



25 years Netherlands Commission for
Environmental Assessment

ZAMBIA (D2B16ZM05)

Advice on the scoping / ToR for the Solwezi Water Supply Project



20 December 2019
Ref: 7216



Advice of the Secretariat

Title	Advice on the scoping / ToR for the Solwezi Water Supply Project (D2B16ZM05)
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Reference	7216

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List of Acronyms

AfDB:	African Development Bank
CSO:	Civil Society Organisation
DRC:	Democratic Republic of Congo
EIS:	Environmental Impact Statement
ESIA:	Environmental and Social Impact Assessment
ESMP:	Environmental and Social Management Plan
GoZ:	Government of Zambia
IFC PS:	International Finance Corporation Performance Standards
LRP:	Livelihood Restoration Plan
MWDSEP:	Ministry of Water Development Sanitation and Environmental Protection
NCEA:	Netherlands Commission of Environmental Assessment
NWSSCL:	North Western Water Supply and Sewerage Company Limited
RAP:	Resettlement Action Plan
RVO:	Netherlands Enterprise Agency
SEP:	Stakeholder Engagement Plan
ToR:	Terms of Reference
WARMA:	Water Resources Management Authority
ZEMA:	Zambian Environmental Management Agency

1. Introduction

1.1 The project & request to the NCEA

Solwezi is the provincial capital of North Western Province of Zambia and is situated 560 km north-west of Lusaka. Solwezi district, a hub of new mining developments in this province, has witnessed transformation and population growth in the past fifteen years. The existing water supply infrastructure operated by the North Western Water Supply and Sewerage Company Limited (NWWSSCL) is under pressure and not able to meet the growing demand. Current water supply coverage is estimated at 34%, which equals 8500 active connections, serving 53.000 of a total of around 160.000 people. NWWSSCL is planning to expand the existing water system to have 100% coverage by 2031 (229.000 people). According to the scoping document, in 2031 the estimated demand will be 37.000 m³/day, which is about 20.000 m³/day more than the capacity installed in 2018.

The proposed project, to be owned by NWWSSCL, shall include the following activities:

- a. construct a modern new water intake on Solwezi River or a groundwater abstraction area / new well fields to supplement existing wells;
- b. relocate, rehabilitate or abandon the Solwezi Water Treatment plant;
- c. find an additional location for a new treatment plant with at least 40.000 m³/day;
- d. construct a raising main from the new plant to the water storage tank;
- e. construct additional high-volume storage tanks;
- f. extend water distribution lines to currently un-serviced areas;
- g. construct, rehabilitate, upgrade any other related water facilities critical to water distribution and supply.

In Zambia, the procedural requirements for Environmental and Social Impact assessments (ESIAs) are provided by the Environmental Impact Assessment Regulation no. 28 of 1997. This regulation requires an ESIA for projects listed under its first and second schedule. As the proposed project falls under the second schedule (section *Transportation* part d and section *Dams, Rivers and Water Resources*) an ESIA is required, which should result in an Environmental Impact Statement (EIS). Scoping is a mandatory step in the Zambian ESIA procedure and involves the development of a Terms of Reference (ToR) for the ESIA. This ToR needs to be approved by the Zambian Environmental Management Agency (ZEMA). The NCEA has contacted ZEMA about their review of this project and the two organizations agreed to communicate and to keep each other informed.

An ESIA is also required by the Netherlands Enterprise Agency (RVO) who intends to fund this project. As part of Phase 1 of the project, NWWSSCL commissioned a feasibility study with RVO's support. The feasibility study included several outputs such as an inception report, hydrological studies, a pre-liminary ESIA, a scoping report and a ToR for a more detailed environmental and social impact assessment. A hydro(geo)logical study is still expected to be delivered (November 2019). The RVO requested that the NCEA independently review the scoping report and the ToR for the environmental and social impact study. Once the scoping document / ToR are approved by ZEMA and RVO, the project will move to Phase 2 in which the final design of the water system and the full ESIA will be carried out.

1.2 Approach by the NCEA

In order to carry out this review, the NCEA formed a working group with members covering different areas of expertise, including hydro(geo)logy, social impacts and civil engineering of water supply systems. The working group visited the project area between 9–15 November 2019 and had a chance to interact with various institutions. The programme of the field visit can be found in Annex 1.

The focus of the NCEA's review and advice is on the scoping document and the ToR for the ESIA for the intended project¹. The working group members also considered other documents because these contained relevant information to better understand the scoping document / ToR, such as the project's inception report (22 August 2018), the Pre-liminary ESIA (November 2018) and the geophysical survey done by Aquaquest (August 2019). However, the NCEA did not assess the quality of the latter documents and does not draw conclusions on their adequacy.

As benchmarks for their review, the working group made use of the following:

- Zambian EIA regulations no. 28 of 1997
- International Finance Corporation Performance Standards (IFC PS) (2012)
- World Bank Group Environmental Health and Safety Guidelines (EHS) for Water Supply and Sanitation (2007) & EHS Guidelines for Wastewater and Ambient Water Quality (2007)

The purpose of the review and recommendations by the NCEA is to advise and guide the proponent and the consultants in carrying out an ESIA that is complete, correct and relevant for decision making. The next section (§1.3) highlights several strengths of the scoping document / ToR and provides a summary of important shortcomings. These are shortcomings that according to the NCEA need to be addressed before moving to the next phase of the ESIA. Chapter 2 describes these key findings in detail and gives recommendations. In chapter 3, an analysis is presented of how the IFC PS have been addressed in the scoping document / ToR.

1.3 Overall conclusions and recommendations

The NCEA observes that good efforts have been undertaken in order to develop the scoping document and ToR under review. In particular, the NCEA is positive about the following aspects:

- The need and justification for the project are well established.
- A good description of activities and infrastructural works expected is given.
- Initial consultations have taken place with most institutional stakeholders (although some seem to be excluded, as outlined later on).
- There is high level of local interest and engagement in the project.
- Several background and baseline studies have been conducted and these are of good quality and can usefully inform the scoping process.

¹ – Terms of Reference (ToR) for the proposed construction and operation of the Solwezi Water Supply System in Solwezi District by North Western Water and Sanitation Company Ltd, September 2019;
– Scoping Report for the Environmental and Social Impact Assessment for the proposed Solwezi Water Supply Project, September 2019

- The most important elements for an ESIA have been considered (e.g. description of the project and project area, baseline, alternatives, impacts and proposals for mitigation). At the same time, the NCEA has some comments on the quality and the extent to which these elements are addressed. These comments are elaborated below.
- Alternatives are considered, in particular regarding the water sources for the project.
- An overview of potential impacts for the *construction* phase of the project is provided.

The NCEA also identified shortcomings in the scoping document /ToR. The key ones are:

- The documents do not outline a clear process to guide the consultant through the different steps, decisions to be taken, methods to use and tasks to carry out in the ESIA.
- Although institutional stakeholders are identified and initial consultations have taken place, stakeholders such as affected communities, Ward Councillors and civil society organisations (CSOs) seem not to have been involved yet. Engaging stakeholders is not described as an integral part of the ESIA process.
- The NCEA learnt that one of the first next steps of the proponent will be the selection of the water source for the water supply system. The information presented on alternative water sources is, at the time of review, insufficient to justify a final selection. Additional information and analysis are still needed. Also, a potentially (more) sustainable and cost-efficient technology, namely riverbank infiltration, has not been considered as alternative.
- The range of impacts identified for further analysis in the ESIA is too narrow and does not include impacts in the operation phase. There is also insufficient acknowledgement of uncertainties in predicting impacts.
- Potential consequences of inadequate wastewater management and sanitation are not considered.
- No framework is provided for the Environmental and Social Management Plan (ESMP) and dealing with resettlement.
- The maps, figures and data provided do not entirely clarify the projects target area, target population and (intended) locations for infrastructure.

Overall recommendations

1. Select the water source for the water supply system on the basis of information that is adequate for decision making and stakeholder consultation.
2. Compare the long-term availability, the quality of water, and the potential impacts associated with withdrawal from different water sources through:
 - first, presenting an analysis of groundwater systems and surface water hydrology (and their interrelation) in the Upper Zambezi catchment, as well as the water quality and total current water withdrawals;
 - then, assessing (through modelling or other reliable methods) the potential cumulative impacts of future water withdrawals.
3. After selecting the water source, reformulate the scoping document / ToR to address current gaps by incorporating:
 - a clear outline for the ESIA process and its integration into project planning and design;
 - a Stakeholder Engagement Plan (SEP);
 - clear figures and maps of the project’s target area, planned infrastructure and locations;
 - impacts that may occur during the operation phase and people that could be affected;
 - an outline of the principles, the intended approach and information expected for the ESMP and the Resettlement Action Plan (RAP) / Livelihood Restoration Plan (LRP).

2. Key findings

2.1 The process: outline project design and stakeholder engagement

Scoping is meant to establish a clear foundation for how to conduct the ESIA. By outlining the process and the division of roles and responsibilities, a scoping report helps to facilitate meaningful participation in ESIA and ensures that the ESIA delivers timely information for project design. In this sense, the scoping document / ToR fall short because they do not deliver a clear outline for the ESIA process. The following points stand out:

- **Selecting the water source:** the water source for the future water supply system has not yet been selected. As a consequence, the scoping document is too generic concerning the type of infrastructure and their locations, the study area, potential impacts and affected people to be considered in the ESIA.
- **Decisions, information and activities:** the scoping document / ToR do not clearly explain which decisions will be informed by the ESIA, what information is needed to take these decisions and which steps and activities will be undertaken by whom and when. When are the specialised studies planned? Based on what criteria and principles will critical design decisions be taken? How will information from the environmental and social assessment be integrated into these decisions?
- **Stakeholder engagement:** there is no plan outlined to engage stakeholders throughout the ESIA, and for considering stakeholder inputs. A list of institutional stakeholders is delivered, and the intention stated to engage them. However, this list is either not complete or not concrete enough. Some stakeholders are missing, such as the Ministry of Lands, Civil Society Organisations, Ward Councillors and community-based groups.
- **Public disclosure:** no information is provided on when, how and which information will be disclosed to the public at large, or to specific stakeholders.
- **Specialised studies:** specialised studies are planned (page 46 ToR). The relevance of some of these studies is not clear, as there seems to be no direct link between these studies and the water supply system (e.g. studies on air quality, effects on gene pools, landscape and visual impacts, sustainable land use). At the same time, there are relevant studies mentioned elsewhere, that do not appear in the ToR, such as an archaeological assessment.
- **Time allocated to the ESIA:** only 1 month has been planned for the actual impact assessment, this is too short.
- **Roles and responsibilities:** there is no outline of the roles, responsibilities and the interactions between the consultant, the proponent, designers and stakeholders. It is therefore vague which tasks belong to the consultant, which to the proponent or the designers.

Recommendations

1. **Select the water source** for the water supply system based on information that is sufficient and adequate for decision making (see § 2.2 for more details) and by consulting stakeholders (e.g. WARMA).
2. After selecting the water source, **reformulate the scoping document / ToR** to include:
 - a. **An outline for a transparent ESIA process, and its link with project planning** with a logical sequence of the ESIA steps, the decisions, stakeholder engagement and information exchange (see Table 1 for an indication of what is meant here).

- b. **A Stakeholder Engagement Plan (SEP) that is aligned with the ESIA process and project planning as outlined in point (a).** A stakeholder engagement plan gives an analysis of relevant stakeholders, their interests, and roles in the project. This plan is useful to define the level of engagement of different stakeholders (information, consultation, engagement in decisions), how engagement will be organised, how comments will be reported and considered and when and how information will be disclosed. The stakeholder engagement plan also provides a framework for a grievance mechanism. IFC's '*Stakeholder Engagement: A Good Practice Handbook for Companies Doing Business in Emerging Markets*' is a useful reference to develop this plan.
- c. **An outline of the principles intended approach and information expected for the ESMP and the RAP/LRP.**
3. Plan more time for the impact assessment to ensure a robust process of analysis, stakeholder engagement and integration with project design.

Table 1. Illustration of integration of project planning & ESIA for this project

Project planning and design decision-making	ESIA planning
Comparison water sources	<ul style="list-style-type: none"> • Baseline analysis, as needed to support water source choice • Comparison of water source options on environmental and social criteria • Consultation with relevant stakeholders on criteria for comparison, and on comparison itself
Water source selected	<ul style="list-style-type: none"> • Update scope/ToR of the ESIA • Inform stakeholders on updated scope • Formulate a Stakeholder Engagement Plan
Overall design: <i>select preferred design</i>	<ul style="list-style-type: none"> • Comparison of design choices (for example on size, technology, locations water storage tanks, piping routes, etc.) against environmental and social criteria • More detailed assessment of relevant impacts and specialized studies • Identification of mitigation measures, and integrating these into project design • Consultation with relevant stakeholders on design choices and mitigation (could be location specific)
Finalize detailed technical design	<ul style="list-style-type: none"> • Develop an ESMP and Resettlement Action Plan (RAP) / Livelihood Restoration Plan (LRP) • Consultation with relevant stakeholders on ESMP and RAP/LRP • Update baseline as needed for monitoring impacts
Submission of project for approval	<ul style="list-style-type: none"> • ESIA report, ESMP, RAP/LRP and other action plans publicly available
Project implementation	<ul style="list-style-type: none"> • Implementation of ESMP, including engagement with stakeholders (through grievance mechanisms, ESMP reporting, community monitoring, etc)

2.2 Data & analysis: address availability and quality of water resources

Different options to draw water for the water supply system are currently under consideration, including intake from surface water and groundwater extraction. For the viability of the project, these options need to be compared on long-term availability and on water quality. These also need to be compared on their social and environmental impacts. For selecting a source for water withdrawal, the World Bank Group's EHS Guidelines on Water and Sanitation recommend:

- To evaluate potential adverse effects of surface withdrawal on the downstream ecosystems and to use appropriate environmental flow assessment to determine acceptable withdrawal rates and;
- To evaluate potential adverse effects of groundwater withdrawal, including modelling of groundwater level changes and resulting impacts to surface water flows, etc. Extraction rates and locations need to be modified to prevent adverse current and future impacts, considering realistic future increases in demand.

The reviewed documents seem to suggest that water resources are abundant in Solwezi and that the project's impacts will be insignificant because only a small quantity of water will be needed for this project. However, from the reviewed documents and interactions during the field visit, the NCEA noted several signs of degrading water resources in the project area; water levels in the wetland on the west of Solwezi have been decreasing and in the river Solwezi water levels have dropped from 2,1 m in 1970 to 0,8 in 2016. In test drillings, dry well fields were discovered by the company in eastern part of Solwezi. Water related challenges in Solwezi area are also depicted in a PBL study ². The reviewed documents and the interactions with stakeholders during the field visit also suggest there is an assumption that the current mining activities do not have an influence on water quality. The potential cumulative impact on the quality and quantity of water resources during the operation phase could be significant. These should therefore be carefully studied.

The NCEA recognises that considerable information has been collected at the time of review, but this does not yet provide enough basis for a justifiable selection of the water source for the project. There is still need for:

- a. a better understanding of the groundwater and surface water systems (and the interactions between these), water quality and the current water uses and future increases in water demand.
- b. a reliable assessment of the (cumulative) impacts of water extraction from different water sources.

Groundwater

Based on the current information it is not possible to evaluate the quality, the availability of water or the impacts of groundwater extraction by the project because:

- More information is needed to understand the dynamic behavior of groundwater flows. The NCEA has not seen any groundwater head contour maps or area wide maps showing thickness and extension of aquifers and aquitards. There is some knowledge on the lithology, but this is based on scattered local information (geo-physical investigations and some drillings). Without this information, it cannot be assumed that the mines have no

² The Geography of Future Water Challenges, April 2018, PBL the Netherlands Environmental Assessment Agency <https://www.pbl.nl/en/publications/the-geography-of-future-water-challenges>

impacts on the water resources, and future impacts from the mines on water quality and quantity cannot be ruled out,

- There is need to know the water quantities available at the considered groundwater sources and how much water is currently being extracted by different users combined.

Surface water

Also, the information on the hydrology does not allow for a solid evaluation of the water availability or the possible impacts of water intake from a specific river, because:

- There is need for an overview of the hydrological system of the sub-catchment Upper-Zambezi. What are the volumes of water passing through the sub-catchment, towards the study area? This information is relevant for a reliable estimation of the long-term river discharges.
- Water quantity available at the considered surface water sources, and the quantities currently taken by different users are not provided.
- In order to come to an environmental flow assessment, a decision needs to be made on what ecosystem services (that could be impacted by this project) are to be preserved and what the demands are for water quality and quantity³ to maintain these ecosystem services.

Surface and ground water combined

The following information is necessary for an analysis of the water sources:

- Information on water quality parameters. The information on groundwater quality in the scoping report is not adequate. With the available data, the NCEA is not able to confirm or conclude whether the current (and future) mining activities have indeed no impacts on the water quality. This requires further investigation.
- The potential increase in water extractions and use in the Upper Zambezi catchment. This information would enable an assessment of cumulative impacts of water withdrawals and discharges.
 - Water demand figures for Solwezi seem to consider water demand in the town only and not the whole district. Does the expected population growth also include induced population growth?
 - There is no information on potential future water uses for mines, irrigation, industries and so on. During the field visit, the NCEA was informed about potential new mining in Solwezi, near the water sources considered in this project⁴. Mining operations may require large quantities, and discharge water. This could have consequences for the future water source for the water supply system, both for its quality and quantity.
- Impacts and possible risks for water quality will arise near the intake points. The NCEA confirms the proponent's consideration that the intake point for water should be located above any discharge points from (possible future) mines.
- The reviewed documents suggest that modelling is planned but information on the modelling programme to be used is not provided (e.g. assumptions, methods for model calibration and verification to be used for simulations of current and future conditions).

³ For environmental flow assessment requirements consider using the World Bank Water Resources and Environment *Technical Note C.1 – Environmental Flow Assessment: Concepts and Materials*.

⁴ <https://www.midnightsunmining.com/zambian-properties/#twenty-two-zone> The company called Midnight Sun seems to have a licence to explore in an area of 506 square kilometres in Solwezi, (see map Annex 2). On their website (24 October 2019), the mining company Midnight Sun states that "60% ownership of the Solwezi Licences has officially been transferred and registered in Zambia with the Patents and Companies Registration Agency". These are licences for mining exploration in an area of 506 square kilometres in Solwezi, adjacent to Kansanshi Mine.

- Effects of climate change on water availability at different water sources are important to consider. The expected changing precipitation patterns will influence the recharge of the water sources. Seasonal variations already exist and may change over time.
- The NCEA learnt that deforestation is a growing problem in Solwezi. This could influence the river water quality, the discharge patterns of the rivers, the groundwater recharge and rainfall patterns. A global analysis of land use and vegetation could help to understand whether deforestation has or may influence the water sources considered.
- Effects of human settlements, planned and unplanned, could have implications for the NWWSSCL's ability to protect the water source and the operations needed for water treatment. Some issues currently observed on the Solwezi River (e.g. siltation) could soon also become an issue for the other surface water sources considered.

Recommendations

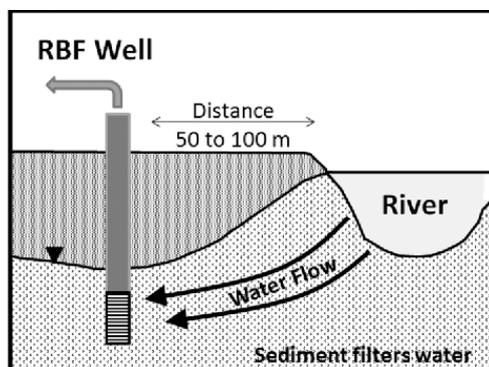
1. Establish a reliable baseline on the relevant water resources against which impacts can be assessed and monitored.
2. Before selecting the water source, make sure that the long-term viability, quality and sustainability of the source are analysed through enough information and application of appropriate evaluation methods. In Annex 3, suggestions are given for data collection and modelling, if this were to be selected as an evaluation method.
3. Present to and discuss with key stakeholders such as the Water Resources Management Authority (WARMA) the information from the analysis from point 2 above. Consult these stakeholders on the selection of the water source. Justify clearly in the ESIA the considerations (including environmental and social) for the selected water source.
4. Establish, after selecting the water source, the study boundaries for upstream and downstream areas for the detailed impact assessment. If groundwater is selected as source, the NCEA suggests defining the study boundary based on the recharge areas of the Chafugoma marbles. In case surface water is selected, the upstream study should preferably coincide with the zone where the rivers spring.
5. Explore during the ESIA whether the NWWSSCL could collaborate with authorities on:
 - defining protection zones around water intake points and water recharge areas and protection measures (e.g. reforestation);
 - the inspection and monitoring of quality and quantity of water resources to detect potential impacts from developments like mining and other developments.

2.3 Alternatives: include riverbank infiltration

As discussed above, different alternatives for the water source for water supply are under consideration. The NCEA wants to draw attention to an alternative that could compare favourably to the current alternatives, in terms of environmental and social performance: riverbank infiltration (see illustration below). According to the NCEA, this could be a feasible technology in Solwezi (e.g. along the Kifubwa River) with potential advantages such as:

- Reducing the needed inputs for treatment like energy and chemicals (when compared to surface water intake, due to natural pre-treatment). This alternative also reduces the risks from deteriorating water quality (and additional treatment required) as a result of new developments like mining and population growth.
- Less resettlement and energy required to transport the water, if favourable locations for infrastructure are feasible (e.g. nearer to the town, along existing infrastructure).

- Climate resilience. During the dry season, when surface water levels are low, groundwater will still be available. Similarly, during the wet season, when turbidity levels of surface water do not allow extraction, groundwater can still be withdrawn with this method.



Source: Guinness et al. ⁵

Recommendation

1. Consider and assess a river infiltration system as an alternative, before selecting the water source to be used in the project.

2.4 The study scope: include sanitation and wastewater management

Expanding the water supply network, as this project aims to do, will lead to an increase in the discharge of domestic wastewater. Uncontrolled discharge, either into aquatic systems, or onto (public or private) open ground can lead to “spread of disease, odors, contamination of wells, deterioration of streets”⁶. Therefore, projects with a “potential to generate process wastewater, sanitary (domestic) sewage”, are recommended to incorporate “the necessary precautions to avoid and minimize adverse impacts on human health, safety or the environment”⁷.

The NCEA observes that neither the project nor the ESIA intend to address sanitation and wastewater management. Exchanges that the NCEA had during the field visit suggest that it is implicitly assumed that a system for disposal and management of wastewater will be established through a separate sanitation project. It also seems to be assumed that people will be willing to invest in a connection to the future (new) sewage system or in (better) septic tanks on their property, which can be used for the disposal of wastewater⁸. The NCEA concludes that this project may lead to an increase in uncontrolled discharges of domestic wastewater and therefore pose health risks due to the following:

Investments in the domestic sewage system of the area are uncertain. It is uncertain if the Government of Zambia (GoZ) can co-fund the future sanitation project. The African Development Bank (AfDB) will consider funding the investments in sanitation, but this

⁵ S.L. McGuinness, J.E. O’Toole, T.B. Boving, A.B. Forbes, M. Sinclair, S.K. Gautam, K. Leder (2017) Protocol for a cluster randomized stepped wedge trial assessing the impact of a community-level hygiene intervention and a water intervention using river filtration technology on diarrhoeal prevalence in India. *BMJ Open*

⁶ World Bank Group Environmental Health and Safety Guidelines (EHS) for Water Supply and Sanitation

⁷ World Bank Group EHS Guidelines for Wastewater and Ambient Water Quality.

⁸ Septic systems are commonly used for treatment and disposal of domestic sanitary sewage in areas with no sewerage collection networks, as currently the case in Solwezi.

funding is yet to be committed. Even if the AfDB approves the funding, the timeline for the sanitation project is likely to differ from this water supply project⁹. As a result, certain parts of town could start receiving water and generate domestic wastewater, while their connection to sewage networks may take some time.

Willingness and ability to pay for sanitation at household level is not clear. A baseline and a feasibility study on sanitation have been carried out separately. Because the scoping document / ToR do not include data on the current sanitation situation at household level, it is not clear to the NCEA how many households have septic tanks, and how effective these are for a safe disposal of the wastewater generated¹⁰. Neither is it clear whether people with insufficient sanitation are willing and able to invest in new or improved septic tanks, or in a connection to a future sewer system. Again, if the amount of wastewater increases at household level, but sanitation does not improve, this could increase the likelihood of health impacts.

Potential health risks of uncontrolled discharge of domestic wastewater are not considered for detailed assessment. The reviewed documents refer to the prevalence of waterborne diseases in the project area. Potential discharges of domestic wastewater could exacerbate these health risks, as a result of e.g.; pools of stagnant water (which can be a breeding ground for disease-carrying mosquito's and other water-borne parasites), contamination of water resources or of crops in vegetable gardens. This topic should be included in the detailed assessment to understand the health risks related to the project.

The NCEA notes that there are measures to manage health risks. These could be considered in the detailed assessment, such as:

- Providing house(water) connections only when houses have access to septic tanks or sewer system that are effective, and where wastewater can be disposed of safely.
- Providing yard connections to households without septic tanks or sewer systems where wastewater can be disposed of, since, in case of yard connection, less water is used by consumers and consequently less wastewater generated.
- Finding ways to prevent stagnant water and monitor high risk areas.
- Organizing awareness raising campaigns on wastewater management and sanitation.
- Looking for opportunities to subsidize poor households who are not able to pay for adequate sanitation.

Recommendations

1. The NCEA recommends that the NWWSSCL and RVO explicitly recognise the need to address sanitation (and capacity for wastewater management) in tandem with water supply. It is recommended that all possible efforts are made for simultaneous investments in the sanitation capacity, and to align the phasing of implementation of water supply and sanitation at the same locations.
2. Potential impacts associated with the increase in domestic wastewater need to be addressed in the ESIA. Particularly concerning health risks, the ESIA needs to:

⁹ During the field visit, the NCEA learnt that by mid-2020 the AfDB will decide which projects, among approximately 14 potential districts, will be funded. At that time, this water supply project will be ahead of plans for improved sanitation.

¹⁰ World Bank Group EHS Guidelines for Wastewater and Ambient Water Quality describe the conditions that apply when septic tanks are the selected form of wastewater disposal.

- provide an overview of quantities of domestic wastewater generated, as a result of the project, at different locations over time.
- provide relevant baseline data such as the current sanitation situation, prevalent water related diseases and their causes, people's ability and willingness to pay for (improved) septic tanks or for a connection to the future sewage network, the soil's absorption capacity at different locations, and other factors that could lead to stagnant water. Identify any specific high-risk areas.
- assess potential health impacts of an increase in uncontrolled domestic wastewater discharge, taking the current situation on sanitation as point of departure.
- specify measures to prevent, mitigate and manage health risks in the period until the sanitation project is realised.
- consult and coordinate with key government bodies (e.g. Ministry of Health, Ministry of Local Government (MLG), Ministry of Water Development, Sanitation and Environmental Protection (MWDSEP) and their local offices) to agree on implementation and monitoring of measures and plans for dealing with emergency situations like the outbreak of disease or water scarcity.

2.5 The assessment: include all relevant impacts

A purpose of scoping is to identify, in consultation with stakeholders, potential negative as well positive impacts of a project and to prioritize which impacts to study further in the ESIA. This process is meant to avoid overlooking important impacts, mitigation and costs and to prevent potential conflicts. For instance, around water use or resettlement. The NCEA made observations on the scoping document / ToR which may limit a comprehensive impact assessment.

Throughout the scoping document / ToR statements are made which suggest that certain impacts will be minor. Negative impacts are anticipated during construction, while during the operation phase, only positive impacts are expected. This seems premature. In earlier sections, several potential impacts have been highlighted that need to be considered in the ESIA, such as the quality and quantity of water resources (§ 2.2) and health impacts related to domestic wastewater (§.2.5). In addition, the NCEA thinks that the following potential impacts and considerations also need to be part of a full assessment:

- **Affected groups:** the project may cause nuisance during construction, affect livelihoods (e.g. due to changes in fish stocks) or the availability, accessibility and use of water by different groups (e.g. downstream users, informal settlements, poor households). These affected groups need to be identified.
- **Resettlement:** there is a likely chance that resettlement will need to take place. It is not yet clear who will be affected. The scoping document / ToR need to provide a framework for incorporating the following information in the ESIA:
 - Land use and tenure maps including informal settlements and customary land users.
 - An overlay map of the project layout.
 - Applicable legislation and regulations.
 - How resettlement will be prevented or minimised and implemented.
 - How the project will deal with informal settlements, non-titled land users and vulnerable groups.
 - How compensation rates and measures will be established, and by whom.

- How grievance mechanisms will address concerns and resolve disputes.
And at whose cost?
- **Biodiversity and ecosystems.** the scoping document / ToR refer to the existence of four national forests and a game reserve within the district boundaries. According to the data provided (including references dating back to 1968) these forests contain several vulnerable, near threatened and even critically endangered species. It is concluded that there will be no impacts because the project does not take place in these forests. The NCEA thinks that this conclusion is not substantiated: it is not indicated in the scoping document where these forests and the game reserve are located. Neither does the scoping document explain if downstream impacts due to water extraction can be ruled out. The ESIA should bring more clarity to this issue.
- **Dealing with uncertainties:** some uncertain factors could have an influence on the water supply system's functioning, and its impacts. Population growth could turn out to be much lower than expected if copper prices drop and mining companies withdraw from Solwezi. The delivery of energy could persist as a problem, if the current energy shortages remain unresolved. Willingness to pay for water supply seems to be assumed, yet not certain. The scoping document / ToR need to outline uncertainties and prescribe how the ESIA is supposed to deal with uncertainties, for instance through scenario analysis.
- The study area for impact assessment is suggested to be the direct project area. **Certain impacts may however occur beyond the project area boundaries**, for instance near the water intake points or downstream.
- Although the study of **cumulative impacts** is mentioned, no further guidance or specification is given for this study. The scoping document / ToR need to be clear about which cumulative impacts are to be assessed and how.

In addition, the NCEA has difficulties understanding the maps, demographic figures and targets of the project. Reference is made to Solwezi, Solwezi urban area, Solwezi district and utility service area. Also, various time horizons, numbers on population (now and future) and people served by the utility (now and future) are given. No map is provided outlining the potential location of all infrastructure.

Recommendations:

1. Include in a revised scoping document / ToR the following:
 - Clear maps and figures on the project's target areas and the infrastructure planned.
 - Instructions to assess the impacts and mitigation measures.
 - Land tenure and land use maps, to facilitate the identification of affected groups.
 - An outline of how the project will deal with resettlement.
 - An outline of how the project will deal with gender issues, informal settlements, informal land tenure and the poor.
2. Give specific guidance for the cumulative impact study by specifying:
 - which impacts should be studied.
 - time and spatial boundaries for identified impacts.
 - which other developments in the area should be considered.
3. Consider in the ESIA a scenario analysis, including maximum and most likely scenarios, to deal with uncertainties.

3. IFC Performance Standards

IFC Performance Standards	Review findings for scoping / ToR for the ESIA
PS-1: Assessment and Management of Environmental and Social Risks and Impacts	
<ul style="list-style-type: none"> • Identify and evaluate environmental and social risks and impacts in the project’s area of influence. Avoid or minimise and compensate/offset for impacts. • Promote improved environmental and social performance (also of clients) through the effective use of management systems, incorporating SEA, a management programme, organisational capacity training, community engagement, monitoring and reporting. • Develop a Stakeholder Engagement Plan (SEP) and provide means for adequate engagement with Affected Communities and disseminate information throughout the project. • Establish a Grievance Mechanism to address grievances from Affected Communities and to respond to external communications from other stakeholders. • Take into consideration and adopt differentiated measures for those differently or disproportionately affected because of their vulnerable or disadvantaged status. • Formulate an Environmental and Social Management Plan (ESMP) with desired outcomes, targets, estimates of the resources and responsibilities. 	<ul style="list-style-type: none"> ➤ The scoping document / ToR do not include a Stakeholder Engagement Plan (see § 2.4) for the project. Formulating a SEP as soon as possible would enable meaningful participation in the ESIA from the start. The SEP should describe the interests, roles and the capacity of key stakeholders and identify what support they need to fulfil their roles under the project. The ESIA should report on how stakeholders have been engaged and how their inputs have been considered in project design and describe a strategy for engagement throughout the project implementation. ➤ The scoping document / ToR do not identify and provide information on affected populations, partly because the source of water supply and further project design have not yet been decided. As soon as water source and project design are clear, affected groups should be identified and engaged. The full ESIA needs to provide information on: <ul style="list-style-type: none"> • Populations potentially impacted by any element of the project temporarily (e.g. noise during construction) or permanently, including those who may need to be resettled or whose livelihoods are impacted negatively, as well as downstream water users. • The social and economic situation, water use, land use and land tenure of affected populations • Measures taken to prevent, mitigate and compensate impacts and how the project deals with vulnerable and disproportionately affected groups (considering issues like gender, poverty, informal non-titled settlers). • A Resettlement Action Plan / Livelihood Restoration Plan each including its own Stakeholder Engagement Plan. ➤ The scoping document / ToR do not lay the groundwork for a description of the governance and management structure of the project, nor for an ESMP. At the scoping phase, the intended approach to developing the ESMP should be clear. The final ESIA needs to provide an overview of the organizational structures, responsibilities, mechanisms and programmes to show how the proponent will manage environmental and social risks, build capacity and implement and monitor the ESMP. ➤ The ESIA needs to describe fundamental principles as well as detailed design of a project-specific grievance mechanism, now not referenced in the scoping report / ToR. ➤ Sub-contractors and supply chains are yet to be identified. The ToR does not require the ESIA to describe procedures / regulations to which the proponent must subscribe as a condition of their appointment.

PS-2: Labour and Working Conditions	
<ul style="list-style-type: none"> • Promote the fair treatment, non-discrimination and equal opportunity of workers, including a gender policy. • Establish, maintain, and improve the worker-management relationship. • Promote compliance with national employment and labour laws. • Protect workers, including vulnerable categories of workers such as children, migrant workers, workers engaged by third parties, and workers in the client's supply chain. • Promote safe and healthy working conditions, and the health of workers. • Avoid the use of forced labour. • Establish an accessible Grievance Mechanism for workers to raise workplace concern. 	<ul style="list-style-type: none"> ➤ The scoping document (page 25) and ToR make reference to this PS by indicating that it is triggered because the project will employ a significant workforce. There is also reference to Occupational Health and Safety legislation. Page 38 indicates that a Human Resource Policy will be developed to deal with employment contracts. ➤ However, the following is not yet clearly specified. The ESIA should outline: <ul style="list-style-type: none"> • Projected labor size for different types of labor and at different project phases • Principles and approach for recruitment, training and dealing with migrant labour. • How the project will secure a labour force at operational and organisational level, considering that local labour may be scarce due to employment opportunities in the mining sector. ➤ The ESIA could explore whether the project could create increased opportunities for female operators. ➤ All existing pipes will be replaced. These pipes contain asbestos. The ESIA needs to outline measures to ensure that the replacement of the current asbestos pipes and their disposal will not bring any harm to workers and communities.
PS-3: Resource efficiency & pollution prevention	
<ul style="list-style-type: none"> • Avoid or minimize adverse impacts on human health and the environment by avoiding or minimizing pollution from project activities. • Promote more sustainable use of resources, including energy and water. • Reduce project related GHG emissions. 	<ul style="list-style-type: none"> ➤ The scoping report outlines that this PS is triggered without further specification of targets and ambitions for the ESIA. The final ESIA needs to outline how the project will deal with: <ul style="list-style-type: none"> • Generated wastewater • Efficient use of water and energy • Byproducts from water treatment chemicals (used in in treatment process for coagulation and disinfection) • Substances that leach from materials used in distribution and plumbing or from corrosion treatment of pipes. ➤ There could be opportunities for efficiency gains by collaborating with the mining companies which have not yet been explored. The treated wastewater from the project could be delivered to the mines, who on their turn would need to extract lesser quantities of water. During the ESIA, the proponent could engage with the mines to explore interest and opportunities on this matter.
PS 4 - Community Health, Safety & Security	
<ul style="list-style-type: none"> • Evaluate, prevent and mitigate adverse impacts and risks on the health and safety of the Affected Community during the project life from both routine and non-routine circumstances like: <ul style="list-style-type: none"> - Public access to the project - Exposure to hazardous materials 	<ul style="list-style-type: none"> ➤ The question of water supply without sanitation is not addressed (see §2.1). ➤ There is no reference to developing plans to deal with project-related emergencies, nor emergency response mechanisms, for outbreaks of disease, energy shortages, etc.

<ul style="list-style-type: none"> - Impacts on priority ecosystems - Exposure to water related and communicable disease • Ensure that preventive and control measures are consistent with relevant human rights principles and Good International Industry Practices. • Emergency Response must be coordinated and viable in terms of capacity of responsible agencies and communicated to Affected Communities. • Project Grievance Mechanism (PS1) will receive affected people’s concerns about security arrangements and acts of personnel. 	<ul style="list-style-type: none"> ➤ Reports make brief reference to possibility of water contamination during construction, but not identify air emissions <i>e.g.: from passing or idling trucks, dust.</i> ➤ The ESIA needs to assess risks associated with either private or public security personnel and how grievances about their arrangements and behaviour will be addressed.
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PS 5 – Land Acquisition & Involuntary Resettlement

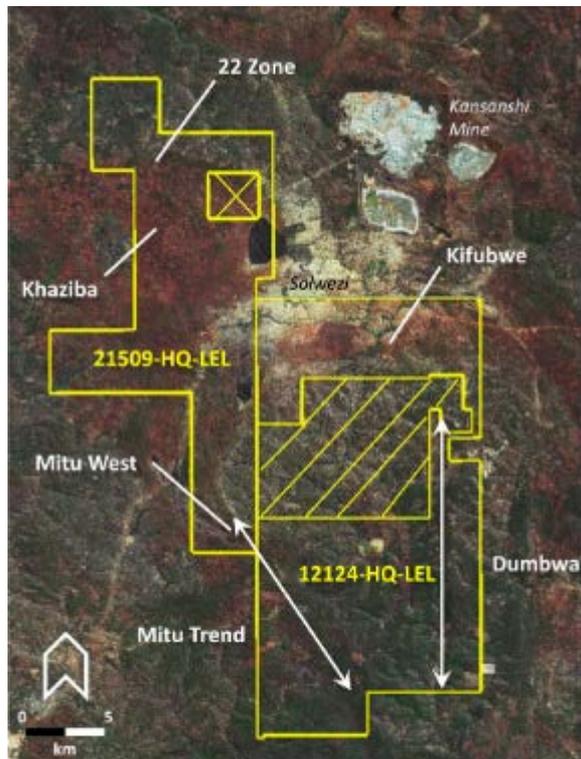
<ul style="list-style-type: none"> • Minimise forced evictions. • Avoid or minimise economic or physical displacement by exploring alternative project designs, including associated facilities. • Minimise adverse social and economic impacts from land acquisition or restrictions on land use by compensation, restoring and improving livelihoods, provision of adequate housing, security of tenure. Formulate a Resettlement Action Plan and Livelihood Restoration Plan when needed. • Establish Grievance Mechanism to receive and address concerns. Ensure that resettlement activities are implemented with appropriate disclosure of information, consultation and informed participation. 	<ul style="list-style-type: none"> ➤ The scoping document / ToR point out that this PS will be triggered because resettlement (permanent or temporary) may take place for some facilities for water treatment and water storage which require land acquisition. ➤ It is not yet known who exactly is going to be affected, because the location of infrastructure is still to be determined. Once this is determined, a map of the project infrastructure can be superimposed onto a Land Use and Land Tenure plan. This will inform the assessment whether people will indeed be affected temporarily or permanently. Ensure that temporary land acquisition (borrowed land) e.g. for construction camps and excavation are considered. ➤ For people whose land will be acquisitioned permanently, a RAP will be prepared and for those whose livelihood affected a LRP. The ToR refers to a RAP but without any statement of principles or guidelines to its design. Livelihoods being affected is included in the ToR but no reference to the need for a LRP (while it is referenced in the scoping document on page 27). The ToR should provide a framework of principles and approach on incorporating the following information in the ESIA: <ul style="list-style-type: none"> • Description of people whose land is affected by the project temporarily or permanently: their livelihood, land use and land tenure situation and possible need for resettlement. • Steps to be taken to resettle and/or compensate, establish compensation rates. • Legislation, regulations and project approaches dealing with informal settlers and customary land tenure. • The formulation of a SEP for each the RAP and the LRP and its specific grievance mechanism ➤ The likelihood that there will be need for land acquisition and resettlement, including for access roads or pedestrian paths, construction camps and road widening.
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PS 6 Biodiversity, Conservation and Sustainable Management of Living Resources	
<ul style="list-style-type: none"> • Protect and conserve biodiversity. • Maintain the benefits from ecosystem services. • Promote the sustainable management of living natural resources through the adoption of practices that integrate conservation needs and development priorities. 	<ul style="list-style-type: none"> ➤ There are 5 areas within the district boundary designated as national park or Game Management Area (Solwezi National Forest no 110, Mbonge National Forest no 58, Mutanda National Forest no 113 and Mulenga National Forest). It is reported these contain several critically endangered species. The scoping concludes no severe impacts will take place. Hence impacts on these areas are left out of the ESIA scope, without giving any further justification and information. ➤ The ToR could ask the following of the ESIA: <ul style="list-style-type: none"> • Need to make inventory of flora and fauna of finally selected infrastructure locations and offset if needed. • Show a map and data where these forests are, their vulnerability, if there is any hydro(geo)local connections to the project area. Could the project have an impact? ➤ Although no severe impacts are expected, the scoping (page 23) refers to National Biological Diversity Strategy Action Plan with the goal to conserve ecosystems, genetic diversity and sustainable management of biological resources. What are the implications of this action plan for the project and ESIA?
PS 7 – Indigenous People	
<ul style="list-style-type: none"> • Avoid or minimise impacts on indigenous peoples. • Ensure sustainable and culturally appropriate development of benefits and opportunities. • Ensure Free, Prior and Informed Consent (FPIC) where populations described as indigenous people are affected by the project. 	<p>The Scoping Study / ToRs state that this PS is not triggered as there are no IPs in the project area. This should be confirmed during the ESIA.</p>
PS 8 – Cultural Heritage	
<ul style="list-style-type: none"> • Protect cultural heritage from the adverse impacts of project activities and support its preservation. • Promote the equitable sharing of benefits from the use of cultural heritage. 	<ul style="list-style-type: none"> ➤ There seems to be a good understanding of the strong cultural importance attached to some sites in the Solwezi area, particularly those relating to water and especially waterfalls, including those around Mutanda River. ➤ It is stated (scoping document page 29) that this PS is triggered because of one archaeological site and several heritage sites. Page 36 mentions the need for an Archaeological baseline assessment and that procedures are in place to deal with this. The project will seek guidance from National Heritage Conservation Commission when needed. The ToR could bring more clarity to how they will be engaging, their roles and at whose costs. It would be helpful to outline how this heritage assessment relates to the ESIA process. ➤ In case risks are encountered, the mitigation measures need to be included in the ESMP along with clear monitoring roles to ensure effective implementation.

Annex 1: Programme Field Visit

DAY	MEETING	PURPOSE
Monday 11 th Nov 2019 morning 08:30 –10:45 hrs.	a) North Western Water and Sewerage Company (NWSSCL) 1. CEO Project manager 2. Core & non-core members 3. Special guest: ZEMA Solwezi	Project Proponent presents the project, scoping/ ToR. Exchange between the NCEA working group, ZEMA and the proponent on questions for clarification.
Monday 11 th Nov2019 afternoon 15:00 – 18:00	Go around at project site with NWSSCL, the NCEA working group.	Get an impression of project related locations: <i>-potential new water source</i> <i>-water distribution pipe routes</i> <i>-water storage and treatment plants</i> <i>-existing water infrastructure</i>
Tuesday 12 th Nov,2019 08:30 13:00 hrs.	a) WARMA/MWDSEP local office b) Solwezi Municipal Council c) Resettlement Department e) Heritage Department f) Forest Department e) ZEMA Solwezi office	Exchange about these institutions' engagement in the scoping process and their views on the impacts, mitigation and roles in this project.
Wednesday 13 th Nov,2019 (Lusaka)	<ul style="list-style-type: none"> • WARMA • Ministry of Water Development, Sanitation & Environmental Protection 	Exchange about these institutions' engagement in the scoping process and their views on the impacts, mitigation and roles in this project.
Thursday (Lusaka)	<ul style="list-style-type: none"> • GIZ • ZEMA 	ZEMA and the NCEA exchange about their own review findings and discuss overlaps / differences.
Friday Start: 10:30 (Lusaka)	Morning: final meeting, NWWSSCL, SEUS and ZEMA	Present draft conclusions and recommendations of the NCEA working group and ZEMA.

Annex 2: Map: areas of new mining exploration



Solwezi Copper area

Source: <https://www.midnightsunmining.com/zambian-properties/#twenty-two-zone>

Annex 3: Groundwater and surface water modelling

In order to understand the short- and long-term water availability at a specific water source, there is first a need to understand the inflow and the outflow of the hydrologic system that the potential water source is part of (a so-called water balance). The water balance helps to determine how much water can be withdrawn from a source, while maintaining minimum environmental flows (for surface water) or preventing extraction wells from going dry (for groundwater). It will also need to be decided which methods, like modelling or the use of analytical formulae, are appropriate to evaluate the (cumulative) impacts of water withdrawals. On this basis it will be possible to identify impacts that can jeopardize the environmental flow.

A groundwater model

A groundwater model helps to understand the current groundwater system and to quantify impacts of water extraction. After calibration, a model can be used to calculate necessary protection zones around the well fields, it can simulate possible future flow regimes, and help take into account the impacts of e.g. future mining activities and climate change.

For a groundwater model to be reliable, several input parameters have to be available, as well as realistic values. In order to come to a useful groundwater model, the following data are indispensable:

- Ground level (from terrestrial measurements, or programs like ESRI world DEM (a Digital Elevation Model, freely accessible on the internet) and Google Earth. This is an important parameter to delineate the catchment area and set the upstream borders of the study area.
- Thickness of the relevant lithological layers (aquifers and aquitards) throughout the study area.
- Information on the groundwater extractions (location, depth, dynamic or mean volume).
- Information on surface water bodies (location, depth, dynamic or mean water level).
- Groundwater heads. These are indispensable as on the one hand they shed light on the location of the water divides which will act as the boundaries of the area to be modelled and on the other hand they serve as calibration data.

For other data, values that are not fully representative for the area can be used in the absence of reliable data. The first model runs can be made using generic values. During the calibration process these initial values are modified to come to as realistic a simulation as possible. These other data include:

- Precipitation/recharge (a value can be deduced from meteorological measurements stations data that do not necessarily lie within the study area).
- Land use, vegetation and slope are three parameters that determine what percentage of the precipitation will infiltrate and form the recharge of the aquifer.
- Permeability (an area-wide value will be deduced from the measurements obtained from pumping tests).
- Storage coefficient: This refers to the amount of water that can be removed from an aquifer for a given drop in hydraulic head. An area-wide value can be deduced from the measurements obtained from the pumping tests.

A calibrated model gives profound insight into the behaviour of the hydrogeological system.

The outcomes of the calibrated model run are a groundwater *balance* of the whole study area or a specific subarea and maps showing the groundwater heads isolines within the aquifers. It will also be possible to calculate the recharge areas of the well fields, so that the boundaries of groundwater protection zones can be designated.

Once the groundwater flow has been calculated, the flows can be used as input for a transport model. This model can calculate (i) the effect (concentration in time) of possible spills anywhere in the study area and (ii) the time it takes for a plume of pollution to reach the pumping wells.

When data for groundwater modelling are lacking:

In case the amount of reliable data proves to be insufficient to develop a realistic groundwater model, it is possible to obtain a general idea of the impact by applying the Thiem equation for confined aquifers.

Groundwater-related information that is already available to the project:

- Ground level (from Google Earth or ESRO world DEM, but probably also terrain measurements)
- Some scattered information on the thickness of the aquifers and aquitards.
- Location of the surface water bodies
- Some groundwater heads, though neither the number, nor the location of the measurements are clear
- Precipitation from the meteorological station at Solwezi airport (1997 – 2016).
- Point permeability values will be available from the pumping tests that were carried out by Aquaquest in November 2019
- Point storage coefficient values may be available from the pumping tests that were carried out by Aquaquest in November 2019.

Groundwater-related information that is not presented or is insufficient:

- Groundwater quality. Information on water quality can be obtained by taking water samples and having them analysed.
- Information on the stratigraphy. This can be obtained from prior drillings and geophysical surveys.
- Land use and vegetation. Ideally, digital land use and vegetation data are needed. If this is not available, the WaPOR-database (FAO) can give a (not very detailed) indication.
- Slopes can be deduced from the ESRI world DEM database.
- The depth and water levels of the surface water bodies. These are important values when determining the interaction between surface water and groundwater.
- Groundwater heads, to be measured in piezometers and wells. During the mission no actual data were made available, but the NCEA was told that data did exist. The amount of data and the reliability of this data is unknown to the NCEA. If not available, a one-off monitoring campaign could be realised, observing the heads in all available piezometers. Depending on the number of piezometers, this could take between 1 – 5 days. Not only the heads should be registered, but also the depth of the piezometers and, if known, the formation it represents. Wells may also be included, as long as it is duly registered that the observed heads come from wells, not from piezometers, especially of the wells that are still being used, as these may give rise to incorrect conclusions as to the impact of a new well field. The results of the campaign will give insight in the static head distribution.

A surface water model

For a surface water model realistic values on the following input parameters are needed:

- Profile and water levels of the watercourses
- Input (inflow from the surrounding catchment, volumes of precipitation, seepage to the groundwater)
- Output (water extractions, volumes of any kind of extractions, infiltration)
- Location of the rivers
- Water levels of the rivers
- Water quality.

A surface water model can show the surface flow entering the ecosystems in case of a water intake of 0,23 m³/s (estimated intake needed for this project).

When data are lacking to develop a reliable surface water model, a simplified approach may give an idea of the impact of water extraction. For this, the water divide could be delineated (for example by using ESRI world DEM). With the aid of the precipitation data and a chosen distribution between surface runoff towards the river and infiltration, some ideas of the volume of water flowing into the river could be obtained.

In order to come to an environmental flow assessment, a decision needs to be made as to what ecosystems are to be preserved and the associated demands for water quality and quantity. For more information about the requirements for an environmental flow assessment, the World Bank Water Resources and Environment Technical Note C1 'Environmental Flow Assessment: Concept and Materials' could be a useful reference.

Surface water–related information available/not yet available:

Concerning the parameter "location of the rivers", information is available. Likely also in digital format.

No information as to the availability and format of the following parameters was found during the NCEA mission. The following information needs to be brought together in order to be able to come to a surface water balance:

- Profile and water levels of the watercourses. Some information was found on this parameter, though the comments concerning the reliability of the data in the Inception Report are contradictory. The only way to obtain information on this parameter is by measuring the profile (once) and the water level.
- Input (volumes of precipitation, seepage to the groundwater).
- Output (volumes of any kind of extractions, infiltration).
- Inflow from the surrounding catchment.
- Water usage (extractions) along the rivers.
- Water quality parameters.