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Environmental Assessment

ZAMBIA (DRI19ZM01)

Advisory review on the ESIA for the Mpulungu Port Development Project



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Advice of the Secretariat

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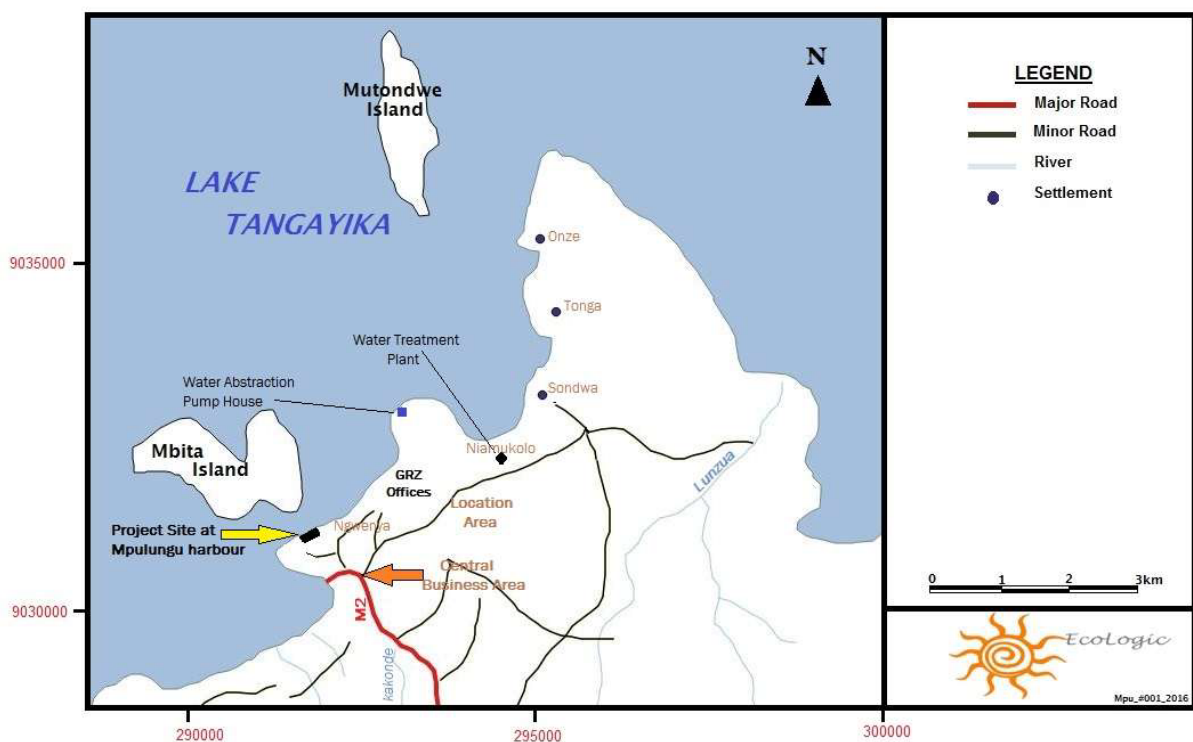
Acronyms

AfDB:	African Development Bank
CSO:	Civil Society Organisation
DMIW:	Department of Maritime and Inland Waterways
DRC:	Democratic Republic of Congo
IDC:	Industrial Development Corporation
EIS:	Environmental Impact Statement
ESIA:	Environmental and Social Impact Assessment
ESMP:	Environmental and Social Management Plan
ESMMP:	Environmental and Social Management and Monitoring Plan
ESMS:	Environmental and Social Management System
GoZ:	Government of Zambia
HIV/Aids:	Human immunodeficiency virus infection and acquired immune deficiency syndrome
IFC PS:	International Finance Corporation Performance Standards
LRP:	Livelihood Restoration Plan
MHCL:	Mpulungu Harbour Corporation Limited
NCEA:	Netherlands Commission of Environmental Assessment
NGO:	Non-Governmental Organisation
NHCC:	National Heritage Conservation Commission
RAP:	Resettlement Action Plan
RVO:	Netherlands Enterprise Agency
SEP:	Stakeholder Engagement Plan
STI:	Sexually Transmitted Infection
ToR:	Terms of Reference
WARMA:	Water Resources Management Authority
ZEMA:	Zambian Environmental Management Agency

1. Introduction

Mpulungu port lies at the southern shores of Lake Tanganyika in the Mpulungu Central Ward, which has 21,465 inhabitants. This is the only water-based port in Zambia with direct access to the neighboring countries of Tanzania, Democratic Republic of Congo (DRC) and Burundi. The port is currently operated by the Mpulungu Harbour Corporation Limited (MHCL), which falls under the Department of Maritime and Inland Waterways (DMIW) of the Ministry of Transport. In 2015 the Government of Zambia (GoZ) transferred its entire shareholding of the port to the Industrial Development Corporation (IDC)¹.

Map project location (Source: draft ESIA report)



The MHCL and IDC (from now on referred to as 'the proponent') are jointly developing a project to modernise and expand the current port. Through several interventions, they want to address the under-utilisation of the port's infrastructure, suboptimal port capacity and operational inefficiencies. With the proposed project, the port's capacity to handle cargo is expected to increase from 200,000 metric tonnes (mainly exports) to approximately 800,000 metric tonnes and its passenger capacity from 17,000 (reported in 2007–2008) passengers to 236,000 persons annually by 2030.

¹ IDC is a State-Owned Enterprise with the mandate to spearhead Zambian commercial investments that strengthen Zambia's industrial base and create jobs.

The expected activities include the following:

Construction of marine infrastructure and yard:

- Phase 1 – passenger quay and roll on – roll off (ro-ro) ramp
- Phase 2 – commercial quay and yard area
- Phase 3 – slipway

Construction of quay walls:

- Phase 1 – embankment
- Phase 2 – pile driving, waling and tie rods
- Phase 3 – backfill and embankment removal
- Phase 4 – beam capping, equipment and apron

Construction of buildings and recreational area:

- Administrative block
- Lodge
- Recreational area

Installation of navigation aids and lake water level recording system

Procurement of a rescue boat

Purchase of plant and equipment

- Mobile port crane
- Navigation aids
- Lake water level recording system

The project is currently in its development phase and several background studies have been carried out as part of the feasibility studies. This has resulted, among others, in a draft ESIA report (dated 29th of September 2016). The African Development Bank (AfDB) is currently reviewing the proposal and the draft ESIA to determine whether the project is eligible for funding under its broader '**Lake Tanganyika transport corridor development project**'². In July 2020 the Dutch Netherlands Enterprise (RVO) also received an application from the proponent for funds from the DRIVE facility. Based on an initial assessment, the RVO concluded that some improvements are still needed in relation to project development, before it can review the project's eligibility for DRIVE funding. By the 20th of December 2020, the RVO would like to have a clear overview of the improvements that are still necessary, including improvement to the draft ESIA. The proponent will then hire (a team of) consultants to improve the feasibility studies, the ESIA and the bidding documents. The RVO has requested that the Netherlands Commission for Environmental Assessment (NCEA) carry out an independent quality review of the draft ESIA, which will help the proponent in formulating a Terms of Reference for the additional ESIA work that is needed.

The report has not yet been submitted to the Zambia Environmental Management Authority (ZEMA) as per the local procedural requirements for ESIA. It is anticipated that this will happen when there is an improved revised version of the ESIA.

² For which phase 1 entailed the development of Bujumbura port in Burundi and phase 2 concerns the port in Mpulungu.

1.1 Approach to the NCEA's review

The NCEA has assembled a working group to review the draft ESIA. The working group has members covering the following areas of expertise: environmental and social impacts, civil engineering and port development, tropical aquatic ecology and biodiversity and environmental system engineering. Due to existing Covid-19 restrictions, the working group was not able to visit the project area. Instead, a local ESIA consultant (who is also a cultural heritage expert) was hired to support the working group by undertaking interviews with stakeholders and collecting information on the project area between. The interviews took place between the 27th –30th of October (See Annex 1 for the locations visited and list of stakeholders consulted). His field findings have been incorporated into this advice.

The primary focus of the working group's review has been **Report R4 – Volume C (29 September 2016)** including:

- Volume 1 the Environmental and Social Impact Assessment (ESIA)
- Volume 2 the Environmental and Social Management Plan (ESMP)
- Volume 3 Environmental Hazard Plan (EHP)
- Volume 4 Resettlement Action Plan (RAP)

In addition, several other project-related documents were used as reference in the review including a) Geotechnical investigations b) Detailed design and engineering and c) Bidding documents.

The working group made use of the following benchmarks in their review:

- Zambian EIA regulations (Zambia Environmental Management Act), 2011 and the Environmental Protection and Pollution Control Act (EIA Regulations) no. 28 of 1997
- International Finance Corporation Performance Standards (IFC PS) (2012)
- World Bank Group Environmental Health and Safety Guidelines (EHS) for Ports, Harbors and Terminals (2017)
- African Development Bank Integrated Safeguard System (2013) including the Sector Keysheet on Construction of Fluvial and Maritime Ports.

Reading Guide

This report presents the main findings and conclusions of the NCEA's review of the draft ESIA report. First, in Chapter 2, a summary of key findings is outlined with a focus on essential shortcomings. These are shortcomings that according to the NCEA should be given the highest priority. Chapter 3 elaborates these essential shortcomings per topic and explains how they link with the IFC PSs where applicable. In Chapter 4, several additional detailed observations are presented. These concern issues that could either be solved by paying more attention or giving a better explanation in the ESIA, or issues that require further investigation to determine whether these are high priority. Chapter 5 lists remaining issues on IFC PSs that have not been highlighted in earlier chapters, but which still need to be addressed to ensure that the ESIA meets these standards.

2. Summary of key findings and conclusions

The NCEA acknowledges the efforts that have been expended to come to the draft ESIA. The report contains all the relevant components and is well structured. The NCEA notes that there seems to be support for the proposed project amongst a wide range of stakeholders because of the potential for socio-economic benefits it is seen to offer. These include, among others, the creation of jobs, improvements in infrastructure and mobility and an increase in local trade. The NCEA further notes that the project could create various synergies and improvements to environmental and social management of the current harbour and its surroundings. For instance, by the possibility to clean up contaminated soils, by improving water quality management and by improving nautical safety. These benefits can be achieved if the port development is planned well and carried out carefully. The ESIA is a tool that could help in that process.

The NCEA also concludes that the documented result does not yet constitute an adequate ESIA for this project, both from the perspective of general good practice ESIA, as well the specific requirements under the IFC PS. The problems that need to be remedied can be divided into a) the process and how the assessment work has been utilised in the design of the project and b) the substance and the way pertinent issues have been addressed.

Shortcomings observed on the ESIA process are as follows:

- The ESIA seems to have been undertaken as a separate process, and on a different timeline than the feasibility and the design work. Consequently, these studies are based on different assumptions (e.g. about the port's design) and data (e.g. water levels). This needs to be resolved.
- The assessment methodologies that have been applied are not suitable for the project's scale.
- Various key stakeholders such as district officials, traditional authorities and NGOs/CSOs have not yet been consulted. Neither are any transboundary consultations with the Lake Tanganyika Basin States or institutions considered. Therefore, stakeholder views do not seem to have informed priorities in the analysis of impacts or the development of solutions. This may give rise to new issues during the project's implementation that have not yet been considered.
- The project will need to go through local assessment requirements for permitting purposes, which should preferably be anticipated in the ESIA work in order to avoid doubling upon the assessment work or stakeholder interaction. This apparent lack of engagement with ZEMA requires attention.

Shortcomings in the substance of the assessment so far are as follows:

- Opportunities to improve the environmental and social performance of the project could be missed because more sustainability and climate proof alternatives do not seem to have been considered. Before moving forward, alternative engineering options and mitigation measures (for example different quay materials and heights and flexible port design layout) need be explored, and the proposed design (e.g. berth length) substantiated.
- The ESIA uses outdated information in baseline descriptions and analysis. This information and data, mainly related to socio-economic baseline and the legal/institutional framework need to be updated to the degree possible.

- The scope of the assessment work is not yet complete. Several relevant impacts are not addressed (for example in relation to dredging and increasing mobility and traffic) or not addressed adequately (for example lake water pollution, social impacts and cultural heritage).
- Information on the stakeholder engagement process undertaken so far is not reported upon. In the final ESIA, the proponent should be able to explain how stakeholder concerns have been incorporated into the project design and/or the ESMP. And if concerns have not been included, what the reasoning is for this.

Main recommendations

- Considering the amount and the nature of the shortcomings encountered both in terms of process and substance, the NCEA concludes that additional work needs to be done to ensure that relevant impacts are sufficiently covered and opportunities to improve the environmental and social performance of the project are identified and integrated into the project design and the ESMP.
- The NCEA would like to emphasise that this is not simply a matter of doing additional studies. This requires revisiting the scoping process for the ESIA and the earlier phases of the project where design decisions were made. It also requires engaging appropriate expertise in environmental and social issues, and embedding this expertise into the project's structure, both for project development and the implementation that follows. The responsibility for integration of the ESIA work into the design and bidding documents needs to be clearly assigned.

3. Elaboration of the essential shortcomings

3.1 The ESIA process

ESIA is a tool that is meant to inform designers, decisions makers and stakeholders about the impacts of a project and to guide them in avoiding, mitigating and managing these impacts. The ESIA under review does not fulfil these functions sufficiently due to the following problems in the process:

- It appears that the detailed design and bidding documents were prepared in isolation from the ESIA. There is a difference between the project scope and the design outlined in the feasibility studies and the bidding document and in the ESIA. Some elements of the project contained in the feasibility study, such as onshore yard development, future slipway and shipyard activities and (maintenance) dredging, have been omitted from the ESIA. As a result, the impacts from these activities have not been assessed and mitigated. On the other hand, some elements described in the outline of the design and drawings, do not appear in the bidding documents (e.g. storm water drainage system, grease oil and sand separation), which may cause negative impacts if not included in the project's scope.
- There is a significant time difference between the ESIA report, which dates back to 2016, and the project approval which is still to come. As a result, some information presented is probably outdated. This particularly concerns the socio-economic baseline data, stakeholder views and new legislation and policies that may have been adopted in the meanwhile, such as the 7th National Development Plan (2017), Employment Code Act (2019) and the Solid Waste Regulation and Management Act (2018).
- ***The applied assessment methodology*** is too simplistic for the size and complexity of the development envisaged. The magnitude, extent, duration and significance of impacts are determined on the basis of a simple three-point scale, which is not fine enough to differentiate where and for how long impacts will occur. As a result, the impact ratings seem to be underestimated. Furthermore, the impact ratings are largely based on a qualitative understanding of the environment and it is difficult to understand the justification for some impact ratings.
- ***The stakeholder engagement*** approach needs to be more comprehensive and integrated. This applies both to the engagement undertaken so far, as well to what is still planned. Many key stakeholders have not been engaged (as will be detailed throughout following sections), and little information is provided on methods and results of the stakeholder engagement undertaken thus far. It is therefore unclear if stakeholder views have been considered in the project design, in assessing impacts and in preparing the mitigation plans.

Recommendations

- Before carrying out any additional work on project development, it is recommended that the proponent; a) first agrees on a structure that will ensure sufficient interaction and alignment between the feasibility study, the ESIA, detailed design and bidding documents and; b) mobilises the necessary expertise to deal with social and environmental issues related to the project.
- Formulate a Terms of Reference to re-do the ESIA and outline therein clearly what is expected from consultants in terms of stakeholder engagement, specialist studies to be

undertaken, updating the socio-economic baseline data and legal frameworks, alignment with ZEMA procedures and interaction with the project design team.

- The ESIA should use an assessment methodology that is transparent and preferably based on at least a 5-point scale in order to better differentiate the magnitude, extent, duration, significance of impacts. To the degree possible, the impact assessment must be based on scientific and quantifiable data and impact ratings need to be substantiated.
- Engage with key stakeholders in identifying the main issues to be investigated and addressed in the ESIA and the ESMP. Also consult stakeholders on the design of the project. Document these engagements and show in the ESIA how inputs have been addressed.

3.2 Sustainability and safety of the port design

As noted above, up until now the ESIA does not seem to have been used to optimise the project approach and design. Particularly for port development, a commonly reported issue is that during project design, environmentally friendly and climate-proof alternatives are missed out³. With regards to this project, the NCEA notes the following:

- **Alternatives for the lay-out of the port.** The ESIA compares five alternative lay-out designs for the port, but none of these lay-out options seems to have been designed to optimise environmental and social performance. In addition, the selection of the final design is not based on environmental and social considerations in an evident way. The report does contain a multi-criteria analysis (technical, economic, environmental and social), but lacks a scoring table, weighting factors or operationalisation of sub-criteria (such as the efficient use of materials/resources, safety or the required dredging volumes).
- **Anticipating changing water levels.** The ESIA does not effectively deal with climate change, and in particular with ensuring the port's resilience to changing water levels. The need to respond to varying water levels is recognised and monitoring and mitigation is proposed, but:
 - o Solutions considered to maintain the *minimum* required water level⁴ do not include flexible port development options⁵. Port infrastructure that can be downscaled, expanded, deepened or heightened in a modular fashion, provides more flexibility to deal with falling or rising water levels (but also with other uncertainties like more or less passengers). In this project this is especially relevant in relation to the quay wall design. The selected quay wall consisting of large concrete blocks does not offer any flexibility to cope with potential lake level variations. One example to consider is a sheet pile quay wall, which can be designed and constructed in such a way that in the

³ See for instance de Boer et al. (2019). A framework to structure ecosystem-based alternative identification in Seaport design applied to Tema port. Ghana. And the NCEA's Meta Study for Port Development: https://api.commissiener.nl/docs/os/i71/i7182/meta_study_of_esias_for_port_development.pdf

⁴ Solutions considered so far are 1) adapting existing port infrastructure to enable the port to be deepened 2) adapting the fleet or loading procedures in such a way that shallower depth in the port is acceptable and 3) regulating the water level in the lake.

⁵ For more information on flexible port design, see Taneja P. (2013) The Flexible Port <https://repository.tudelft.nl/islandora/object/uuid%3Aa9f0c128-d4c3-41a2-8790-13aec89dca63> . University of Technology, Delft, the Netherlands or a shorter paper (2019) <https://journals.open.tudelft.nl/index.php/ejtir/article/view/2950>

future it will be possible to deepen the water in front of the quay by dredging. Another example used by Taneja et al (2019) (see footnote 5) is a floating quay wall.

- o The final design is based on the assumption that the water level will be regulated by a proposed (thus yet to be realised) dam on the Lukuga River near Kalemie in the DRC. Taking this uncertain solution as the starting point for the design seems risky and the ESIA needs to include a reflection of the discussion that this solution is contested⁶. The design takes into account the possibility of a drop in water levels and the ESIA assumes a variation in water levels of 1.16m, which based on data over only five years. For water level variation, no reference is made to recent studies on water levels in Lake Tanganyika (See Annex 2). Moreover, the feasibility study and detailed engineering and design (Report 4) estimates this variation to be at 4.24m based on a historic period 1929 to 2010. Taking this variation as starting point implies that high water levels also need to be anticipated in the design (which now seems not to be the case). The NCEA further notes that the top level of the quay appears to be designed at a height 1 meter lower than the constant lake water level which is thought to be the optimal for operations. It is assumed that in the future, the water level will be regulated at this constant level. If that would indeed be the case, this would imply that the port would be continuously at risk of inundation⁷.
- **Ecosystem-based design considerations** could still be explored⁸ which would include considerations such as:
 - o A port-lay out with a minimal need for and low impacts from civil works and dredging. The proposed quay walls/berths seem very long (100 meters per berth) for the forecast vessels (60m for cargo and 35m passengers). Preparing the slope for the slipway also appears to lead to double the amount of inputs/work than what would seem to be required. This is said to be due to safety reasons and difficult with maneuvering of the vessels, but this is not well argued, and alternatives are not assessed. Potentially, the use of materials could be better optimised, and eco-friendly and sustainable materials could be considered. Also, measures to minimise the need for dredging should be explored.
 - o Including structures and materials in the design that support or enhance the functioning of the eco-system, such as structures where water organisms could attach (e.g. hanging ropes from poles, artificial habitats for juvenile fish).
- **Nautical Safety:** The NCEA has not been able to observe a clear connection between the assumptions about the vessels (for instance size, draught levels) and the port design (for instance top level of the quays, levels for dredging). A proper analysis of the required water depths for safe berthing and mooring of the expected vessels should be included. Also, the proposed design is not explained and assessed in terms of safety. Without such assessment, safety during port operations cannot be guaranteed. Note that at Lake

⁶ Between 82–94% of the loss in water volume is reported to be associated with evaporation and only the remaining 6–18% with Lukuga River outflow. See for more details World Bank report by Serrat-Capdevilla, Lajaunie, Bonzanigo, Figueira & Bench 2018.

⁷ For details see section 26.14.5 of Report R4 (detailed engineering and design) where the lake water level is assumed to be regulated at 774m in the future, as this is considered to be the optimal level for the Kalemie Port in DRC. The quay and quay extension are designed at 773m (section 27.3.5 of detailed engineering and design) based on the following expected water levels: 772m high, 770,5 medium and 769m low level water.

⁸ See for inspiration de Boer et. Al. (2019). A framework to structure ecosystem-based alternative identification in seaport design applied to Tema port, Ghana. Sustainability <https://www.mdpi.com/2071-1050/11/23/6633>

Tanganyika, tornadoes can be observed during the wet season, which at times affect the inland area. As a key component of safe navigation, the meteorological conditions need to be taken into consideration in the port's design.

Recommendations

- Develop at least one lay-out alternative that is distinct from an environmental and social perspective. Compare the lay-out alternatives based on clear and operationalised social and environmental criteria. Substantiate the selection of the preferred alternative with reference to this comparison.
- Effectively deal with climate change and water level changes:
 - o Strengthen the analysis on water level variations at Lake Tanganyika by making use of recent existing studies and a climate change scenario analysis⁹. Use the insights from this analysis in designing different design options and in formulating realistic and climate resilient mitigation measures for port infrastructure. In particular, consider an flexible or adaptive port lay-out that can be built in phases and with adaptive quay design alternatives (e.g. sheet pile, floating quay walls etc.)¹⁰. Make sure that the port design is resilient to both low and high-water levels.
 - o It would also be highly recommended that the proponent organises exchanges with port authorities such as in Bujumbura or Kigoma, to learn how these ports deal with varying water levels, and other challenges in port development.
- Include eco-system based considerations in the port design (e.g. minimise the need for civil works and dredging, the use of eco-friendly materials and opportunities to enhance the functioning of the eco-system).
- Nautical Safety: Demonstrate how nautical risks and safety considerations have been integrated in the location of the turning circle, the safety of the berthing and mooring operations and the design of the approach channel. Take into account meteorological conditions to ensure that port infrastructure such as buildings is resilient to extreme meteorological events. The installation of an automatic weather station at the port site as an operational tool for navigation is also highly recommended.

⁹ Various climate change models are available e.g. from the World Bank climate change portal <https://climateknowledgeportal.worldbank.org/>

¹⁰ This refers to a design that takes into account, for instance, circulation patterns, that includes transition zones between land and water and that is adaptable to unexpected situations like low or high water levels or a lower (or later) increase in the cargo and passenger numbers than currently estimated.

3.3 Dredging

The development of Mpulungu harbour is expected to necessitate dredging of approximately 100,000 m³ to ensure adequate depth at the quay walls. Dredging and the disposal of dredged sediments could potentially have an impact on ecosystems and biodiversity, which has not been considered in the ESIA. The NCEA considers this an important omission and notes that the following information needs to be generated through the ESIA:

- **Baseline.** It is not clear from the ESIA (nor from the bidding documents or the geophysical survey) what the composition of the bed material is in the area to be dredged and whether there may be bedrock¹¹ or contaminated sediments. Therefore, soil profile investigations will be necessary. It is also not clear if maintenance dredging will be needed and what the associated quantities are. Dredging will probably also be needed in the navigation channel and the turning circle. The NCEA is therefore not able to confirm whether the estimated dredging volumes are correct.
- **Alternatives.** The ESIA does not inform project design by analysing relevant alternatives for dredging techniques and disposal of dredged material. Specifically:
 - The bidding documents propose the use of a mechanical digger mounted on a pontoon, that can dredge 300 m³ /day. The NCEA notes that this would require temporary storage of the dredged material on a barge before disposal, and continuous dredging during approximately 332 days to dredge the total volume of sediment required. This scenario assumes that no further problems are encountered and that there is no bedrock. Continuous dredging will probably have a larger impact on the ecology and cause higher noise levels, which could possibly be avoided or reduced by alternative technologies. Depending on the composition of the sediment, a suction dredger or a larger mechanical dredger could be an alternative to consider. These dredging techniques would be faster and confined to a bounded time period, potentially reducing negative impacts where these exist.
 - Dredged sediments can be disposed of in the aquatic environment or on land. Both these options can cause impacts on the ambient environment. Disposing of sediments in the aquatic environment requires consideration of transport routes and schedules, locations, important fishing grounds and ecologically sensitive areas (e.g. fish breeding areas). Disposal on land would require considering the locations where the dredged sediments are to be disposed of. These options and their impacts need to be compared in the ESIA, to inform the selection and necessary mitigation measures for disposal.
- **Impacts and mitigation.** Potential impacts from dredging on aquatic processes and ecosystems, nautical safety and noise levels could be significant but have not been assessed. It is therefore not clear what mitigation measures will be put in place to avoid, minimise and manage negative impacts. One measure to consider would be the placing of screens around the dredger and barge, to prevent wide dispersal of fine sediment. If

¹¹ The geophysical survey cores from transects P1, P2 and P3 on land suggest that the sediments in the nearshore zone could potentially have more than 12% fine material. At the same time, in the Strategic and Social Environmental Impact Assessment of the World Bank's Lake Tanganyika Transport and Sustainability Program (2019) it is suggested on the basis of anecdotal evidence, that the area to be dredged may actually comprise of bedrock.

dredged material will be stored temporarily on a barge before transporting the material for disposal, the implications also need to be assessed in the ESIA.

Recommendations

Include dredging and disposal of dredged material in the scope of the assessment and the ESIA report¹² :

- Investigate and clarify the amounts that need to be dredged, considering the predicted transport developments (for instance required draught levels now and in future) and the necessity for maintenance dredging.
- Carry out soil profile investigations to inform the dredging approach.
- Consider different alternatives for dredging and the disposal of dredged materials, including different locations for disposal. Justify in the ESIA why a certain dredging and disposal method is selected.
- Assess impacts from the required dredging, storage and disposal of dredged materials, as well as the associated transportation and integrate conclusions into the ESMP.
- Formulate a dredging and disposal plan outlining the institutional roles, responsibilities and specific measures to avoid, reduce and mitigate impacts. Monitor water quality in the harbour and disposal sites to collect the information needed for implementation of this plan.

3.4 Water quality

Lake Tanganyika provides essential ecosystem services to Mpulungu's inhabitants such as drinking water and fish as a source of livelihood and for consumption. Lake Tanganyika is also known for its biodiversity and its endemic cichlids fish, among other species. With the port's expansion, the number of vessels and people passing through the port is expected to increase significantly, which could result in the contamination of Lake Tanganyika's water. Also, activities in the different project phases could lead to the disturbance of sediments or the disposal of wastes. The contamination of the lake's water could pose serious risks to community health (IFC PS 3), and adversely affect ecosystem services and biodiversity (IFC PS 3 and 6). Although the ESIA rates the significance of the impact of lake water pollution as 'High' for all project phases, this issue is not dealt with adequately throughout the ESIA.

The NCEA notes the following shortcomings:

- The description and analysis of the *pollution sources* which may contribute to the predicted impact on lake water pollution, and the proposed mitigation measures should be more robust and more specific concerning:
 - The discharge of sewage (containing dissolved nutrients and micro-biological contaminants) is rightly recognised as a pollution source and the ESMP mentions that '*sewage effluent will be contained in septic tanks and periodically collected*'. Considering the risk of pollution from sewage, the ESIA should provide a more detailed analysis and quantification of the potential problems and elaborate further on the envisaged mitigation measures and plans. How will the project ensure that sanitation facilities at the port will be enough for the number of people expected? Similarly, the ESMP refers to a site drainage plan that is to be developed and implemented. The ESIA

¹² As required and specified by WB EHS and Integrated Environmental and Social Impact Assessment Guidelines of the AfDB (see Safeguards and Sustainability Series Volume 2, issue 1 pages 11-17, 2015).

- should provide more information on the problems (what will the drainage plan address?) and the type of solutions that should be addressed in the drainage plan.
- ‘Discharge of suspended solids and soil particles during construction’ is mentioned, but a further specification is required to understand which construction works are associated with what type of pollution (for instance heavy metal toxins or increased total dissolved solids in the water column). Similarly, the sources and types of pollution during the operational phase have not been specified. In this regard, the NCEA notes that the dredging and dry excavation needed for quay wall construction are potential sources of pollution that should be assessed in detail. Especially if any sediment or excavated material contains pollutants or could affect light penetration. These issues should be clarified.
 - Hydrocarbon spill prevention receives some attention, but it is not clear how this will be managed during the operational phase.
 - The ESIA does not investigate in what ways water pollution from the project will affect current uses of the lake, especially in conjunction with other sources of pollution such as the Ngwenya market:
 - **Water users.** There is no mention of potentially affected water users, where they abstract or use water, what they use the water for and any adverse impacts on community health that the project may contribute to. For instance, by contaminated water that will be consumed or by the creation of habitat for disease vectors (such as bilharzia snails).
 - **Fishermen.** The importance of fisheries to the local community has been highlighted in the ESIA. In case of any structural pollution of the lake, or accidental pollution such as from oil spills, the impact on these fishermen (and also biodiversity) could be significant. This risk has not been analysed.
 - **Biodiversity.** Since this has not yet been investigated, it cannot be ruled out that unique species or morphotypes are present in or near the harbour area (see later chapter 4). Lake Tanganyika is naturally characterised by low nutrient levels and clear waters and any pollution from the discharge of wastewater with high nutrient loads could have an adverse impact on the habitat for fish and on endemic fishes that are adapted to the natural conditions. The ESIA should show that such risks are negligible, or otherwise how these risks will be mitigated and managed.
 - Data presented on the existing water quality poorly captures the existing micro-biological contamination. Only a single sample of water has been taken to analyse faecal coliforms. No further information is provided on the laboratory that did the water testing. A comparison is made of existing water quality with the drinking water standards, but no baseline is established, nor target values determined, to ensure that the water quality remains suitable for any vulnerable species such as cichlids which are endemic to Lake Tanganyika.
 - Water quality monitoring is not taken up as part of the ESMP.

Recommendations

- Specify for each project phase the activities that can cause water pollution (including dredging and dry excavation) and, the associated levels of discharges. Indicate what measures will be put in place to avoid or minimise water pollution and include these

measures in the ESMP. Include more detailed plans for dealing with sewage, storm water and site drainage and oil spills and leakages than have now been provided.

- Assess together with stakeholders how lake water pollution could adversely affect ecosystem services like water abstraction and fisheries, as well as how it could affect biodiversity and community health. In this assessment, take into account that there is a clockwise current along the shores of Lake Tanganyika that could propagate pollution along the coast to the west of Mpulungu. Also consider other major causes of contamination existing in the area and whether this may give rise to cumulative impacts. Include in the ESMP appropriate mitigation measures, where necessary.
- Formulate a water quality monitoring plan which should help the project to manage its impact on water quality. The monitoring plan needs to include relevant water quality parameters and methodologies to ensure that: the project complies with water quality standards for human health, that variation in nutrient levels stays within the limits for certain fish species to survive. Considering the risk of cumulative impacts, collaborate and engage with relevant stakeholders in water quality monitoring, such as the departments responsible for health and water. Outline different roles, responsibilities, frequencies and methodologies to monitor water quality. Establish mechanisms to use the monitoring results to evaluate the effectiveness of mitigation measures/ ESMP and revisit these when necessary.
- Make sure that the ESIA establishes the water quality baseline needed both to assess the project's impacts and to provide a starting point for monitoring¹³.

This will include:

- Using existing studies and reports (see examples Annex 2) on Lake Tanganyika's water quality.
- Carrying out an improved water quality survey, with an explanation on the methodology and including the report of the water analysis as an Annex to the ESIA. Add the details of the laboratory that did the water analysis, to show it is a certified lab.
- Carrying out a sediment survey to determine particle size distributions and chemistry.

3.5 Socio-economic impacts

Further development of the Mpulungu port could bring various positive benefits to the area, and this appears to be the reason why there is support for the project by a wide range of stakeholders. The proposed development could also have other impacts on people's life in Mpulungu. The port's expansion will generate an increase in traffic, and the movement and influx of goods and people across the whole region. This may possibly result in social stress and social ills. The NCEA concludes that the way in which socio-economic impacts have been assessed, does not meet the basic requirements of the Zambian legislation and environmental and social safeguards of the IFC PS (3) and AfDB, due to the following:

- Relevant national social, gender, health policies, strategic plans and frameworks need to be referred to. The same applies to relevant international conventions on social, health, gender, human rights and occupational health and safety which have been omitted. These

¹³ For guidance on relevant parameters for water and sediments, see WB EHS Guidelines for Ports Harbours and Terminals (2017).

conventions are especially relevant considering the potential social, health and transboundary issues associated with the project as will be outlined next.

- Descriptions on the socio-economic environment are outdated (based on the 2010 census) and largely qualitative in nature. The proposed socio-economic mitigation measures do not specify the goals and targets to be met, or the key performance indicators that need to be applied.
- Several *indirect impacts* have not been assessed¹⁴:
 - **Refugees and illegal immigration.** The quantities are unknown but consultations with the Immigration Department indicated that that refugees (mainly from DRC) arrive at Mpulungu harbour, where they are screened at the port office by the immigration department, and then taken to a transit camp 10 km away at Kayizya. From there the refugees are transported to the Maheba Refugee Camp in the Copperbelt (Solwezi)¹⁵. The immigration office representatives indicate that they expect the number of refugees to increase with the proposed project.
 - **Drug trafficking**¹⁶. Consultative meetings with the Drug Enforcement Commission revealed that an increase in drug trafficking and abuse may be reinforced by the project.
 - **Communicable diseases and (transboundary) health issues** such Ebola, HIV/Aids, Tuberculosis (TB), Sexually Transmitted Infections (STIs) and cholera outbreaks (which especially occur in the rainy season)¹⁷ may also be reinforced by increasing mobility. Currently, COVID-19 must be added to this list as well. Other health issues could arise from water pollution (see earlier section). The assessment of these risks and impacts of communicable disease and health issues, and the proposed mitigation in the Environmental Hazard Plan, is now too generic to be considered practical.
- National and district level officials with responsibilities related to health, gender, social welfare, labour, immigration and safety, as well as relevant NGOs (e.g. Zambian Red Cross Society) and CSOs were not consulted. The NCEA notes that several stakeholders such as the District Health Officer, Drug Enforcement Commission, the Immigration Department and the Police indicate that the current infrastructure at the port is inadequate to deal with the aforementioned issues like drug trafficking, transboundary health issues and immigration, and that the expanded port will require more staff.

Recommendations

- Identify and outline all relevant social, gender, health and human rights policies and legal instruments in order to set clear goals, targets and key performance indicators for the ESMP.
- Make use of more recent, qualitative and quantitative socio-economic baseline data and carry out a more robust socio-economic assessment¹⁸ that considers all relevant direct

¹⁴ Assessing indirect impacts is required by the Zambian EIA Regulations 11.

¹⁵ Note that the photograph in detailed engineering report (Volume A, section 7.3.1) showing a tent purporting to be a refugee camp within the port limits is erroneous.

¹⁶ Drug Enforcement Commission indicated that the Port is currently experiencing drug trafficking and 11 people were arrested for drug related offences at the port in 2019 and 2 persons in 2020.

¹⁷ There are several scientific studies showing a statistical correlation between the abundance of phytoplankton and cholera outbreaks in Great African Lakes, including Tanganyika.

¹⁸ For guidance see: IFC WB General Environmental Health and Safety Guidelines and special guidelines for Ports, Harbours and Terminals. AfDB's Guidelines on Construction of Fluvial and Maritime Ports

and indirect impacts outlined above such as drug trafficking, health and increased migration. Note that baseline data (such as on the prevalent diseases) impacts need to be disaggregated by gender as per AfDB guidelines.

- Outline in the ESIA and the ESMP how the project plans to address and monitor social impacts.
- Continuously engage with departments that will play a key role in managing various socio-economic and safety issues (District Health Officer, Immigration Office, Drug Enforcement Commission etc.). Consult with district officials and incorporate measures to upgrade existing facilities and services at the harbour and to accommodate their offices. Also, the capacities of district government institutions to manage the social and environmental impacts from the project needs to be addressed in the ESMP.

3.6 Cultural Heritage

The ESIA identifies that the project may cause a loss of cultural heritage but does not address this issue adequately and in line with IFC PS (7). The project is going to require the relocation of the **Lungu National Monument**, which currently stands within the port area. Expansion of the port may also have an impact on **Mbita island**, 1km offshore from the port area, as there might be a need to place a navigation light on this island. These are both of cultural and spiritual significance to the Lungu tribe and the following needs to be addressed:

- From the ESIA report it appears that no consultations have taken place with the Lungu Tribe to learn their views. This was confirmed during an interview with the Lungu Royal Establishment (on 28 October 2020). Neither does the ESMP (section 3.4.9) suggest that any consultations are to be undertaken in future. The lack of consultations may be the reason why the ESIA fails to mention another important traditional site (on plot 127, adjacent to the port area) – **the Mpu-Lungu Hill** – which is where a new Lungu Chief spends the night before being installed the following day.
- The ESIA rates the impact on cultural heritage as medium during the construction phase and low in the operational phase. This rating is not substantiated and it needs to be checked whether this is in line with the views of the affected stakeholders. It is therefore important that the proponent consult and engage with the Lungu people and the Lungu Royal Establishment as soon as possible to jointly assess potential impacts and determine mitigation measures to avoid potential conflicts.
- The project will also affect the Good News ship which represents an important part of the history of navigation on the lake and needs to be properly preserved. Consultation with the National Cultural Heritage Conservation Commission has not yet taken place, although it is envisaged in the ESMP (section 3.4.9). Further, the ESIA should take note of the presence of three Stone Age Sites in the immediate project area and the Walamo Traditional Cultural Heritage site in the town.

Recommendations

- Consider undertaking an archaeology and cultural heritage assessment by a qualified specialist.
- The Lungu Royal Establishment and the National Heritage Conservation Commission need to be consulted as early as possible with regards to disturbance of and/or access to cultural heritage sites. Consider consulting the ‘Moto Moto’ Museum’ in the nearby

city Mbala, where various researchers and specialists on the Zambian culture are working.

- Any relevant issues emerging from the assessment and consultations need to be addressed, and measures incorporated into the ESMP.

4. Additional detailed observations

In addition to the essential shortcomings outlined in the previous chapter, the NCEA notes several issues that require attention or a better understanding to determine whether more detailed investigations and mitigation plans are necessary.

- **Port location.** Different port locations will have more or less environmental and social impacts. For the proposed project, it is not clear by what rationale the existing Mpulungu port site has been selected for port expansion. It is also not indicated if and how higher-level strategic policies and plans (national, local) underpin the proposed development.

The NCEA suggests that the ESIA explains the strategic considerations that led to a choice to invest in the proposed intervention. Also, substantiate why the existing port location has been selected as the best option to achieve strategic (policy) goals, and how social and environmental considerations have factored into this.

- **Hazardous and non-hazardous wastes.** Currently, very little seems to be known about the generation and handling of hazardous waste in the current port operations. It is possible that historical ground contamination exists in the port area. In line with IFC PS 3 (sub 4.12), a requirement for the project should be that all wastes (both hazardous, non-hazardous) are avoided, minimised and recovered or reused to the degree possible. Where wastes cannot be avoided, the proponent is responsible for disposal in an environmentally sound manner, or at a licensed facility that operates according to acceptable standards. The NCEA has learnt (from field data and interactions with the proponent) that the nearest licensed hazardous waste site is in the Copperbelt or Lusaka and that licensed municipal landfill and waste collection services are lacking in Mpulungu.

The ESIA needs to clarify how the proponent will deal adequately with hazardous and non-hazardous wastes and what will be expected from prospective contractors in this regard. The ESIA should also include a waste management plan. The NCEA recommends that options to develop waste facilities at the Mpulungu harbour are explored. It is further recommended that a contaminated land investigation in the port area and surrounding properties is carried out.

- **Trans-boundary impacts.** There are no references in the ESIA to trans-boundary impacts. It should be noted that recently a Strategic Environmental and Social Impact Assessment (SESIA) has been carried out for the Lake Tanganyika Transport and Sustainability Programme in 2019. The latter study should be taken into consideration as it has identified trans-boundary and cumulative impacts of various developments on Lake Tanganyika. It also sets out associated mitigation measures. No consultations seem to have taken place with the Lake Tanganyika basin states and with the Lake Tanganyika Basin Authority. Note that the study of transboundary impacts is both required by the Zambian EIA regulations, as well as by the IFC PS.

Integrate findings from the SESIA into the ESIA for Mpulungu port and consult with Lake Tanganyika Authority on and Lake Tanganyika basin states about transboundary issues related to the project.

- **Biodiversity.** Lake Tanganyika is one of the world's largest freshwater supplies and is considered a biodiversity hotspot and among the richest freshwater ecosystems in the world (World Bank 2019)¹⁹. In the ESIA (section 8.3.8) it is stated that the project area is protected by the Lake Tanganyika Convention, the Ramsar Convention and the Convention on Biodiversity. At the same time, the report concludes that the impact from the project is expected to be low, because the area has already been transformed by port, fishing and other commercial activities. The NCEA notes that this conclusion cannot be drawn on the basis of the information provided, and the assessments undertaken so far, because:
 - Many fish in the lake are endemic and unique morphotypes of cichlids fishes. This, and other species such as turtles, otters, crocodiles and water cobras could potentially be present near the port. IFC PS 6 requires that impacts on biodiversity in modified habitats (under which the project could classify) also need to be assessed and mitigated. Moreover, IFC PS 6 (sub 20) requires that legally protected or internationally recognised area should meet requirements of natural/critical habitats, which applies to this project which is located at a Ramsar site. The ESIA does not provide any information on flora and fauna in the project's area of influence, especially on offshore areas (including along the shores and Mbita Island). Nor does it present an assessment of impact on flora and fauna. As such information is lacking, potential impacts cannot be ruled out.
 - The table outlining Key Performance Indicators to be monitored (page 171) mentions that terrestrial flora and fauna, the aquatic riverine habitat and fish and sensitive habitats will be monitored. There is no explanation given as to why such monitoring is needed (what impacts are expected?) and what this monitoring will entail. It is also unclear why the development of a habitat conservation plan is suggested in the ESMP (section 3.3.8)²⁰.
 - A number of tree species will be impacted during the construction phase, but no proposals are made for afforestation/replantation to compensate for the lost trees.

Given the conservation status of the Lake, the ESIA should provide a clear picture of the potential impact of the project on biodiversity. The assessment of this topic can begin more generally, moving to more rigorous assessment work if necessary.

- As a first step, undertake a review of existing information on biodiversity and assess whether there are any critical habitats or any site-specific biodiversity issues that need to be addressed. Based on this screening, determine what further studies are needed as per IFC PS 6. Involve in this screening recognised biodiversity professionals that know the Lake area and include field work and stakeholder consultations (with the

¹⁹ As indicated in the final Strategic Environmental and Social Impact Assessment (SEIA) report (final July 2019) for the Lake Tanganyika Transport and Sustainability Programme. The study was administered by the World Bank.

²⁰ Some of the flora and fauna mentioned in the ESIA would indeed trigger critical habitat measures but these concern species in the Nsumbu National Park, which is 50 km away from the harbour, and therefore not likely to be impacted by the project.

Departments of Fisheries, Wildlife and Forestry, and fishermen and aquarium fishery specialists).

- Depending on the outcomes of the previous step, undertake surveys and site-specific inventories into the flora and fauna as needed. Assess whether the project could cause a significant impact upon these flora and fauna, for instance due to water pollution and increasing traffic. Formulate specific mitigation and monitoring measures to address the impacts on the biodiversity. Ensure that the methods chosen are compatible with the requirements of IFC PS 6.

- **Engagements with ZEMA.** Although the Zambian EIA requirements are outlined, the ESIA does not reflect how these have been applied. It is unclear how the proponent intends to align the ESIA in such a way that it meets donor finance requirements, and the local regulations at the same time. Such alignment would help to avoid replication of efforts – think of the need for additional stakeholder meetings or the need to prepare new ESIA documents. Alignment also allows for the early integration of specific priorities or requirements from ZEMA. As currently presented, the ESIA report does not yet fully align with ZEMA’s requirements for lay out and contents. For example, in relation to the ESMP format that should be used, the lack of minutes and attendance registers of stakeholder meetings, and lack of a summary of the ESIA in local languages.

Consult with ZEMA as soon as possible to get their advice on further steps and requirements in the ESIA (e.g. on reporting, stakeholder engagement) and approval for the scoping conclusions and the ESIA – ToR.

5. Additional points of attention relating to the IFC Performance Standards

The previous chapters have addressed topics that are also central to the IFC PSs. In this chapter, we highlight a series of issues for which the IFC PS have specific requirements or guidance, and that will require attention for the project to properly follow these standards.

IFC PS 1 – Assessment and Management of Environmental and Social Risks and Impacts

- **Compliance with national and international frameworks.** The ESIA needs to update the information on several Zambian legal aspects as well as on development policy and programs developed and promulgated since 2016 (e.g. Seventh National Development Plan).
- **Environmental and Social Management and Monitoring Plan (ESMMP):** The previous chapters contain a number of specific recommendations for the project's ESMP. Here the NCEA wants to point out that, in light of the IFC PS, it is important that measures identified should include specific, measurable targets and key performance indicators. More realistic and justified budgets should be allocated to the ESMMP, the environmental and social monitoring and health and safety risk management plans²¹. Monitoring plans should outline clear roles, responsibilities, arrangements to review monitoring data and to take the necessary actions to manage impacts when needed.
- **A Social and Environmental Management System (ESMS)** still needs to be developed for the Mpulungu port, which should outline the specific policies (e.g. for environmental protection, community health safety and security, labour and working conditions, occupational health and safety) and establish a clear organisational structure with includes the roles and responsibilities for the implementation of the ESMP. As well as a description of the capacities needed for this work.
- **Stakeholder engagement.** Several recommendations for stakeholder engagement have been noted in earlier chapters. Here we point out the IFC PS 1 requires a, stakeholder engagement plan, describing the envisaged engagement processes (beyond permitting) including how information will be shared with stakeholders both on the ESIA as well as during project implementation
- **Vulnerable groups** that could be disproportionately affected by the project need to be identified explicitly, to be able to formulate differentiated mitigation measures.
- The presented Grievance Mechanism requires more elaboration.
- The risks and impacts associated with sourcing of material needed for construction from quarries need to be identified (in conjunction with other performance standards such as IFC PS 2 and 6).

²¹ In the current ESIA the allocated budgets for the entire project are \$ 350,000 for the ESMMP, \$100,000 for environmental and social monitoring and \$ 100,000 for the health and safety risk management.

IFC PS 2 Labour and working conditions

- Relevant national/international legal frameworks for dealing with occupational health and safety need to be outlined.
- **Occupational health and safety risks** need to be properly identified and evaluated. Particularly risks in relation to explosives, handling waste containing asbestos (which is present in some of the old port and adjacent buildings that will be demolished²²), safe storage, handling and disposal of hazardous materials and suspended loads require a careful assessment and mitigation.
- From the ESIA report and exchanges with stakeholders the NCEA notes that the local community has high expectations from the project and particularly in relation to employment. The ESIA needs to reflect on these expectations and highlight what commitments shall be made with regards to hiring local labour force and job creation.
- A Grievance Mechanism needs to be established for workers and a Labour Working Conditions Policy should be formulated.

IFC PS 3 Resource Efficiency

- Little consideration has been given to energy efficiency in design, construction and operations. For the purpose of resource efficiency, but also in the light of energy shortages in Zambia, it would be recommended to explore the potential for solar and wind power as sources of energy.
- The ESIA dismisses the decommissioning phase of the port as irrelevant and does not consider a further upgrade of the port in the future. However, if these phases were incorporated into the project design, the use of alternative, more ecologically friendly materials could turn out to be financially viable. Where such material may initially appear to be expensive, these may save on maintenance costs on the long run.
- **GHG emissions:** the greenhouse gas emissions assessment is too generic and needs to be aligned with Good International Practice²³. In the ESIA, all GHG emissions are added up and divided into CO₂ and 'other' emissions. The air pollution impact assessment considers dust and GHG emissions at the same time, while these two have different impacts and in varying magnitudes, and should therefore be assessed separately. The comparison of GHG emissions for different modes of transport requires an explanation of the assumptions adopted.
- Storage and handling of products like maize attracts rodents such as rats, and as such involves pest control. This aspect needs to be highlighted in the ESIA and appropriate protocols adopted.

IFC PS 4 Community health and safety

- **Explosive cargos:** the port will be used to handle and store explosives cargos. These will also have to be transported through the town. The ESIA needs to include a robust risk analysis and mitigation and safety plan to protect communities and workers from any risk.
- **Traffic impact assessment:** with increasing cargo volumes and passengers, vessel and truck movements are expected to increase. Safety risks and mitigation in relation to traffic movements (both water-borne and terrestrial) need to be quantified, assessed and mitigated. The results of this assessment can be integrated into the Contingency Plan that is already planned (see ESIA report volume 3 and chapter 4).

²³ For tools see for instance <https://ghgprotocol.org/calculation-tools>.

- **Emergency Plans:**

- The ESMP needs to include a bunker oil spill and mitigation or contingency plan.
- An Environmental Hazard Plan has been developed, but as mentioned earlier, this requires some more specification and stakeholder engagement.

IFC PS 5: Land Acquisition and Involuntary Resettlement

Although the ESIA makes reference to acquisition of two plots of total 1,25ha²⁴, further exchanges with the MHCL and IDC have revealed that due to the high compensation cost, the proponent is reviewing project designs to avoid having to purchase these two plots²⁵. The implications for the ESIA are as follows:

- Update and provide the correct project lay-out and design based on the land area on which the project will be implemented.
- In case any land acquisition and resettlement would be needed after all, a Resettlement Action Plan (RAP) should include details on how stakeholders have been engaged and how the property valuation was calculated to determine compensation rates. In the current ESIA, the compensation amounts for the two privately owned plots seems excessive²⁶. It should also be noted that further inquiries in the field have revealed that Plot 82 is subject to a land dispute between the alleged owner of Plot 82 and the Lungu Royal Establishment.
- In case the land acquisition is voluntary (and there are no further conflicts and claims on the land) and only very few households are affected, there may be no need for an elaborate RAP/LRP and grievance mechanism. In such case, it may be more appropriate for an abbreviated RAP or compensation framework to be undertaken.

IFC PS 6: Biodiversity Conservation and Sustainable Management of Living Natural Resources

Chapters 3 and 4 have highlighted specific considerations related to biodiversity and ecosystem services that should be investigated in the ESIA. Note that if the recommended additional work shows that the project will affect any critical habitats, then this component of the ESIA will become a significant undertaking. Competent professionals need to be engaged, appropriate methodologies followed for demonstrating no net loss or net gain or for the design of biodiversity offsets. And specific measures for the management of biodiversity impacts would have to be developed.

IFC PS 7 Indigenous People

From the information presented in the ESIA, this issue does not seem to be triggered.

IFC PS 8: Cultural Heritage

This issue has been highlighted in section 3.5. A Chance Finds Procedure needs to be in place, to deal with any additional cultural artefacts found during site preparation and construction.

²⁴ One plot consists of undeveloped land where a caretaker and his family live who cultivate some vegetables and fruits. The other is an old fish processing factory that is in a state of disrepair.

²⁵ In the ESIA, the total amount of compensation had been estimated at \$2,891,900 for two plots.

Annex 1: List of Stakeholders Consulted for review

(interviews and group discussions)

Surname	Forename	Position/Title
Bwalya	Dominic	Managing Director (MD) (MHCL)
Ngoma	Malupande	Business Development Manager (MHCL)
Ntali	Paul Z	Maintenance Manager (MHCL)
Chapewa	Mande	District Administrative Officer (DAO)
Sichilengwe	Deo	Council Chairman
Miti	Ackson	District Manager – Chambeshi Water and Sewerage Company Mpulungu
Sakala	Lilani	Environmental Health Officer (EHO) District Health Officer Mpulungu
Siwanzi	Wankumbu N.	Officer in Charge, Central Police Mpulungu
Mwibe	Oscar	Inspector, Central Police Mpulungu
Mwenya	Peter	Chief Investigation Officer, Central Police Mpulungu
Kassanda	Stallone	Marine Officer, Central Police Mpulungu
Mulubwa	John. S.	PU Officer in Charge, Central Police Mpulungu
Kabungo	Justin	Victim Support Unit Officer
Kabesha	Mazambani	Officer in Charge, Drug Enforcement Commission, Mpulungu
Chifulya	Chimba	Investigation Officer, Drug Enforcement Commission, Mpulungu
Chiwaka	Stephen	Manager, Mpulungu
Banda	Joseph	District Officer in Charge, Immigration Mpulungu
Zulu	Aaron	Acting T.O, Immigration, Mpulungu
Mugala	Martin	District Forest Officer, Mpulungu
Mabo	Lwabanya	Acting Fisheries and Livestock coordinator, Mpulungu
Miti	Thomas	Acting Park Ranger Wildlife
Mwamulowe	Kagosi	Regional Director, National Heritage Conservation Commission
Simakole	Brutus	Senior Conservation Officer, National Heritage Conservation Commission
Mkongu	Matthew	His Royal Highness Senior Chief Tafuna
Mwambazi	Moliland	Chairman, Mpulungu Town
Sikazwe	Winstone	Induna
Chifunda	Chola	Tradition Secretary, Niamkolo village
Tafuna	Mwenya G.	Secretary for Senior Chief Tafuna
Sindazi	Blackwell	Induna, Mpulungu Town
Sikazwe	Chomba	Chief Representative, Mpulungu Town
Simfukwe	Germanico	Secretary Senior Chief Tafuna
Chifunda	Kapembwa	Walamo Traditionist, Mpulungu Town
Chisanga	Simuyemba	Induna, Mpulungu Town
Mwamazi	Silila	Chief Retainer, Mpulungu Town
Mapulanga	Japhet	Chief Secretary, Mbala
Sikana	Freedom	Chief Retainer, Mpulungu Town
Chilando	Joseph	Chief Grandson, Mpulungu Town
Sikazwe	Freedom	Plot No 82 Owner
Shahid	Motala	Plot No 83 Owner
Sikazwe	Denis K.L	His Royal Highness Chinakila, Viyembe
Mazimba	Albert	Supervisor, Pendulum Transport and Fisheries

Annex 2: List of potential information sources

This Annex describes a series of potential sources of information for future ESIA work for the Mpulungu port expansion. These are references that the working group members have suggested.

Water level

- Bergonzini, L., Richard, Y., Petit, L. and Camberlin, P. (2004). Zonal circulations over the Indian and Pacific Oceans and the level of lakes Victoria and Tanganyika. *International Journal of Climatology*, 24 (13), 1613 – 1624.
- Bergonzini, L., Richard, Y. & Camberlin, P. (2002). Variation interannuelle du bilan hydrique du lac Tanganyika (1932–1995): changement dans la relation précipitation–excédent lacustre/Interannual variation of the water budget of Lake Tanganyika (1932–1995): changes in the precipitation–lake water excess relationship. *Hydrological sciences journal*, 47(5), 781–796.
- Bergonzini, L., Williamson, D. & Albergel, J. (2015). L'hydrologie et la limnologie autour du lac Tanganyika. – in Cazenave–Piarrot A., Ndayirukiye S., Valton C. (coord.) – 2015, Atlas des Pays du Nord–Tanganyika. Marseille, IRD Éditions, 144 pages.
- Camus, C. (1965). Fluctuations du niveau du Lac Tanganyika. *Bulletin des séances. Académie royale des sciences coloniales (d'outre mer). Série 11: 1242–1256.*
- Devroey, E. (1938). Le Lac Tanganyika et les fluctuations de son niveau. *B. A. 1. Br. 7:185–204.*
- Inros Lackner SE (2018). Feasibility Study for Lake Tanganyika Port Access and Safety of Navigation Improvements under Varying Lake Levels Technical Report – Field Data. Feasibility Study for the World Bank.
- Serrat Capdevila, Aleix; Lajaunie, Marie Laure, Bonzanigo, Laura Figueira, Pedro; Bench, Reynaldo. (2018). Port Access in the Lake Tanganyika: Key Challenges and Recommendations. World Bank, Washington, DC
<https://openknowledge.worldbank.org/handle/10986/29330> License: CC BY 3.0 IGO

Water quality, monitoring and pollution

- Degens, E.T., von Herzen, R.P. et Wong, H.K. (1971). Lake Tanganyika: water chemistry, sediments, geologic structure. *Naturwissenschaften*, 58, 229–240.
- Edmond, J.M, Stallard, RF, Craig, H., Craig, R., Weiss, F., Coulter, G.W. (1993). Nutrient chemistry of the water column of Lake Tanganyika. *Limnol Oceanogr* 38:725–738
- Plisnier, P.D., Langenberg, V., Mwape, L., Chitamwebwa, D., Tshibangu, K., and Coenen, E.C. (1996). Limnological sampling during an annual cycle at three stations on lake Tanganyika (1993–1994). *FAO/FINNIDA Research for the Management of the Fisheries on Lake Tanganyika. GCP/RAF/271/FIN–TD/46 (En) 124p.*
- Plisnier, P.D., Chitamwebwa, D., Mwape, L., Tshibangu, K., Langenberg, V. and Coenen, E. (1999). Limnological annual cycle inferred from physical–chemical fluctuations at three stations of Lake Tanganyika. *Hydrobiologia*, 407: 45–58
- Plisnier, P.D., Nshombo, M, Mgana, H., and Ntakimazi, G. (2018). Monitoring climate change and anthropogenic pressure at Lake Tanganyika, *J. Great Lakes Res.* (44): 1194–1208
- West, K. (2001). Lake Tanganyika: Results and Experiences of the UNDP/GEF Conservation Initiative RAF/92/G32 in Burundi, D.R. Congo, Tanzania, and Zambia. *UNDP–GEF–UNOPS: 138p*

Adaptive and sustainable port design

- De Boer, W.P., Slinger, J.H., Arno, K., Kangeri, W.A., Vreugdehill, H.S.I., Taneja, P., Appening Addo, K., and Veillinga, T. (2018). Identifying Ecosystem-Based Alternatives for the Design of a Seaport's Marine Infrastructure: The Case of Tema Port Expansion in Ghana https://ocw.tudelft.nl/wp-content/uploads/de_Boer_et_al_2019_Ecosystem-based_alternatives.pdf
- Perkol-Finkel, S., Hadary, T., Rella, A., Shirazi, R., Sella, I. (2018). Seascape architecture – incorporating ecological considerations in design of coastal and marine infrastructure. Ecological Engineering, Volume 120, pages 645–654, September 2018 <https://www.sciencedirect.com/science/article/abs/pii/S0925857417303798?via%3Dihub>
- Taneja, P., Ligteringen, H., Walker, W.E. (2012) Flexibility in Port Planning and Design. European Journal of Transport and Infrastructure Research, (S.I) V 12, n1, January 2012 <https://journals.open.tudelft.nl/index.php/ejtir/article/view/2950>
- Taneja, P. (2013). [The Flexible Port](#). University of Technology Delft, The Netherlands <https://repository.tudelft.nl/islandora/object/uuid%3Aa9f0c128-d4c3-41a2-8790-13aec89dca63>