencies.

To enhance the positive impact associated with the provision of a market for building materials, the developer will prioritize the procurement of locally available construction materials that meet the required quality standards. This will support local suppliers, stimulate business growth, and strengthen the local supply chain during the construction phase.

#### **7.1.1.4 Creation of a Market for Supply of Building Materials.**

To enhance the positive impact associated with the provision of a market for building materials, the developer will prioritize the procurement of locally available construction materials that meet the required quality standards. This will support local suppliers, stimulate business growth, and strengthen the local supply chain during the construction phase.

The project will implement transparent and fair procurement processes to ensure that local producers and vendors are given adequate opportunity to participate in supplying materials such as sand, quarry stone, cement, timber, steel, electrical cables, pipes, and water storage equipment. Where feasible, the developer will establish early engagement with suppliers to allow them to plan and meet project demand efficiently.

By promoting the use of locally manufactured and sourced materials, the project will contribute to increased economic activity, job creation, and enhanced revenue generation for the government through applicable taxes, thereby supporting national economic growth and contributing GDP.

## **7.1.2 Mitigation Measures for Negative Impacts During Construction Phase**

### **7.1.2.1 Ecological Resources (Flora and Fauna)**

Vegetation clearance will be restricted to the minimum area required for safe construction activities. Sensitive areas and mature vegetation will be avoided where feasible through careful route alignment and site planning. Prior to commencement of clearing activities, a walk-through inspection will be conducted to identify any ecologically sensitive features or species requiring protection. Topsoil removed during excavation works will be stockpiled separately and reused during reinstatement activities to promote natural regeneration.

Upon completion of construction works, disturbed areas will be rehabilitated through:

- Re-grading of disturbed surfaces;
- Replacement of stockpiled topsoil;
- Re-vegetation using indigenous grass and shrub species; and
- Removal of unnecessary construction debris and temporary structures.

These measures will reduce long-term habitat disturbance and support restoration of ecological functions within affected areas

### **7.1.2.2 Soil Erosion and Land Degradation**

To minimise soil erosion and land degradation, excavation works will, where practicable, be scheduled during the dry season to reduce exposure of disturbed soils to rainfall events. Additional mitigation measures will include:

- Prompt backfilling and compaction of trenches following pipe installation;
- Installation of temporary erosion and sediment control measures such as silt fences, sediment traps, berms, and diversion channels;
- Proper management and stabilization of spoil heaps away from drainage lines;
- Restriction of vehicle movement to designated access routes; and
- Progressive reinstatement and revegetation of disturbed areas.

These measures will minimise sediment transport, surface runoff impacts, and long-term soil instability.

### **7.1.2.3 Dust and Air Quality Impacts**

Construction activities will be managed to minimise generation of dust and exhaust emissions that may affect nearby communities, businesses, health facilities, and road users. Mitigation measures will include:

- Regular watering of exposed surfaces and active construction areas during dry conditions;
- Covering of trucks transporting soil, sand, and other loose materials;
- Application of water or non-toxic dust suppressants on unpaved access roads and staging areas where necessary;
- Proper maintenance and servicing of construction vehicles and machinery to minimise exhaust emissions;
- Avoidance of unnecessary vehicle idling;
- Proper planning of material transportation to reduce the number of vehicle trips;
- Rapid reinstatement or surfacing of disturbed areas where feasible; and
- Proper site layout planning to minimise traffic congestion within work areas.

In addition, workers and equipment operators will receive awareness training on good housekeeping and emission control practices

#### **7.1.2.4 Noise and Vibration Impacts**

The contractor will implement measures to minimise construction-related noise and vibration impacts on nearby receptors, including residential areas, schools, churches, businesses, and health facilities. Mitigation measures will include:

- Restricting noisy construction activities to approved daytime working hours where feasible;
- Use of properly maintained equipment fitted with silencers and mufflers;
- Avoidance of unnecessary idling of vehicles and machinery;
- Limiting simultaneous operation of high-noise equipment in sensitive areas;
- Provision of temporary noise barriers or shielding where necessary;
- Advance notification to nearby communities and institutions regarding particularly noisy activities; and
- Routine inspection and maintenance of machinery to minimise excessive noise generation.

These measures will reduce disturbance to surrounding communities and sensitive institutions during construction.

#### **7.1.2.5 Traffic Disruption and Restricted Access**

A comprehensive Traffic Management Plan (TMP) will be implemented in consultation with the Road Development Agency (RDA), Lusaka City Council, traffic police, and affected stakeholders to ensure safe movement of vehicles and pedestrians throughout the construction period. Mitigation measures will include:

- Installation of warning signs, barricades, cones, and directional signage at active construction sites;
- Deployment of trained traffic marshals and flag personnel in high-traffic areas;
- Phased construction scheduling to avoid prolonged closure of road sections;

- Provision of temporary diversions and pedestrian walkways where required;
- Maintenance of continuous access to homes, businesses, schools, churches, service stations, and other public facilities;
- Scheduling of works in high-traffic areas during off-peak periods where feasible; and
- Continuous stakeholder engagement and public notification regarding construction schedules and access arrangements.

Special attention will be given to facilities requiring uninterrupted access, including health facilities, emergency service providers, and commercial premises dependent on continuous vehicle access.

#### **7.1.2.6 Occupational Health and Safety**

The contractor will implement a comprehensive Occupational Health and Safety (OHS) Management Plan in accordance with the Occupational Health and Safety Act, No. 36 of 2010 and international good industry practice. Key mitigation measures will include:

- Provision and mandatory use of appropriate Personal Protective Equipment (PPE);
- Conducting worker induction training and regular toolbox talks;
- Safe barricading and shoring of excavations and trenches;
- Provision of safe access and egress points for excavations;
- Routine inspection and maintenance of equipment and machinery;
- Appointment of qualified Health and Safety Officers;
- Implementation of emergency preparedness and response procedures;
- Provision of first aid kits and trained first aid personnel on-site;
- Enforcement of speed limits within construction zones; and
- Implementation of vector control and worker awareness measures relating to malaria prevention.

These measures are intended to minimise accidents, injuries, and occupational illnesses during construction activities

#### **7.1.2.7 Public Health and Safety Risks**

To protect surrounding communities and road users, all active work areas will be secured and clearly demarcated throughout the construction period. Mitigation measures will include:

- Installation of barricades, caution tape, temporary fencing, and warning signage around hazardous areas;
- Provision of adequate lighting around open trenches and work areas during night-time;
- Deployment of traffic marshals and safety personnel at strategic locations;
- Community sensitization programs on construction risks and safety precautions;
- Safe management of construction traffic and equipment movement;
- Immediate covering, barricading, or reinstatement of open trenches where feasible; and
- Maintenance of emergency access routes at all times.

Particular attention will be given to vulnerable groups such as school children, elderly persons, patients accessing health facilities, and informal traders operating adjacent to the Project corridor.

#### **7.1.2.8 Waste Generation**

A Construction Waste Management Plan will be implemented to guide the segregation, storage, transportation, recycling, and disposal of all waste generated during the project. Waste will be sorted at source into reusable, recyclable, and hazardous categories. Reusable excavated material will be used for backfilling where suitable, while surplus material will be disposed of at approved disposal sites designated by the Agency (ZEMA). Hazardous wastes such as used oil and fuel-contaminated materials will be stored in sealed containers and handled by licensed waste management contractors in accordance with national environmental regulations.

#### **7.1.2.9 Increased Risk of HIV/AIDS and Communicable Diseases**

The Project will implement awareness and prevention programs aimed at reducing the spread of HIV/AIDS and other communicable diseases among workers and surrounding communities. Mitigation measures will include:

- Regular HIV/AIDS and communicable disease awareness sessions and toolbox talks;
- Distribution of educational materials to workers and nearby communities;
- Provision and promotion of condom use at construction sites;
- Collaboration with local health authorities and health facilities on awareness campaigns; and
- Promotion of responsible worker conduct and behaviour throughout the construction period.

These measures will support improved awareness and reduction of disease transmission risks associated with labour influx.

#### **7.1.2.10 Soil Contamination**

The qualified personnel will thoroughly supervise works on the site so as to ensure proper handling of machinery and material that has the potential to contaminate the soil.

To mitigate the impacts as a result of solid waste, waste will be disposed of in bins on site and disposed of by a contracted waste collection agency approved by the Chilanga and Lusaka Council. As much as possible, minimize the area of exposed soil at any given time. To avoid leakages, construction machineries will be regularly inspected and serviced.

#### **7.1.2.11 Disturbance to Informal Traders, Businesses, and Livelihoods**

To minimise socio-economic impacts associated with temporary displacement, restricted access, and disruption of trading activities, the Project will implement a structured stakeholder engagement and livelihood restoration approach during the construction phase. The following mitigation measures will be implemented:

- Conduct pre-construction identification, enumeration, and verification of all affected traders, businesses, and Project Affected Persons (PAPs);
- Provide advance notice regarding construction schedules, temporary relocation requirements, and anticipated duration of disturbances;
- Maintain continuous engagement with affected traders, businesses, local authorities, and community representatives throughout the construction period;
- Establish and implement a Project-specific Grievance Redress Mechanism (GRM) to address complaints and concerns in a timely manner;
- Facilitate temporary relocation arrangements where feasible and necessary to maintain continuity of economic activities;
- Maintain or restore access to affected businesses and trading areas as quickly as practicable;
- Reinstall disturbed business infrastructure, paved surfaces, signposts, and related facilities following completion of works; and
- Implement livelihood restoration support measures proportionate to the scale and duration of economic disruption.

Where temporary disruption to trading activities cannot be avoided, the Project will, in consultation with affected persons and relevant local authorities, explore practical support measures such as temporary relocation of stalls, phased construction scheduling, and maintenance of pedestrian and customer access to businesses.

The Project will seek to avoid or minimise economic displacement in accordance with applicable national legislation and international good industry practice, including the principles of IFC Performance Standard 5 where applicable

#### **7.1.2.12 Damage to Existing Infrastructure and Utilities**

Prior to commencement of excavation works, the contractor will undertake utility verification and mapping in consultation with relevant utility providers and affected property owners.

Mitigation measures will include:

- Identification and marking of existing underground and overhead utilities before excavation;
- Use of controlled excavation techniques near sensitive infrastructure;
- Coordination with utility service providers prior to relocation or isolation of services;
- Immediate repair or reinstatement of damaged utilities and property features;
- Proper compaction and reinstatement of backfilled trenches to restore structural stability and access;
- Continuous access management for service stations, businesses, and institutional facilities; and
- Routine inspection of reinstated surfaces to ensure safety and functionality.

To ensure uninterrupted operation of critical facilities such as hospitals and emergency service providers, the following additional measures will be implemented:

- Construction of temporary access crossings or bypasses where trenching occurs near entrances;
- Phased construction scheduling to maintain at least one functional access point at all times;
- Advance notification to facility management prior to commencement of works;
- Development and implementation of an Emergency Access Plan in consultation with affected facilities;
- Deployment of dedicated liaison personnel during active construction near sensitive institutions; and
- Placement of clear directional signage and traffic control measures around affected access points.

These measures will be incorporated into the Project Traffic Management Plan and monitored throughout the construction phase.

### **7.1.3 Enhancement Measures for Positive Impacts During Operation Phase**

#### **7.1.3.1 Long-Term Employment Opportunities**

To maximize employment benefits during the operational phase, the project proponent will prioritize the recruitment of qualified personnel from local communities for routine operation, maintenance, and administrative roles associated with the water supply system. Structured capacity-building programmes will be implemented in partnership with technical training institutions and other accredited vocational training providers to develop specialized skills in pump maintenance, water quality monitoring, pipeline repair, and system management. Continuous professional development will be provided through refresher training, certification programmes, and exposure to modern water management technologies. These initiatives will not only enhance the efficiency and reliability of system operations but will also contribute to the development of a skilled local workforce capable of supporting similar infrastructure projects in the future. Furthermore, clear career progression pathways and fair employment practices will be established to promote workforce retention, motivation, and long-term socio-economic benefits within the host communities.

#### **7.1.3.2 Employment of Women and Youths**

To enhance the positive impact associated with the employment of women and youths, the project will promote inclusive recruitment practices that encourage applications from qualified female candidates and young people within the local communities. Where practicable, the developer will collaborate with local authorities, community leaders, and training institutions to disseminate information on employment opportunities and required skills.

The project will also support on-the-job training and skills transfer during both construction and operations, enabling women and youths to gain practical experience and improve their long-term employability. In addition, the developer will seek to maintain a safe and respectful working environment that is free from discrimination and harassment, thereby supporting sustained participation of these groups in the workforce.

#### **7.1.3.3 Increased Local Public Revenue/Taxes**

To strengthen the positive fiscal contribution of the project, the developer will maintain full compliance with national tax and statutory requirements and ensure transparent reporting of financial and employment records to relevant authorities, including ZRA and NAPSA.

The project will also priorities formal employment arrangements and proper payroll administration to support consistent remittance of PAYE and pension contributions. By sustaining stable operations and promoting local procurement and employment, the project will indirectly enhance government revenue through value-added tax (VAT), corporate taxes, and other statutory fees, thereby contributing to long-term public revenue generation and national economic development.

#### **7.1.3.4 Improved Access to Safe and Reliable Water Supply**

To maximize the benefits associated with improved access to potable water, the project proponent will implement measures aimed at ensuring long-term system reliability, affordability, and equitable distribution. This will include the establishment of a preventive maintenance programme covering boreholes, pumps, pipelines, and storage reservoirs to minimize service interruptions and infrastructure failure. The developer will also work in coordination the National Water Supply and Sanitation Council to ensure compliance with national service delivery standards and water quality guidelines. Community engagement programmes will be implemented to educate consumers on responsible water use, leak reporting, and payment compliance, thereby promoting sustainability of the water supply system and reducing non-revenue water losses. In addition, provision will be made for future network expansion to accommodate population growth and urban development in Garden Park Ward 10 and surrounding areas.

#### **7.1.3.5 Improved Public Health and Sanitation**

To enhance public health gains resulting from improved water availability, the project will support complementary hygiene and sanitation awareness initiatives within beneficiary communities. These initiatives will be implemented in collaboration with the Ministry of Health and local health facilities through community sensitization campaigns focusing on safe water storage, hand-washing practices, and household sanitation. The project will also promote the integration of water supply improvements with existing sanitation programmes, including support for household latrine upgrades and safe wastewater disposal practices. Regular water quality monitoring will be conducted in accordance with national drinking water standards to ensure that the supplied water remains safe for human consumption. By reinforcing behavioural change and public health education alongside physical infrastructure, the project will amplify reductions in waterborne diseases and improve long-term community health outcomes.

#### **7.1.3.6 Economic Development and Increase in Property Values**

To ensure that the improved water infrastructure translates into tangible local economic development, the project will facilitate coordination with local authorities, including the Lusaka City Council, to support orderly urban growth and service planning in areas benefiting

from the new water supply. Enhanced access to reliable water is expected to attract residential developers, small businesses, and service providers; therefore, the project will advocate for integration of water supply planning into broader land-use and infrastructure development frameworks. The availability of water will also support the growth of water-dependent economic activities such as small-scale manufacturing, food processing, hospitality services, and urban agriculture. By enabling these activities, the project will indirectly contribute to job creation, increased municipal revenue through property rates, and improved living standards for local residents.

#### **7.1.4 Mitigation Measures for Negative Impacts During Operation Phase**

##### **7.1.4.1 Groundwater Resource Depletion**

Groundwater abstraction will be regulated in accordance with water permits issued by the Water Resources Management Authority to ensure that withdrawal rates remain within sustainable yield limits. The project will implement a groundwater monitoring programme involving periodic measurement of static and dynamic water levels, abstraction volumes, and borehole performance trends. Monitoring data will be recorded and submitted to regulatory authorities as required, enabling early detection of declining water tables. Where necessary, abstraction schedules will be adjusted, and rotational pumping regimes introduced to allow aquifer recovery. The project will also promote water conservation among consumers through awareness campaigns and leakage reduction measures to minimize unnecessary demand on groundwater resources.

##### **7.1.4.2 Risk of Water Contamination and Leakage**

To minimize these risks, the proponent will implement a comprehensive preventive maintenance programme covering routine inspection, servicing, and replacement of aging components within the water supply network. Pressure management systems and leak detection technologies will be utilized to identify hidden leaks and reduce system losses. Rapid response procedures will be established to ensure that reported leaks or pipe bursts are repaired promptly to prevent prolonged water loss or environmental contamination. Regular water quality testing will also be conducted in line with standards set by the National Water Supply and Sanitation Council to ensure that any contamination risks are detected and addressed without delay.

##### **7.1.4.3 Energy Consumption and Greenhouse Gas Emissions**

To reduce the environmental footprint of the project, energy-efficient pumps, motors, and control systems will be installed, and equipment will be selected based on life-cycle energy performance rather than only initial capital cost. Pumping schedules will be optimized to operate during off-peak periods where feasible, thereby improving energy efficiency and reducing strain on the power grid. Opportunities for integrating renewable energy solutions, such as solar-powered auxiliary systems or hybrid pumping arrangements, will be assessed in collaboration with the ZESCO Limited. In addition, periodic energy audits will be conducted to identify opportunities for further efficiency improvements and cost savings over the operational life of the system.

#### **7.1.4.4 Safety Risks Associated with Water Supply Infrastructure**

All critical water supply installations will be secured through perimeter fencing, lockable access gates, and controlled entry systems to prevent unauthorized access. Warning signage indicating restricted areas, electrical hazards, and deep-water risks will be installed in both English and appropriate local languages to ensure clear communication to the public. Routine safety inspections will be carried out to verify the integrity of fencing, locks, and structural components of reservoirs and tanks. The project will also coordinate with local community leaders and neighbourhood watch groups to promote community awareness and discourage vandalism or tampering with water infrastructure.

#### **7.1.4.5 Solid Waste Generation**

To mitigate potential impacts associated with solid waste generation during project operation, the developer will implement a site-specific Waste Management Plan that promotes waste minimization, segregation, reuse, and safe disposal. Waste receptacles will be strategically placed within operational areas to encourage proper disposal and prevent littering.

The developer will engage licensed waste collection service providers and coordinate with the Lusaka City Council to ensure that all solid waste is transported and disposed of at approved disposal facilities in compliance with national regulations and the requirements of ZEMA. Regular inspections and staff awareness programmes will be undertaken to promote good housekeeping practices and reduce the risk of environmental contamination.

#### **7.1.4.6 Impacts on HIV/AIDS**

To address the potential risk of increased HIV/AIDS and other sexually transmitted infections associated with increased economic activity, the developer will support awareness and sensitisation programmes targeting workers and surrounding communities. These programmes will be implemented in collaboration with local health authorities and recognised organisations such as the National HIV/AIDS/STI/TB Council.

Information, education, and communication (IEC) materials will be made available at the project site, and periodic awareness sessions will be organised to promote responsible behaviour, voluntary counselling and testing, and the use of preventive measures. These measures will contribute to reducing vulnerability and promoting long-term public health outcomes.

#### **7.1.4.7 Archaeology and Cultural Sites**

Although no known archaeological or cultural heritage sites were identified within the project area, a precautionary approach will be adopted in line with good international practice. The developer will implement a chance-find procedure to guide workers on the steps to be taken in the event that artefacts, human remains, or culturally significant materials are encountered during operational maintenance activities.

In such cases, work in the affected area will be temporarily halted, and relevant authorities such as the National Heritage Conservation Commission will be notified to assess and advise on

appropriate handling and preservation measures. This will ensure that any previously unknown cultural resources are protected in accordance with national heritage legislation.

#### **7.1.4.8 Landscape and Visual Characteristics**

To minimise adverse changes to landscape and visual character during operation, the developer will implement landscaping and site maintenance measures aimed at improving the aesthetic integration of the project infrastructure within the surrounding environment. This will include maintaining vegetative cover in non-operational areas, re-vegetating disturbed sections where practicable, and ensuring that structures are maintained in good condition and free from unsightly waste or debris.

Where feasible, the developer will incorporate visual screening measures such as planting indigenous trees and shrubs around operational facilities to soften the visual contrast between the built infrastructure and the natural environment. Regular maintenance and good housekeeping practices will further ensure that the site remains orderly and visually acceptable to neighbouring communities.

### **7.1.5 Enhancement Measures for Positive Impacts During Decommissioning Phase**

#### **7.1.5.1 Rehabilitation**

To enhance the positive outcomes associated with site rehabilitation during decommissioning, the developer will implement a structured decommissioning and restoration plan to guide the safe removal of infrastructure and the progressive restoration of disturbed areas. Where feasible, rehabilitation works will prioritise the use of indigenous vegetation and environmentally appropriate landscaping practices to promote ecological recovery and improve the visual quality of the site.

The developer will also, in consultation with relevant authorities such as ZEMA and local planning authorities, explore suitable post-decommissioning land uses that are compatible with surrounding land use plans and community expectations. This approach will help ensure that the site is returned to a stable, safe, and potentially productive condition following cessation of operations.

#### **7.1.5.2 Employment Opportunities**

To maximise employment benefits during the decommissioning phase, the developer will, where practicable, prioritise the engagement of local skilled, semi-skilled, and unskilled labour for demolition, site clearance, and rehabilitation activities. This will provide short-term income opportunities and support local economic activity during the transition period following project closure.

The developer will also encourage contractors to adopt fair labour practices, provide necessary safety training, and ensure that workers are equipped with appropriate personal protective equipment during demolition and restoration works. Where feasible, opportunities for skills transfer in areas such as dismantling, waste segregation, and site restoration will be promoted to enhance the future employability of participating workers.

## **7.1.6 Mitigation Measures for Negative Impacts During Decommissioning Phase**

### **7.1.6.1 Air Quality, Noise and Vibration**

To minimise dust emissions during demolition and rehabilitation activities, the developer will implement dust suppression measures such as periodic water spraying on demolition areas, exposed soils, and access roads, particularly during dry and windy conditions. Demolition materials will be handled and transported in a manner that reduces dust generation, including covering trucks carrying debris and avoiding unnecessary stockpiling of loose materials.

All construction and demolition machinery will be maintained in good working condition to reduce exhaust emissions. Where feasible, equipment with lower emission and noise levels will be used. To mitigate noise and vibration impacts, demolition activities will be restricted to daytime hours, and equipment will be fitted with appropriate mufflers and silencers. Workers will be provided with suitable PPE, including dust masks and hearing protection, to safeguard occupational health.

### **7.1.6.2 Waste Generation**

A demolition waste management plan will be implemented to guide the segregation, handling, storage, and disposal of different waste streams. Materials suitable for reuse or recycling, such as metals, concrete, and timber, will be separated at source where practicable to reduce the volume of waste requiring disposal. Hazardous components, if encountered, will be identified and managed in accordance with national regulations and the requirements of the Agency (ZEMA).

All residual waste will be transported by licensed waste handlers to approved disposal facilities in coordination with the Lusaka City Council or other relevant authorities.

During the care and maintenance period, sanitation facilities will be retained in functional condition and periodically inspected to prevent leakages or blockages. Where existing sewer systems are decommissioned, they will be safely sealed or removed to prevent contamination of surrounding soils and groundwater. Routine monitoring of sanitation facilities will be undertaken to ensure that risks of faecal contamination are minimised.

### **7.1.6.3 Public Health and Safety**

To prevent unauthorised access and associated safety risks following project closure, the developer will maintain adequate site security measures, including perimeter fencing, controlled access points, and warning signage indicating potential hazards. Hazardous infrastructure such as exposed boreholes, electrical lines, or unstable structures will be safely decommissioned, capped, or removed in accordance with applicable safety standards.

Community awareness measures, including engagement with local leaders and nearby residents, will be undertaken to inform the public of potential dangers associated with entering the decommissioned site.

#### **7.1.6.4 Soil Erosion**

To reduce the risk of soil erosion during and after decommissioning, disturbed areas will be progressively stabilised through grading, compaction, and re-vegetation using suitable grass and indigenous plant species. Temporary erosion control measures such as silt fences, contour bunds, and drainage channels will be installed where necessary to manage stormwater runoff and prevent the formation of gullies.

Regular inspection and maintenance of drainage structures during the decommissioning and care and maintenance period will further ensure that stormwater is safely conveyed without causing soil loss or sedimentation in adjacent areas.

#### **7.1.6.5 Land Use Changes**

To manage land use transitions following project closure, the developer will implement a rehabilitation plan aimed at restoring the site to a stable and environmentally acceptable condition that is compatible with surrounding land uses. This will include removal of redundant infrastructure, re-contouring of the land where necessary, and re-establishment of vegetation cover.

Where future land use changes are anticipated, the developer will engage with local planning authorities and relevant stakeholders to ensure that any subsequent land use is consistent with local development plans and environmental considerations. This approach will help minimise conflicts, support sustainable land management, and ensure that the site remains safe and beneficial for future use.

### **7.2 ENVIRONMENTAL AND SOCIAL MANAGEMENT PLAN (ESMP)**

In this section, an Environmental and Social Management Plan (ESMP) has been prepared to cover all the phases of the project life: design, construction, operation and maintenance. The ESMP combines both the environmental and social monitoring plan and the environmental and social management plan.

The purpose of the ESMP is to present a structured approach for optimizing beneficial impacts on the one hand while mitigating adverse impacts on the other. It has been prepared to render practical guidance to implementation of the proposed project in an environmentally friendly and socially acceptable manner. The construction contractor will thus assist the developer in implementing mitigation measures contained in the ESIA to ensure environmental protection. In this regard, the ESMP is based on the EMA (2011) and (EIA) Regulations of 2026 together with underscores responsibilities for LWSC (developer), the construction contractor, supervising consultant, GRZ agencies, NGOs and the affected community in safeguarding the environment in and around the project area.

The measures taken will as a matter of principle seek to:

- Reduce the harmful characteristics of impact sources by devising less harmful ways of effecting project activities;

- Localise project impacts as much as possible by taking precautions in effecting project activities;
- Explore ways and means of enhancing the resilience and regenerative/recovery capacity of impacted elements of the environment, and,
- Streamline better management practices including cleaner production as an integral part of project implementation.

Monitoring of the project's environmental performance will be carried out as a routine part of project implementation to observe changes taking place in the environment and assess the effectiveness of the interventions put in place. This would help the timely administering of corrective management interventions to avoid occurrence of serious negative effects. The plan, indicated in table 34, specifies: -

- Environmental Aspect (What needs to be managed?);
- Environmental Management Objective (Why does it need to be managed?); and,
- Mitigation/enhancement measure (How should it be managed?).

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Table 30: Environmental and Social Management Plan (ESMP)

| Table 30: Environmental and Social Management Plan (ESMP) |   |                                              |                                                                                                                                                               |                                                                                                                                                                                                                                                                                                                                                        |                      |                |                                  |
|-----------------------------------------------------------|---|----------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------|----------------|----------------------------------|
| Category                                                  | # | Item                                         | Anticipated Impact                                                                                                                                            | Mitigation Measures / Other Measures                                                                                                                                                                                                                                                                                                                   | Implementation       | Responsibility | Cost Estimate (USD)              |
| Before construction                                       |   |                                              |                                                                                                                                                               |                                                                                                                                                                                                                                                                                                                                                        |                      |                |                                  |
| Natural Environment                                       | 1 | Biodiversity / Ecosystem                     | <ul style="list-style-type: none"><li>Tree felling</li></ul>                                                                                                  | <ul style="list-style-type: none"><li>Obtaining permits for tree felling.</li></ul>                                                                                                                                                                                                                                                                    | LWSC                 | LWSC           | About 1,000 USD                  |
| Social Environment                                        | 2 | Land Acquisition / Resettlement of Residents | <ul style="list-style-type: none"><li>Land acquisition from landowners</li><li>Temporary relocation of street vendors</li></ul>                               | <ul style="list-style-type: none"><li>Verification on completion of land acquisition and payment to the landowners.</li></ul>                                                                                                                                                                                                                          | LWSC                 | LWSC           | Waiting for a response from LWSC |
|                                                           | 3 | Living and Livelihood                        |                                                                                                                                                               | <ul style="list-style-type: none"><li>Verification on completion of compensation payments to informal land occupants (street vendors).</li></ul>                                                                                                                                                                                                       |                      |                | About 24,000 USD                 |
|                                                           | 4 | Vulnerable Social Groups                     |                                                                                                                                                               |                                                                                                                                                                                                                                                                                                                                                        |                      |                |                                  |
| During construction                                       |   |                                              |                                                                                                                                                               |                                                                                                                                                                                                                                                                                                                                                        |                      |                |                                  |
| Pollution Control                                         | 5 | Air quality                                  | <ul style="list-style-type: none"><li>Emission and dust from trucks and heavy machinery</li><li>Open burning of waste</li></ul>                               | <ul style="list-style-type: none"><li>Install screens or other measures to prevent dust at the boundaries of the construction area as needed.</li><li>Checking the cover of the transport truck.</li><li>Waste collection by licensed waste collection companies.</li></ul>                                                                            | Construction company | LWSC           | About 5,000 USD / year           |
|                                                           | 6 | Water quality                                | <ul style="list-style-type: none"><li>Water pollution at construction sites</li></ul>                                                                         | <ul style="list-style-type: none"><li>Install an appropriate number of temporary toilets and septic tanks at the construction site.</li></ul>                                                                                                                                                                                                          | Construction company | LWSC           | About 5,000 USD / year           |
|                                                           | 7 | Waste Management                             | <ul style="list-style-type: none"><li>Generation of construction waste and household waste</li></ul>                                                          | <ul style="list-style-type: none"><li>Reuse of construction waste and other materials, and proper disposal in accordance with regulations.</li><li>Proper disposal and treatment of general waste at construction camps.</li><li>Human waste should be stored in temporary tanks and then transported to designated sewage treatment plants.</li></ul> | Construction company | LWSC           | About 4,000 USD / year           |
|                                                           | 8 | Noise and vibration                          | <ul style="list-style-type: none"><li>Noise and vibration from pile driving and excavation work.</li><li>Noise and vibration caused by the movement</li></ul> | <ul style="list-style-type: none"><li>Use of low-noise construction machinery and limiting of construction hours.</li><li>Install sound barriers (sheet piles or soundproofing sheets) as needed.</li><li>Provision of personal protective equipment such as earplugs to construction workers.</li></ul>                                               | Construction company | LWSC           | About 8,000 USD / year           |

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| Category           | #  | Item                                                                                      | Anticipated Impact                                                                                                                                                                                                                                      | Mitigation Measures / Other Measures                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | Implementation       | Responsibility | Cost Estimate (USD)    |
|--------------------|----|-------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------|----------------|------------------------|
|                    |    |                                                                                           | of transport trucks and heavy machinery.                                                                                                                                                                                                                |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                      |                |                        |
| Social Environment | 9  | Land Acquisition / Resettlement of Residents                                              | <ul style="list-style-type: none"> <li>Temporary removal of sign posts, lawns, curbs, etc. due to underground water pipe construction.</li> </ul>                                                                                                       | <ul style="list-style-type: none"> <li>Prompt restoration work to the original condition of sign posts, lawns, curbs, etc.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | LWSC                 | LWSC           | Approx. 17,000 USD     |
|                    | 10 | Working Conditions, and Accidents                                                         | <ul style="list-style-type: none"> <li>Contact with transport trucks, heavy machinery, etc.</li> </ul>                                                                                                                                                  | <ul style="list-style-type: none"> <li>Provision of personal protective equipment such as helmets, safety shoes, and fluorescent jackets to construction workers.</li> <li>Implementation of occupational safety training</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | Construction company | LWSC           | About 2,000 USD / year |
|                    | 11 | Health, Safety and Security of Local Communities, incl. infectious disease, i.e. HIV/AIDS | <ul style="list-style-type: none"> <li>Passing of construction vehicles</li> <li>Movement of heavy machinery within the construction area</li> <li>Spread of infectious diseases such as HIV/AIDS due to the influx of construction workers.</li> </ul> | <ul style="list-style-type: none"> <li>Provision of personal protective equipment such as fluorescent jackets to the construction workers.</li> <li>Deployment of traffic controllers and installing safety-related signs</li> <li>Restriction of access to the construction area through signs, barriers, etc.</li> <li>Installation of nighttime lighting in the construction area and establishment of waiting areas and parking lots for construction vehicles</li> <li>Speed restrictions for construction-related vehicles</li> <li>Safety training for construction workers</li> <li>Establishment of safe detours for nearby residents and commuters during construction</li> <li>Education and awareness-raising activities for workers regarding infectious disease control</li> </ul> | Construction company | LWSC           | About 5,000 USD / year |
| Operational Phase  |    |                                                                                           |                                                                                                                                                                                                                                                         |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                      |                |                        |
| Pollution Control  | 12 | Water Quality                                                                             | <ul style="list-style-type: none"> <li>Water quality at each facility</li> </ul>                                                                                                                                                                        | <ul style="list-style-type: none"> <li>Each facility is equipped with wastewater treatment facilities such as septic tanks to properly treat wastewater.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | LWSC                 | LWSC           | About 5,000 USD / year |
|                    | 13 | Noise and vibration                                                                       | <ul style="list-style-type: none"> <li>Noise and vibration from the pump equipment within the facility.</li> </ul>                                                                                                                                      | <ul style="list-style-type: none"> <li>Installation of sound barriers (sheet piles or soundproofing sheets) as needed.</li> <li>Provision of personal protective equipment such as earplugs to construction workers.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | LWSC                 | LWSC           | About 8,000 USD / year |

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Table 31: Environmental Social Monitoring Program for Pre-Construction Phase

| # | Environmental Social Item                    | Mitigation and other measures                                                     | Monitoring items                                       | Standards | Location                                | Implementation | Duration / Frequency             | Estimated costs     |
|---|----------------------------------------------|-----------------------------------------------------------------------------------|--------------------------------------------------------|-----------|-----------------------------------------|----------------|----------------------------------|---------------------|
| 1 | Biodiversity and Ecosystems                  | Confirmation of obtaining permits for tree felling                                | Issued permit                                          | None      | Project sites                           | LWSC           | Once before construction begins. | See Table 30 above. |
| 2 | Land Acquisition / Resettlement of Residents | Confirmation of land acquisition and payment to the landowners                    | Receipt from the landowners                            | None      | Production wells and water supply areas | LWSC           | Once before construction begins. | See Table 30 above. |
| 3 | Living and Livelihood                        | Confirmation of compensation payments to informal land occupants (street vendors) | Receipts from informal land occupants (street vendors) | None      | Project sites                           | LWSC           | Once before construction begins. | See Table 30 above. |
| 4 | Vulnerable Social Groups                     |                                                                                   |                                                        |           |                                         |                |                                  |                     |

Table 32: Environmental Social Monitoring Program for Construction Phase

| # | Environmental Social Item | Mitigation and other measures                                                                                                                                                                                                                                                       | Monitoring items                                                                                                                                                                                                                                                                              | Standards                           | Location                                                                                                                                   | Implementation       | Duration / Frequency                    | Estimated costs                                        |
|---|---------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------|----------------------|-----------------------------------------|--------------------------------------------------------|
| 5 | Air quality               | 1. Install screens or other measures to prevent dust at the construction area boundary as needed.<br>2. Check the covers on transport trucks.<br>3. Waste collection by licensed waste collection companies.<br>4. Air quality monitoring (see the five items listed on the right). | 1. Whether it is installed or not.<br>2. Whether it has a cover or not.<br>3. Contractor's license and collection/transportation records<br>4. NO <sub>2</sub> (1-hour), SO <sub>2</sub> (10-minute), PM <sub>2.5</sub> (24-hour), PM <sub>10</sub> (24-hour), and CO (15-minute measurement) | 1-3: None<br>4: WHO Guidelines 2022 | 1: Construction area boundary<br>2 and 3: Project sites<br>4: Two locations in total (One at production well and one at water supply area) | Construction company | Once every quarter during construction. | 1-3: See Table 30 above.<br>4: About 12,000 USD / year |
| 6 | Water quality             | 1. Install an appropriate number of temporary toilets and septic tanks at the construction site.                                                                                                                                                                                    | 1. Whether it is installed or not.<br>2. pH, EC, TDS, turbidity, color, odor, taste, Calcium, Magnesium, Sodium, Sulphate, Chloride,                                                                                                                                                          | 1. None<br>2. Zambian               | Construction area                                                                                                                          | Same as above        | Same as above                           | 1: See Table 30 above.<br>2: About 5,000 USD / year    |

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| #  | Environmental Social Item                    | Mitigation and other measures                                                                                                                                                                                                                                                       | Monitoring items                                                                                                                                                                                                    | Standards                           | Location                                                                                                             | Implementation | Duration / Frequency | Estimated costs                                       |
|----|----------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------|----------------------------------------------------------------------------------------------------------------------|----------------|----------------------|-------------------------------------------------------|
|    |                                              | 2. Water quality monitoring (28 items listed on the right)                                                                                                                                                                                                                          | Total Hardness (as CaCO <sub>3</sub> ), Nitrate, Nitrite, Fluoride, Arsenic, Lead, Cadmium, Total Chromium, Mercury, Iron, Manganese, Copper, Zinc, Selenium, Total Coliforms, <i>E. coli</i>                       | Standards 190: 2024                 |                                                                                                                      |                |                      |                                                       |
| 7  | Waste                                        | 1. Reuse and proper disposal of construction waste, etc., in accordance with regulations.<br>2. Proper disposal and treatment of general waste at construction camps.<br>3. Human waste is stored in temporary tanks and transported to designated sewage treatment plants, etc.    | 1, 2, and 3: Contractor's license and collection/transportation records etc.                                                                                                                                        | None                                | Project sites                                                                                                        | Same as above  | Same as above        | See Table 30 above.                                   |
| 8  | Noise and Vibration                          | 1. Use of low-noise construction machinery and limiting of construction hours<br>2. Installation of sound barriers (sheet piles or soundproofing sheets) as needed<br>3. Provision of personal protective equipment such as earplugs to construction workers<br>4. Noise monitoring | 1. Specifications of construction machinery and construction time records for<br>2. Whether it was installed or not.<br>3. Records of actual provision<br>4. Measurement results of noise (dBA: A-weighted decibel) | 1-3: None<br>4: WHO Guidelines 1999 | 1, 2, and 3.<br>Construction area<br>4: Two locations in total (One at production well and one at water supply area) | Same as above  | Same as above        | 1-3: See Table 30 above.<br>4: About 8,000 USD / year |
| 9  | Land Acquisition / Resettlement of Residents | Prompt restoration work will be carried out on sign posts, lawns, curbs, etc.                                                                                                                                                                                                       | On-site inspection documents (photographs, etc.) about the completion of restoration work.                                                                                                                          | None                                | Construction area                                                                                                    | Same as above  | Same as above        | See Table 30 above.                                   |
| 10 | Working Conditions, and Accidents            | 1. Provision of personal protective equipment such as helmets, safety shoes, and fluorescent jackets to construction workers.<br>2. Implementation of occupational safety training.                                                                                                 | 1. Record of actual provision of personal protective equipment.<br>2. Record of training implementation.                                                                                                            | None                                | Construction area                                                                                                    | Same as above  | Same as above        | See Table 30 above.                                   |

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| #  | Environmental Social Item                                                                                      | Mitigation and other measures                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | Monitoring items                                                                                                                                                                                                                                        | Standards | Location          | Implementation | Duration / Frequency | Estimated costs     |
|----|----------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------|-------------------|----------------|----------------------|---------------------|
| 11 | Health,<br>Safety and<br>Security of<br>Local<br>Communities,<br>incl. infectious<br>disease, i.e.<br>HIV/AIDS | 1. Provision of personal protective equipment such as fluorescent jackets to construction workers.<br>2. Deployment of traffic controllers and installation of safety-related signs.<br>3. Restriction of entry into construction areas through the installation of signs, barriers, etc.<br>4. Installation of nighttime lighting in construction areas and establishment of waiting areas and parking lots for construction vehicles<br>5. Speed restrictions for construction-related vehicles<br>6. Implementation of safety training for construction workers<br>7. Establishment of safe detours for nearby residents and commuters during construction<br>8. Implementation of education and awareness-raising activities for workers regarding infectious disease control | 1: Record of actual provision<br>2-4: On-site inspection records (photos, etc.)<br>5. Materials related to speed restrictions<br>6. Training implementation record<br>7. On-site inspection records (photos, etc.)<br>8. Training implementation record | None      | Construction area | Same as above  | Same as above        | See Table 30 above. |

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Table 33: Environmental Social Monitoring Program for Post-Construction Phase

| No | Environmental Social Item | Mitigation and other measures                                                                                                                                                                      | Monitoring items                                                                                                                                                                                                                                                                                                                   | Standards                                 | Location                                                                     | Implementation | Duration / Frequency              | Estimated costs                                       |
|----|---------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------|------------------------------------------------------------------------------|----------------|-----------------------------------|-------------------------------------------------------|
| 12 | Water Quality             | 1. Install wastewater treatment facilities such as septic tanks at each facility to properly treat wastewater.<br>2. Water quality monitoring (28 parameters listed on the right)                  | 1. Whether it is installed or not.<br>2. pH, EC, TDS, turbidity, color, odor, taste, Calcium, Magnesium, Sodium, Sulphate, Chloride, Total Hardness (as CaCO <sub>3</sub> ), Nitrate, Nitrite, Fluoride, Arsenic, Lead, Cadmium, Total Chromium, Mercury, Iron, Manganese, Copper, Zinc, Selenium, Total Coliforms, <i>E. coli</i> | 1. None<br>2. Zambian Standards 190: 2024 | Two locations in total at project sites                                      | LWSC           | Once per quarter for three years. | 1: See Table 30 above.<br>2: About 5,000 USD / year   |
| 13 | Noise and vibration       | 1. Installation of sound barriers (sheet piles or soundproofing sheets) as needed<br>2. Provision of personal protective equipment such as earplugs to construction workers<br>3. Noise monitoring | 1: Whether it is installed or not.<br>2: Record of actual provision<br>3: Measurement results of noise (dBA: A-weighted decibel)                                                                                                                                                                                                   | 1-2: None<br>3: WHO Guidelines 1999       | Two locations in total (One at production well and one at water supply area) | LWSC           | Once per quarter for three years. | 1-2: See Table 30 above.<br>3: About 8,000 USD / year |

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Table 34: Environmental and Social Monitoring Plan (ESMP)

| Aspects                                | Impacts                                       | Objective                                                        | Mitigation Measures/Enhancement Measure                                                                                                                                                                                                                                          | Responsible Person                  | Performance Indicator                                                                                                            | Means of Verification                                                                                 | Frequency of Monitoring | Time frame                       | Cost USD                             |
|----------------------------------------|-----------------------------------------------|------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------|----------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------|-------------------------|----------------------------------|--------------------------------------|
| <b>Positive Impacts of the Project</b> |                                               |                                                                  |                                                                                                                                                                                                                                                                                  |                                     |                                                                                                                                  |                                                                                                       |                         |                                  |                                      |
| Construction and operation activities  | Employment creation and income generation     | To maximise local employment opportunities and economic benefits | Priority will be given to local employment where feasible. Contractors will implement fair recruitment practices and promote equal employment opportunities, including participation of women and vulnerable groups. Local procurement of goods and services will be encouraged. | Project Manager / Contractor / LWSC | <ul style="list-style-type: none"> <li>• % of local employees engaged</li> <li>• % of women employed</li> </ul>                  | <ul style="list-style-type: none"> <li>• Employment records</li> <li>• Contractor reports</li> </ul>  | Monthly                 | Construction and Operation Phase | 12,000                               |
| Construction activities                | Growth of local businesses and service demand | To stimulate local economic activity                             | Procurement of construction materials and services will, where feasible, prioritise local suppliers, transporters, traders, and service providers.                                                                                                                               | Project Manager / Contractor / LWSC | <ul style="list-style-type: none"> <li>• Number of local suppliers engaged</li> <li>• Value of local procurement</li> </ul>      | <ul style="list-style-type: none"> <li>• Procurement records</li> <li>• Supplier contracts</li> </ul> | Quarterly               | Construction Phase               | Included in procurement budget       |
| Construction and operation activities  | Skills transfer and capacity building         | To strengthen local technical capacity                           | On-the-job training, mentoring, and skills transfer programs will be implemented for local workers involved in pipeline installation, welding, mechanical works, and site supervision.                                                                                           | Project Manager / Contractor / LWSC | <ul style="list-style-type: none"> <li>• Number of trained personnel</li> <li>• Number of training sessions conducted</li> </ul> | <ul style="list-style-type: none"> <li>• Training records</li> <li>• Attendance registers</li> </ul>  | Monthly                 | Project Lifecycle                | 17,500                               |
| Construction and operation activities  | Contribution to public revenue                | To contribute to economic growth and public revenue generation   | The developer and contractors will ensure compliance with all statutory tax obligations, labour contributions, and licensing requirements.                                                                                                                                       | Project Manager / LWSC              | <ul style="list-style-type: none"> <li>• Statutory contributions made</li> <li>• Taxes paid</li> </ul>                           | <ul style="list-style-type: none"> <li>• Payment receipts</li> <li>• Tax records</li> </ul>           | Quarterly               | Project Lifecycle                | Included under statutory obligations |

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| Aspects                                         | Impacts                            | Objective                                           | Mitigation Measures/Enhancement Measure                                                                                                                                                                       | Responsible Person           | Performance Indicator                                                                                                | Means of Verification                                                                                       | Frequency of Monitoring | Time frame         | Cost USD                                          |
|-------------------------------------------------|------------------------------------|-----------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------|----------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------|-------------------------|--------------------|---------------------------------------------------|
| Operation of water supply infrastructure        | Improved water supply reliability  | To improve access to reliable water supply services | Preventive maintenance programs will be implemented for pipelines, pumps, boreholes, reservoirs, and associated infrastructure to ensure continuous and reliable water supply.                                | LWSC / Operations Manager    | <ul style="list-style-type: none"> <li>Number of service interruptions</li> <li>Downtime records</li> </ul>          | <ul style="list-style-type: none"> <li>Maintenance logs</li> <li>Incident reports</li> </ul>                | Monthly                 | Operation Phase    | Included in Operations & Maintenance (O&M) budget |
| <b>Negative Impacts Biophysical Environment</b> |                                    |                                                     |                                                                                                                                                                                                               |                              |                                                                                                                      |                                                                                                             |                         |                    |                                                   |
| Vegetation clearance and earthworks             | Disturbance to flora and fauna     | To minimise ecological disturbance                  | Vegetation clearance will be restricted to approved work areas only. Topsoil will be stockpiled for reinstatement and disturbed areas progressively rehabilitated using indigenous vegetation where feasible. | Project Manager / Contractor | <ul style="list-style-type: none"> <li>Area cleared</li> <li>Area rehabilitated</li> </ul>                           | <ul style="list-style-type: none"> <li>Site inspections</li> <li>Rehabilitation records</li> </ul>          | Weekly                  | Construction Phase | 2,500                                             |
| Earthworks and trench excavation                | Soil erosion and land degradation  | To prevent erosion and land instability             | Excavation works will be undertaken in phases; trenches will be promptly backfilled and compacted. Erosion control measures such as silt fences and diversion channels will be installed where necessary.     | Project Manager / Contractor | <ul style="list-style-type: none"> <li>Number of erosion incidents</li> <li>Condition of reinstated areas</li> </ul> | <ul style="list-style-type: none"> <li>Site inspections</li> <li>Monitoring reports</li> </ul>              | Weekly                  | Construction Phase | Included under earthworks budget                  |
| Construction activities and vehicle movement    | Dust and air quality deterioration | To minimise dust and exhaust emissions              | Exposed surfaces will be watered regularly; trucks carrying loose materials will be covered; vehicles and machinery will be maintained; speed limits will be enforced within work areas.                      | Project Manager / Contractor | <ul style="list-style-type: none"> <li>Number of dust complaints</li> <li>Air quality exceedances</li> </ul>         | <ul style="list-style-type: none"> <li>Monitoring reports</li> <li>Community complaints register</li> </ul> | Weekly                  | Construction Phase | 6,250                                             |

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| Aspects                               | Impacts                     | Objective                                                     | Mitigation Measures/Enhancement Measure                                                                                                                                                                   | Responsible Person           | Performance Indicator                                                                                           | Means of Verification                                                                                            | Frequency of Monitoring | Time frame         | Cost USD               |
|---------------------------------------|-----------------------------|---------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------|-----------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------|-------------------------|--------------------|------------------------|
| Operation of generators and equipment | Air emissions               | To minimise operational air pollution                         | Generators and equipment will be regularly maintained to ensure efficient operation and reduced emissions.                                                                                                | Maintenance Engineer         | <ul style="list-style-type: none"> <li>• Equipment maintenance status</li> <li>• Emission complaints</li> </ul> | <ul style="list-style-type: none"> <li>• Maintenance logs</li> </ul>                                             | Quarterly               | Operation Phase    | Included in O&M budget |
| Construction works                    | Noise and vibration impacts | To minimise noise nuisance                                    | Noisy activities will be limited to daytime hours where feasible. Equipment will be properly maintained and fitted with silencers where applicable.                                                       | Project Manager / Contractor | <ul style="list-style-type: none"> <li>• Number of complaints</li> <li>• Noise exceedances</li> </ul>           | <ul style="list-style-type: none"> <li>• Noise monitoring records</li> <li>• Complaints register</li> </ul>      | Weekly                  | Construction Phase | 10,000                 |
| Operation of pumps and equipment      | Operational noise           | To minimise operational noise disturbance                     | Pumps and mechanical equipment will be routinely maintained and noise control measures implemented where necessary.                                                                                       | Operations Manager           | <ul style="list-style-type: none"> <li>• Number of complaints</li> </ul>                                        | <ul style="list-style-type: none"> <li>• Inspection records</li> </ul>                                           | Quarterly               | Operation Phase    | Included in O&M budget |
| Construction activities               | Water contamination         | To prevent contamination of surface and groundwater resources | Refuelling and equipment maintenance will be undertaken in designated areas. Spill response materials will be available on-site. Portable sanitation facilities will be provided for workers.             | Project Manager / Contractor | <ul style="list-style-type: none"> <li>• Spill incidents</li> <li>• Water quality compliance</li> </ul>         | <ul style="list-style-type: none"> <li>• Site inspections</li> <li>• Water quality monitoring reports</li> </ul> | Weekly                  | Construction Phase | 6,250                  |
| Operation of water infrastructure     | Water contamination         | To prevent leaks and contamination                            | Pipelines, reservoirs, and associated infrastructure will be routinely inspected and maintained to prevent leakages and contamination risks. Adequate sanitation facilities will be provided for workers. | LWSC / Operations Manager    | <ul style="list-style-type: none"> <li>• Leak incidents</li> <li>• Water quality compliance</li> </ul>          | <ul style="list-style-type: none"> <li>• Maintenance records</li> <li>• Monitoring reports</li> </ul>            | Monthly                 | Operation Phase    | 6,250                  |

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| Aspects                                            | Impacts                       | Objective                                      | Mitigation Measures/Enhancement Measure                                                                                                                                                                            | Responsible Person           | Performance Indicator                                                                                    | Means of Verification                                                                              | Frequency of Monitoring | Time frame                 | Cost USD                                       |
|----------------------------------------------------|-------------------------------|------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------|----------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------|-------------------------|----------------------------|------------------------------------------------|
| Construction and maintenance activities            | Soil contamination            | To prevent soil pollution                      | Fuels, oils, and chemicals will be stored in designated bunded areas. Machinery will be regularly inspected for leaks and spill response procedures implemented.                                                   | Project Manager / Contractor | <ul style="list-style-type: none"> <li>Number of spills</li> <li>Soil contamination incidents</li> </ul> | <ul style="list-style-type: none"> <li>Inspection reports</li> <li>Incident records</li> </ul>     | Weekly                  | Construction Phase         | Included under environmental management budget |
| Waste generation                                   | Waste generation and nuisance | To ensure proper waste management              | Waste will be segregated, stored, transported, and disposed of through approved waste management systems. Hazardous waste will be handled by licensed contractors.                                                 | Project Manager / Contractor | <ul style="list-style-type: none"> <li>Waste volumes generated</li> <li>Number of complaints</li> </ul>  | <ul style="list-style-type: none"> <li>Waste transfer records</li> <li>Site inspections</li> </ul> | Weekly                  | Construction Phase         | 5,000                                          |
|                                                    | Operational waste generation  | To maintain clean operational facilities       | Operational waste will be collected and disposed of in accordance with approved procedures and good housekeeping practices maintained.                                                                             | Operations Manager           | <ul style="list-style-type: none"> <li>Site cleanliness</li> <li>Waste complaints</li> </ul>             | <ul style="list-style-type: none"> <li>Inspection reports</li> </ul>                               | Quarterly               | Operation Phase            | Included under O&M budget                      |
| Construction activities                            | Visual impacts                | To maintain visual quality of the project area | Construction materials will be stored neatly and disturbed areas reinstated progressively. Good housekeeping practices will be maintained at all times.                                                            | Project Manager / Contractor | <ul style="list-style-type: none"> <li>Site condition</li> <li>Number of complaints</li> </ul>           | <ul style="list-style-type: none"> <li>Site inspections</li> </ul>                                 | Weekly                  | Construction Phase         | Included under rehabilitation budget           |
| Routine maintenance of water supply infrastructure |                               |                                                | Infrastructure will be maintained; landscaping around reservoirs and pump houses will be established and trimmed; vegetation will be managed to maintain orderly surroundings; good housekeeping will be enforced. | Project Manager              | <ul style="list-style-type: none"> <li>Maintained infrastructure</li> </ul>                              | <ul style="list-style-type: none"> <li>Inspections</li> </ul>                                      | Quarterly               | Operation phase (50 years) | 15,000<br>(landscaping upkeep only)            |

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| Aspects                                      | Impacts                                              | Objective                                         | Mitigation Measures/Enhancement Measure                                                                                                                                                           | Responsible Person                  | Performance Indicator                                                                                         | Means of Verification                                                                                  | Frequency of Monitoring | Time frame                       | Cost USD                  |
|----------------------------------------------|------------------------------------------------------|---------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------|---------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------|-------------------------|----------------------------------|---------------------------|
| Negative Socio-economic and Cultural Impacts |                                                      |                                                   |                                                                                                                                                                                                   |                                     |                                                                                                               |                                                                                                        |                         |                                  |                           |
| Workforce presence and labour influx         | Increased risk of HIV/AIDS and communicable diseases | To minimise disease transmission risks            | HIV/AIDS and communicable disease awareness programs will be conducted regularly. Condoms and awareness materials will be provided where feasible in collaboration with local health authorities. | Project Manager / Contractor / DACA | <ul style="list-style-type: none"> <li>• Number of awareness sessions</li> <li>• Attendance levels</li> </ul> | <ul style="list-style-type: none"> <li>• Training records</li> <li>• Toolbox talk registers</li> </ul> | Monthly                 | Construction and Operation Phase | 5,000                     |
| Construction activities                      | Occupational health and safety risks                 | To prevent injuries and accidents                 | Contractors will implement approved OHS Plans. Workers will receive induction training and PPE. Excavations and work areas will be barricaded and emergency response procedures implemented.      | Project Manager / Contractor        | <ul style="list-style-type: none"> <li>• Number of incidents</li> <li>• PPE compliance levels</li> </ul>      | <ul style="list-style-type: none"> <li>• HSE reports</li> <li>• Inspection records</li> </ul>          | Daily / Monthly         | Construction Phase               | 15,000                    |
| Operation of water supply infrastructure     | Occupational health and safety risks                 | To maintain safe operational conditions           | Routine inspections, preventive maintenance, worker training, and emergency preparedness procedures will be implemented throughout operation.                                                     | Operations Manager                  | <ul style="list-style-type: none"> <li>• Number of incidents</li> <li>• Inspection findings</li> </ul>        | <ul style="list-style-type: none"> <li>• OHS reports</li> </ul>                                        | Monthly                 | Operation Phase                  | Included under O&M budget |
| Construction activities                      | Public health and safety risks                       | To protect surrounding communities and road users | Construction areas will be barricaded and signposted. Traffic marshals and warning signage will be provided. Community sensitization will be undertaken before major works commence.              | Project Manager / Contractor        | <ul style="list-style-type: none"> <li>• Number of incidents</li> <li>• Number of complaints</li> </ul>       | <ul style="list-style-type: none"> <li>• Incident reports</li> <li>• Inspection records</li> </ul>     | Weekly                  | Construction Phase               | 7,500                     |

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| Aspects                                            | Impacts                                                      | Objective                                             | Mitigation Measures/Enhancement Measure                                                                                                                                                                                                                                                                                                                                              | Responsible Person                  | Performance Indicator                                                                                                                          | Means of Verification                                                                                                                         | Frequency of Monitoring | Time frame         | Cost USD                  |
|----------------------------------------------------|--------------------------------------------------------------|-------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------|-------------------------|--------------------|---------------------------|
| Construction traffic and trenching works           | Traffic disruption and restricted access                     | To maintain safe movement and access                  | A Traffic Management Plan will be implemented. Temporary diversions, warning signage, traffic marshals, and phased construction scheduling will be used to maintain safe access to businesses, residences, schools, churches, and health facilities.                                                                                                                                 | Project Manager / Contractor / RDA  | <ul style="list-style-type: none"> <li>• Traffic incidents</li> <li>• Access complaints</li> </ul>                                             | <ul style="list-style-type: none"> <li>• Traffic reports</li> <li>• Inspection records</li> </ul>                                             | Weekly                  | Construction Phase | 12,500                    |
| Maintenance works                                  | Traffic and road safety risks                                | To maintain road safety during maintenance activities | Maintenance works will be properly signposted and undertaken in accordance with approved traffic management procedures.                                                                                                                                                                                                                                                              | Operations Manager                  | <ul style="list-style-type: none"> <li>• Traffic incidents</li> </ul>                                                                          | <ul style="list-style-type: none"> <li>• Inspection reports</li> </ul>                                                                        | Quarterly               | Operation Phase    | Included under O&M budget |
| Construction activities along Mumbwa Road corridor | Disturbance to informal traders, businesses, and livelihoods | To minimise socio-economic disruption                 | Affected traders and businesses will be identified prior to construction. Advance notice will be provided regarding construction schedules and temporary disruptions. Access to businesses and institutions will be maintained where feasible, and disturbed surfaces and signposts reinstated after works. A grievance redress mechanism will be implemented to address complaints. | Project Manager / Contractor / LWSC | <ul style="list-style-type: none"> <li>• Number of grievances</li> <li>• Number of businesses restored</li> <li>• Access maintained</li> </ul> | <ul style="list-style-type: none"> <li>• Stakeholder engagement records</li> <li>• Complaints register</li> <li>• Site inspections</li> </ul> | Weekly                  | Construction Phase | 20,000                    |

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| Aspects                                                    | Impacts                                                 | Objective                                                     | Mitigation Measures/Enhancement Measure                                                                                                                                                                                                 | Responsible Person           | Performance Indicator                                                                                                         | Means of Verification                                                                                      | Frequency of Monitoring | Time frame         | Cost USD                                 |
|------------------------------------------------------------|---------------------------------------------------------|---------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------|-------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------|-------------------------|--------------------|------------------------------------------|
| Construction activities near utilities and institutions    | Damage to infrastructure and utilities                  | To prevent disruption to existing services and infrastructure | Existing utilities will be identified prior to excavation. Controlled excavation methods will be used near sensitive infrastructure. Damaged services and property features will be reinstated promptly.                                | Project Manager / Contractor | <ul style="list-style-type: none"> <li>• Utility damage incidents</li> <li>• Restoration completed</li> </ul>                 | <ul style="list-style-type: none"> <li>• Inspection reports</li> <li>• Utility provider records</li> </ul> | Weekly                  | Construction Phase | Included under construction contract     |
| Construction works near hospitals and sensitive facilities | Restricted access to health facilities and institutions | To ensure uninterrupted access to critical facilities         | Temporary access arrangements, steel plate crossings, traffic marshals, and phased construction scheduling will be implemented to maintain uninterrupted access to hospitals, schools, service stations, and other critical facilities. | Project Manager / Contractor | <ul style="list-style-type: none"> <li>• Number of blocked access incidents</li> <li>• Emergency access maintained</li> </ul> | <ul style="list-style-type: none"> <li>• Site inspections</li> <li>• Stakeholder feedback</li> </ul>       | Daily / Weekly          | Construction Phase | Included under traffic management budget |
| Construction activities                                    | Chance finds of cultural heritage resources             | To protect archaeological and cultural resources              | In the event of any chance finds, works will cease immediately and the National Heritage Conservation Commission (NHCC) will be notified for guidance.                                                                                  | Project Manager / Contractor | <ul style="list-style-type: none"> <li>• Number of chance finds reported</li> </ul>                                           | <ul style="list-style-type: none"> <li>• Incident records</li> </ul>                                       | As required             | Construction Phase | 2,500                                    |
| Construction and operation activities                      | Site restoration and reinstatement                      | To restore disturbed areas and infrastructure                 | Disturbed roads, pavements, access points, drainage structures, and landscaped areas will be reinstated following completion of works.                                                                                                  | Project Manager / Contractor | <ul style="list-style-type: none"> <li>• % of disturbed areas restored</li> </ul>                                             | <ul style="list-style-type: none"> <li>• Inspection reports</li> </ul>                                     | Monthly                 | Project Lifecycle  | 40,000                                   |

## **8.0 DECOMMISSIONING AND REHABILITATION PLAN**

### **8.1 Introduction**

This decommissioning plan is prepared in accordance with the National Council of Construction (NCC). Decommissioning will be undertaken at the closing down of the proposed water supply improvement project for peri-urban areas of Lusaka City: Garden Park ward 10. The decommissioning activities will be undertaken by LWSC in collaboration with JICA.

The main objectives of decommissioning are to:

- Ensure safe closure of all facilities and infrastructure
- Prevent environmental pollution and public health risks
- Remove or repurpose infrastructure where feasible
- Restore the site to a stable and environmentally acceptable condition

The decommissioning activities will apply to the following project components:

a) Well Field Transmission Pump Station (Water Source)

- Raw water receiving tank
- Pump house and associated electrical systems
- Office building and guard house
- Transmission pipelines
- Septic tank and sanitation system
- Parking area and perimeter wall

b) Garden Park Distribution Reservoir Station (Termination Point)

- Elevated storage tanks
- Administration building and flowmeter room
- Transmission and distribution pipelines
- Drainage and sanitation systems
- Parking and security infrastructure

In line with the National Council of Construction Act and ZEMA guidelines, the works will be undertaken as per the plan outlined below.

#### **8.1.1 Legislative Requirements**

The NCC is responsible for the administration, inspection and enforcement of legislation regarding decommissioning activities. The decommissioning and demolition of buildings has to be undertaken according to the stipulations of the NCC Act. Also, according to ZEMA, the developer is mandated to ensure compliance to environmental protection laws and guidelines. Also decommissioning will be done in line with the guidelines set by the Council.

### **8.1.2 Licensed Technical Personnel**

The knock down and demolition of the structures on site will be done under the supervision of an Engineering Institute of Zambia registered civil engineer.

### **8.1.3 Application for Permit**

Prior to undertaking the demolition activities, the relevant permits will be obtained by the company.

### **8.1.4 Demolition Safety Precautions**

Demolition of structures at the two sites will be done with the utmost caution. In case any site contamination is identified, it will be cleaned up by licensed environmental cleaning service providers. Furthermore, the contractor once on site will submit a safety plan to ensure procedures are followed to prevent injury to personnel and the environment.

## **8.2 Impacts Arising from the Decommissioning Phase**

### **8.2.1 Loss of Access to Clean and Safe Water**

Decommissioning of the bulk water supply system will result in the discontinuation of water supply services to Garden Park and surrounding peri-urban areas. This may significantly affect households, institutions, and small businesses that depend on the system for reliable access to clean and safe water.

### **8.2.2 Environmental Visual impact**

The decommissioning of the bulk water supply system may temporarily affect the visual quality of the surrounding environment. Removal of above-ground infrastructure such as elevated tanks, pump houses, office buildings, guardhouses, fencing, and signage can create unsightly landscapes if not properly managed. Excavated areas, open trenches, and exposed soil along pipeline corridors can also contribute to visual disturbance, especially in peri-urban communities where people live or commute nearby.

### **8.2.3 Waste Management Impacts**

Decommissioning will generate various waste materials, which may pose environmental risks if not properly handled, but can be effectively managed through proper waste disposal practices.

## **8.3 Environmental Management Commitments**

### **8.3.1 Loss of Access to Clean and Safe Water**

To address the potential loss of access to clean and safe water during decommissioning, temporary water supply arrangements will be provided, including water tankers or alternative boreholes. The community will be informed in advance about service disruptions, access points, and schedules. Regular water quality monitoring will ensure safety, and hygiene awareness campaigns will reduce public health risks. Decommissioning activities will be planned to minimize the duration of water supply disruption, ensuring equitable access for households, institutions, and vulnerable groups.

### **8.3.2 Environmental Visual impact**

To minimize visual disturbance during the decommissioning of the bulk water supply system, all demolition debris, temporary structures, and construction waste will be promptly removed and properly disposed of, with recyclable materials recovered where possible. Excavated areas and removed infrastructure sites will be backfilled, re-contoured, and re-vegetated using local plant species to restore the natural landscape and blend with the surrounding environment. Work areas and machinery will be organized to reduce visual clutter, and periodic inspections will ensure that rehabilitation is completed effectively. These measures will restore the aesthetic quality of the project sites and minimize long-term visual impacts on the surrounding communities.

### **8.3.3 Waste Management Impacts**

During decommissioning, all waste materials generated, including concrete, metal, pipelines, electrical components, and other demolition debris, will be segregated, collected, and disposed of in accordance with national regulations and ZEMA guidelines. Recyclable and reusable materials will be recovered and directed to appropriate facilities, while hazardous materials such as oils, fuels, and chemicals will be handled safely and disposed of at licensed hazardous waste sites. Temporary storage areas for waste will be clearly designated and managed to prevent spillage or contamination of soil and water. Regular monitoring will ensure that waste management practices are properly implemented, minimizing environmental pollution and maintaining site safety throughout the decommissioning process.

## **8.4 Decommissioning Activities**

### **8.4.1 Pre-Decommissioning Planning**

A detailed decommissioning plan will be prepared in accordance with the requirements of ZEMA, ensuring that all environmental and regulatory standards are met. All necessary approvals and permits will be obtained prior to the commencement of decommissioning activities. Stakeholder engagement will be conducted with local communities and relevant authorities to ensure transparency, address concerns, and facilitate smooth implementation. Additionally, all materials to be removed during decommissioning will be carefully assessed to identify those that can be reused or recycled, minimizing waste and promoting sustainable resource management.

### **8.4.2 Site Preparation**

Prior to dismantling, all electrical systems and mechanical equipment will be safely disconnected to prevent accidents and ensure worker safety. Tanks, pipelines, and pump systems will be thoroughly drained and cleaned to remove any residual water or contaminants. Any remaining water and sludge will be carefully collected and disposed of in a safe and environmentally responsible manner, ensuring that no pollutants are released into the surrounding environment during the decommissioning process.

#### **8.4.3 Dismantling and Removal of Infrastructure**

During the decommissioning phase, concrete structures such as tanks, buildings, and foundations will be demolished where necessary, following safety and environmental guidelines. Pipelines will be removed where feasible; in cases where complete removal is impractical, they will be properly sealed and abandoned in place to prevent environmental risks. Mechanical and electrical equipment will be carefully dismantled, and all ancillary infrastructure, including fencing, gates, and other support structures, will be removed. These activities will be conducted in a controlled manner to minimize environmental disturbance and ensure site safety.

Where decommissioning activities result in temporary disruption to businesses or access to properties, advance notification, grievance redress, and restoration of affected areas, will be applied.

#### **8.4.4 Waste Management**

All waste generated during decommissioning will be carefully segregated into recyclable, reusable, and non-recyclable materials to promote resource recovery and minimize environmental impact. Construction debris will be safely disposed of at approved disposal sites in accordance with national regulations and environmental guidelines. Hazardous materials, including oils, fuels, and electrical components, will be handled with appropriate safety measures to prevent contamination of soil and water. Excavated areas will be properly backfilled using suitable materials and levelled to restore the site to a stable and safe condition.

#### **8.4.5 Site Rehabilitation**

Following the removal of infrastructure and backfilling of excavated areas, all disturbed sites will be re-contoured and levelled to restore the natural landform. Where necessary, topsoil will be replaced to support vegetation growth, and re-vegetation will be carried out using suitable local grass and plant species to reinstate the natural landscape. Measures will also be implemented to stabilize soils and prevent erosion, ensuring long-term environmental stability and minimizing the risk of land degradation.

### **8.5 Health and Safety**

All decommissioning activities will comply with national health and safety regulations. Measures will include:

- Provision of personal protective equipment (PPE) to all workers.
- Safe handling of equipment, materials, and hazardous substances.
- Training personnel on emergency procedures and safety practices.
- Implementation of a site-specific safety plan to prevent accidents and environmental harm.

Table 35: Decommissioning and Closure Phase

| Aspects                                                                                | Impacts                                       | Objective                                                  | Mitigation Measures/Enhancement Measure                                                                                                                                                                                                                                                                                                                                                       | Responsible Person | Performance Indicator                                                                                                                   | Means of Verification                                                                                                                                              | Frequency of Monitoring | Time frame             | Cost USD |
|----------------------------------------------------------------------------------------|-----------------------------------------------|------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------|-----------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------|------------------------|----------|
| Decommissioning of pipelines (in situ), pump stations, reservoirs and site restoration | Soil and groundwater contamination            | To prevent soil and groundwater contamination              | Pipelines will be isolated, drained, flushed, and sealed in situ; tanks, pumps, and pipelines will be cleaned before dismantling; wastes will be segregated and stored in designated areas; equipment will be maintained; refuelling and maintenance will be conducted offsite; sanitation facilities will be provided; spill prevention and emergency response measures will be implemented. | Project Manager    | <ul style="list-style-type: none"> <li>• Number of pollution incidents</li> <li>• Compliance with soil and water standards</li> </ul>   | <ul style="list-style-type: none"> <li>• Site inspections</li> <li>• Water quality test results</li> <li>• Soil test reports</li> </ul>                            | Weekly                  | 6 months               | 290,000  |
| Decommissioning planning and approvals                                                 | Delays in compliance and stakeholder concerns | To ensure regulatory compliance and stakeholder engagement | A detailed decommissioning plan will be prepared in line with ZEMA requirements; all relevant permits and approvals will be obtained; stakeholders will be consulted and informed in advance; opportunities for reuse and recycling of materials will be identified.                                                                                                                          | Project Manager    | <ul style="list-style-type: none"> <li>• Number of approvals obtained</li> <li>• Number of stakeholder engagements conducted</li> </ul> | <ul style="list-style-type: none"> <li>• Approved decommissioning plan</li> <li>• Stakeholder consultation records</li> <li>• Regulatory correspondence</li> </ul> | Monthly / Once          | Before decommissioning | Included |
| Limited excavation works (localized removal at exposed sections)                       | Air pollution (dust and emissions)            | To minimise air pollution                                  | Dust suppression through water spraying will be undertaken; speed limits will be enforced; exposed areas will be stabilised; machinery will be maintained to minimise exhaust emissions.                                                                                                                                                                                                      | Project Manager    | <ul style="list-style-type: none"> <li>• Number of exceedances</li> <li>• Number of complaints</li> </ul>                               | <ul style="list-style-type: none"> <li>• Air quality monitoring</li> <li>• Site inspections</li> </ul>                                                             | Weekly / As needed      | 6 months               | Included |

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| Aspects                                                      | Impacts                                          | Objective                                               | Mitigation Measures/Enhancement Measure                                                                                                                                                                                                                                                                                                                                                    | Responsible Person | Performance Indicator                                                                                                             | Means of Verification                                                                                                            | Frequency of Monitoring | Time frame | Cost USD |
|--------------------------------------------------------------|--------------------------------------------------|---------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------|-----------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------|-------------------------|------------|----------|
| Use of machinery and tools                                   | Noise pollution                                  | To minimise noise nuisance                              | Equipment and machinery will be regularly maintained; noisy activities will be restricted to daytime hours; workers will use appropriate PPE such as ear protection; operations will be controlled to minimise noise impacts.                                                                                                                                                              | Project Manager    | <ul style="list-style-type: none"> <li>• Number of exceedances</li> <li>• Number of complaints</li> </ul>                         | <ul style="list-style-type: none"> <li>• Noise monitoring records</li> <li>• Site inspections</li> </ul>                         | Weekly                  | 6 months   | Included |
| Dismantling of infrastructure and decommissioning activities | Environmental disturbance, injury, and accidents | To minimise environmental disturbance and ensure safety | Concrete structures will be demolished in a controlled manner; pipelines will be removed or sealed safely; fencing, gates, and ancillary infrastructure will be dismantled systematically; restricted access, barricades, and warning signage will be maintained; workers will be trained on emergency procedures and safe handling practices; PPE will be provided and used at all times. | Project Manager    | <ul style="list-style-type: none"> <li>• Number of incidents</li> <li>• PPE compliance</li> <li>• Number of complaints</li> </ul> | <ul style="list-style-type: none"> <li>• Safety audit reports</li> <li>• Incident records</li> <li>• Site inspections</li> </ul> | Weekly                  | 6 months   | Included |
| Decommissioning and repurposing activities                   | Waste generation and nuisance                    | To prevent waste nuisance and pollution                 | Waste will be segregated into recyclable, reusable, and non-recyclable categories; hazardous waste such as oils and lubricants will be handled by licensed contractors; reusable materials will be salvaged where practicable; debris will be disposed of at approved sites; good housekeeping practices will be maintained throughout decommissioning activities.                         | Project Manager    | <ul style="list-style-type: none"> <li>• Number of waste incidents</li> <li>• Site cleanliness</li> </ul>                         | <ul style="list-style-type: none"> <li>• Waste records</li> <li>• Site inspections</li> <li>• Waste audits</li> </ul>            | Weekly                  | 6 months   | Included |

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| Aspects                            | Impacts                                            | Objective                                                  | Mitigation Measures/Enhancement Measure                                                                                                                                                                                 | Responsible Person           | Performance Indicator                                                                                                    | Means of Verification                                                                               | Frequency of Monitoring | Time frame                      | Cost USD       |
|------------------------------------|----------------------------------------------------|------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------|--------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------|-------------------------|---------------------------------|----------------|
| Presence of workers                | Spread of HIV/AIDS and STIs                        | To reduce spread of diseases                               | HIV/AIDS and STI awareness programmes will be conducted; local employment will be prioritised where possible; worker commuting arrangements will be encouraged to minimise temporary settlement pressures.              | Project Manager              | <ul style="list-style-type: none"> <li>• Number of awareness sessions conducted</li> <li>• % local employment</li> </ul> | <ul style="list-style-type: none"> <li>• Training records</li> <li>• Employment register</li> </ul> | Monthly                 | 6 months                        | Included       |
| Movement of machinery and vehicles | Traffic and road safety risks                      | To ensure public safety                                    | A Traffic Management Plan will be implemented; warning signage and barricades will be installed; vehicle movement will be controlled; only trained and authorised drivers/operators will be engaged.                    | Project Manager              | <ul style="list-style-type: none"> <li>• Number of incidents</li> <li>• Driver compliance</li> </ul>                     | <ul style="list-style-type: none"> <li>• Traffic reports</li> <li>• Site inspections</li> </ul>     | Weekly                  | 6 months                        | Included       |
| Closure of project                 | Loss of employment                                 | To mitigate socio-economic impacts associated with closure | Advance notice of closure will be given to employees and stakeholders; skills training and redeployment support will be provided where possible; terminal benefits will be paid in accordance with labour requirements. | Project Manager / HR Manager | <ul style="list-style-type: none"> <li>• % employees compensated</li> <li>• Number trained</li> </ul>                    | <ul style="list-style-type: none"> <li>• HR records</li> <li>• Payment records</li> </ul>           | Once                    | 3 months before decommissioning | Training costs |
| Closure of project                 | Loss of public revenue and stakeholder uncertainty | To prepare stakeholders for project closure                | Relevant authorities and stakeholders will be notified in advance of closure; closure and transition plans will be communicated appropriately.                                                                          | Project Manager / HR Manager | <ul style="list-style-type: none"> <li>• Number of stakeholders notified</li> </ul>                                      | <ul style="list-style-type: none"> <li>• Official notices</li> <li>• Correspondence</li> </ul>      | Once                    | 3 months before decommissioning | Included       |

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| Aspects                                                | Impacts                                            | Objective                                       | Mitigation Measures/Enhancement Measure                                                                                                                                                                                                                                   | Responsible Person | Performance Indicator                                                                                                  | Means of Verification                                                                                          | Frequency of Monitoring | Time frame | Cost USD |
|--------------------------------------------------------|----------------------------------------------------|-------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------|------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------|-------------------------|------------|----------|
| Repurposing of reservoirs, tanks, and buildings        | Positive reuse and reduced environmental footprint | To promote sustainable reuse of infrastructure  | Reservoirs, tanks, and buildings will be assessed for alternative uses such as water storage, utility support, or industrial use; only unsafe or unusable structures will be dismantled; maintenance plans for retained infrastructure will be implemented.               | Project Engineer   | <ul style="list-style-type: none"> <li>• % infrastructure repurposed</li> <li>• Number of structures reused</li> </ul> | <ul style="list-style-type: none"> <li>• Repurposing plans</li> <li>• Inspection reports</li> </ul>            | Monthly                 | 6 months   | Included |
| Site restoration and rehabilitation                    | Visual, erosion, and landscape impacts             | To restore site condition and prevent erosion   | Disturbed areas will be regraded and levelled; topsoil will be replaced where necessary; revegetation using local grasses and plant species will be undertaken; soil stabilisation measures will be implemented; wayleave areas will be restored to acceptable condition. | Project Engineer   | <ul style="list-style-type: none"> <li>• % area rehabilitated</li> <li>• Number of complaints</li> </ul>               | <ul style="list-style-type: none"> <li>• Site inspections</li> <li>• Rehabilitation reports</li> </ul>         | Weekly                  | 6 months   | Included |
| Closure or interruption of water supply infrastructure | Loss of access to clean and safe water             | To minimise disruption to water supply services | Temporary water supply arrangements such as water tankers or boreholes will be provided where necessary; affected communities will be notified in advance; water quality monitoring and hygiene awareness programmes will be conducted to protect public health.          | Project Manager    | <ul style="list-style-type: none"> <li>• Number of supply interruptions</li> <li>• Number of complaints</li> </ul>     | <ul style="list-style-type: none"> <li>• Water supply records</li> <li>• Community feedback records</li> </ul> | Weekly / As needed      | 6 months   | Included |

## **9.0 CONCLUSION**

The proposed *Water Supply Improvement Project for Peri-Urban Areas of Lusaka City (Garden Park Ward 10)* is expected to deliver substantial social and economic benefits through improved access to safe and reliable potable water, enhanced public health conditions, and strengthened local livelihoods. Stakeholder engagement conducted during the assessment indicated strong community support, particularly in view of the anticipated improvements in water security and sanitation services.

The assessment identified a range of environmental and social impacts associated with the construction, operation, and decommissioning phases. These impacts are generally localized, short-term, and manageable through the implementation of the prescribed Environmental and Social Management Plan (ESMP), as well as compliance with national regulatory requirements and applicable international standards.

In conclusion, the project is considered environmentally acceptable and socially beneficial. With the effective implementation of mitigation and monitoring measures, the long-term positive outcomes of the project are expected to outweigh the identified adverse impacts, thereby supporting sustainable development objectives within the project area.

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## **11.0 DECLARATION OF AUTHENTICITY**

We trust the above provides a fair and accurate Executive Summary of the Environmental and Social Impact Statement for the Proposed Water Supply Improvement Project for Peri – Urban Areas of Lusaka City: Garden Park 10, Lusaka Province by Lusaka Water Supply and Sanitation Company Limited.

This document is presented to the Zambia Environmental Management Agency (ZEMA) for consideration for approval.

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Owen Micho  
Project Manager  
Lusaka Water Supply and Sanitation Company Limited

***To be signed in final report***

## **ANNEXES**

## ANNEX I: COMPANY DOCUMENTS

## ANNEX II: SATELLITE MAP AND SITE PHOTOS

### ANNEX III: SITE LAYOUT MAPS

## ANNEX IV: LAND DOCUMENTS

## ANNEX V: CURRICULUM VITAE OF EIA TEAM

## ANNEX VI: SPECIALISTS REPORTS

ANNEX VII: APPROVED TERMS OF REFERENCE AND SCOPING REPORT

## ANNEX VIII: SCOPING, TORs AND PUBLIC DISCLOSURE REPORTS

## ANNEX IX: TRAFFIC MANAGEMENT PLAN

## ANNEX X: GRIEVANCE REDRESS MECHANISM