

**MANAGEMENT RESPONSE TO
REQUEST FOR INSPECTION PANEL REVIEW OF THE
KENYA: WATER AND SANITATION SERVICE IMPROVEMENT PROJECT
(P096367) AND WATER AND SANITATION SERVICE IMPROVEMENT
PROJECT – ADDITIONAL FINANCING (P126637)**

Management has reviewed the Request for Inspection of the Kenya: Water and Sanitation Service Improvement Project (P096367) and Water and Sanitation Service Improvement Project – Additional Financing (P126637) received by the Inspection Panel on November 29, 2016, and registered on January 12, 2017 (RQ16/10). Management has prepared the following response.

February 17, 2017

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ABBREVIATIONS AND ACRONYMS

AFD	Agence Française de Développement
AWSB	Athi Water Services Board
EIA	Environmental Impact Assessment
ESIA	Environmental and Social Impact Assessment
GRS	Grievance Redress Service
IDA	International Development Association
IPE	Independent Panel of Experts
MC	Murang'a County
MC TC	Murang'a County Technical Committee on Northern Collector Tunnel Project
NCT1	Northern Collector Tunnel Phase 1
NEMA	National Environmental Management Authority
NIB	National Irrigation Board
OP	Operational Policy
RTCNT	Report of the Technical Committee on Northern Collector Tunnel Project
SMP	Social Management Plan
WaSSIP	Water and Sanitation Service Improvement Project
WaSSIP AF	Water and Sanitation Service Improvement Project – Additional Financing
WRMA	Water Resource Management Authority

Currency Unit – Kenyan Shilling (as of February 10, 2017)

1 KES = 0.0096 USD

1 USD = 103.85 KES

EXECUTIVE SUMMARY

Inspection Panel Request and Background

i. ***The Kenya Water and Sanitation Service Improvement Project (WaSSIP, P096367) and the Water and Sanitation Service Improvement Project – Additional Financing (WaSSIP AF, P126637) aim to alleviate the impacts of Kenya’s water scarcity by improving access to reliable, affordable, and sustainable water supply and sanitation services.*** Arid and semi-arid lands account for more than two thirds of Kenya’s land area and the country’s management and investment in water resources have been neglected for many years. The inability of the utilities to deliver adequate services has disproportionately hurt poor residents, especially those living in informal settlements, who often need to get water from private sources, which are overpriced and difficult to access.

ii. ***A Master Plan for Developing New Water Sources for Nairobi and 13 Satellite Towns recommends the Northern Collector Tunnel Phase 1 (NCT1), the subject of the Request, as a priority investment for supplying additional water to Nairobi.*** The Master Plan recommended a series of investments for tunnels, dams, and conveyance and treatment works including the Northern Collector Tunnel. The original WaSSIP credit is closed and the closing date of the WaSSIP AF is December 15, 2017. The WaSSIP AF credit is 63 percent disbursed. The Board approved the US\$300 million WaSSIP AF in 2012, which included financing for the NCT1. Conveyance and treatment infrastructure, including a water treatment plant, transmission mains, and distribution networks, are being financed by the Agence Française de Développement (AFD) and the International Development Association (IDA).

iii. The Requesters allege that the water transfer from the rivers in their area would have irreversible environmental impacts and cause water shortages, leading to food insecurity and domestic water scarcity.

Management Response

iv. ***The NCT1 will have significant positive impacts on a large number of beneficiaries in Nairobi and Murang’a County. Management does not believe there will be significant negative impacts from the scheme, and temporary impacts that may occur during construction have been carefully analyzed and mitigated.*** A comprehensive monitoring program of the water sources above the tunnel is in place and water will be delivered by trucks to affected communities should there be any temporary adverse impact on the wells above the tunnel. Once completed, the NCT1 will be a completely watertight tunnel and no groundwater will be able to enter it. Rainfall is expected to restore any drop in the water level that might occur in wells during construction. Since the project is designed to use part of the excess water flows when the rivers flood (and not water from regular flows), no changes to normal and low flows are anticipated. The remaining water flow should be sufficient to supply any downstream water schemes that have been built or are still in planning. The flood water flow abstracted by the NCT1 is currently not being used, as there is no water storage available until the water reaches Masinga dam (90 km

downstream). Further, at Masinga dam, the impact of the future water abstraction by the NCT1 will be insignificant, representing only 2.7 percent of inflows to the dam. Management emphasizes that Kenyan regulations prioritize drinking water above all other uses of water resources, and the NCT1 will not abstract any water from the normal flows that supply this water for human needs.

v. ***Management understands the concerns of the Requesters regarding potential impacts that could arise from the project. However, based on the comprehensive studies examining the project's potential impacts, there are no indications that the NCT1 would cause adverse impacts to people living above the tunnel alignment. Management is confident that potential environmental, health or safety impacts from the project have been thoroughly studied and consulted upon,*** and that they are appropriately addressed by the design and mitigation measures that the project has established. This includes a fully watertight tunnel as well as intake structures which can only divert water to the NCT1 when the water level reaches flood level, and no diversion can occur during normal or low flows. The design was informed by the consultation on the Environmental and Social Assessment (ESIA), as well as additional stakeholder consultations and by an Independent Panel of Experts (IPE). A comprehensive monitoring plan is in place to ensure the effectiveness of the project's mitigation measures.

vi. ***Management further notes that many of the Requesters' concerns are based on either inaccurate reports*** that had to be corrected, or on draft documents that have been updated since.

vii. ***Despite repeated efforts by the project team, the World Bank's Grievance Redress Service (GRS), the implementing agency and an Independent Panel of Experts (IPE) to discuss the Requesters' concerns, the Requesters were not available for a meeting either in person or by video/phone.*** In light of the complex nature of the project and the outdated information on which the Requesters based their claims, such a meeting would have been helpful to discuss the Requesters' concerns and project documentation, and explore additional mitigation measures.

viii. Management notes that a lawsuit has been filed to contest the project. A stop order was issued and then rescinded by the Kenya High Court. The matter is now pending with the Court of Appeal and has not yet been heard.

ix. ***Management believes that the project is technically sound and that its design is based on thorough studies that were undertaken by reputable international firms, and reviewed by the Bank and the IPE.*** The IPE was initiated by the agency implementing the Project, the Athi Water Services Board (AWSB), to review the technical designs and construction methodology, as well as the project's potential environmental and social impacts, and to review the implementation of the project until commissioning and initial operation stage. The selected design of a fully lined watertight tunnel is a well-known and tested technology applied worldwide when tunnels need to pass through areas with aquifers, or under rivers or other water bodies. The lining of the NCT1 will prevent leakage or intrusion, and hence will not affect any surface or ground water in the tunnel's alignment.

x. ***Management also emphasizes that the project complies with the applicable Bank policies.*** The potential risks and impacts pointed out by the Requesters have been identified and analyzed in the project design and ESIA, and mitigation measures are put in place to manage impacts. Stakeholder consultation and information disclosure associated with the preparation of the ESIA was conducted in line with Bank policy and continues during project implementation. Bank Management and AWSB have made significant efforts to address local community concerns.

xi. ***In Management's view, the Bank has followed the policies and procedures applicable to the matters raised by the Request. As a result, Management believes that the Requesters' rights or interests have not been, nor will they be, directly and adversely affected by a failure of the Bank to implement its policies and procedures.***

I. INTRODUCTION

1. On January 12, 2017, the Inspection Panel registered a Request for Inspection, IPN Request RQ 16/10 (hereafter referred to as “the Request”), concerning the Kenya: Water and Sanitation Service Improvement Project (WaSSIP, P096367) and Water and Sanitation Service Improvement Project – Additional Financing (WaSSIP AF, P126637), financed by the International Development Association (IDA).

2. *Structure of the Text.* Following this introduction, the document contains the following sections: Section II describes the Request; Section III presents country background and the objectives of the projects; and Section IV contains Management’s response to the Request. Annex 1 presents the Requesters’ claims, together with Management’s detailed responses, in table format.

II. THE REQUEST

3. The Request for Inspection of the Northern Collector Tunnel Phase 1 (NCT1) project, which is part of the WaSSIP AF, was submitted by 47 residents of Murang’a County, supported by a local nongovernmental organization (hereafter referred to as the “Requesters”). The Requesters asked that their identities be kept confidential. Attached to the Request are a detailed explanation of alleged harmful impacts; the Report of the Technical Committee on the Northern Collector Tunnel Project (RTCNCT); and a list of members and signatures. No further materials were received by Management in support of the Request.

4. The Requesters claim that the water transfer from the rivers in their area to the NCT1 would have irreversible environmental impacts and cause water shortages, leading to food insecurity and domestic water scarcity. They also allege that the environmental and social impact assessment for the NCT1 was not comprehensive, and community participation in this process was insufficient. Finally, the Requesters are concerned about the impartiality of the Independent Panel of Experts (IPE) constituted under the NCT1 project. The concerns raised in the Request can be organized in five categories:

- *Environmental and Social Impacts:* The Requesters allege that the environmental and social impact assessment for the NCT1 was not comprehensive and as a result, the tunnel is being constructed without adequate geotechnical studies to map rocks, aquifers, water table, swamps, and springs, or to identify associated mitigation measures. They believe tunneling will puncture aquifers, interrupt underground water flow paths and cause rivers and springs to dry up. The Requesters further allege that contractors were engaged to commence works before the issuance of the relevant environmental license.
- *Water Availability:* The Requesters are concerned about possible water shortages for domestic, agricultural and industrial use when water from the rivers is diverted into the NCT1.

- *Water Storage Capacity:* The NCT1 will deliver water to the Thika dam (also called Ndakaini dam), and the Requesters allege that this dam does not have sufficient storage capacity to absorb additional water intake, leading to spillage and wasted flood flows that otherwise would have been used to replenish the water table in low-lying lands.
- *Community Participation:* The Requesters allege that impacts from the NCT1 were not properly explained to relevant communities.
- *Independent Panel of Experts:* As a response to earlier complaints received from the Requesters and Murang'a County, the Athi Water Services Board (AWSB) formed an IPE to study the project. The Requesters raise concerns about the functioning of the IPE and question its impartiality.

III. PROJECT BACKGROUND

5. *The Request refers to activities financed under the WaSSIP and the WaSSIP AF.* Both projects aim to alleviate the impacts of Kenya's water scarcity by improving access to reliable, affordable, and sustainable water supply and sanitation services. A video¹ illustrates the benefits of the projects.

6. *The Projects.* The Bank's Board of Executive Directors approved the US\$150 million Kenya WaSSIP in December 2007. The development objectives of the project are to (a) increase access to reliable, affordable, and sustainable water supply and sanitation services; and (b) improve water and wastewater services in the areas served by the AWSB, Coast Water Services Board, and Lake Victoria North Water Services Board. Under the project, and with support from the Agence Française de Développement (AFD), the Ministry of Water and Irrigation, through the AWSB, undertook a Feasibility Study in 2010 and prepared a Master Plan for Developing New Water Sources for Nairobi and 13 Satellite Towns. The key objective of the study was to identify sufficient water sources to meet the short- and long-term water needs for Nairobi City and the satellite towns.

7. The Master Plan recommended the NCT1, the subject of the Request, as a priority investment for supplying additional water to Nairobi. The NCT1 project consists of a tunnel which will transfer raw water through approximately 11.8 km from intakes at the Maragua, Gikigie and Irati Rivers to an outlet at the Githika River near Makomboki, upstream of the existing Thika (Ndaikaini) Reservoir, which serves Nairobi County, into which the water will be transferred. In 2012, the Board approved the US\$300 million WaSSIP AF, which included financing for the NCT1. Conveyance and treatment infrastructure, including a water treatment plant, transmission mains, and distribution networks, are being financed by AFD and IDA. The NCT1, which aims to reduce water shortages in Nairobi City, is the largest contract (US\$80 million) under WaSSIP and will be implemented by the AWSB.

¹ <http://awsboard.go.ke/our-projects/nct-1-project/nct-1-3d-documentary/>

8. **Environmental and Social Safeguards.** Under the AF, the project's Environmental Assessment category was changed from B to A to reflect the potentially significant environmental and social impacts of the NCT1. As a Category A under the Operational Policy on Environmental Assessment (OP4.01), the project required a full environmental assessment. An Environmental and Social Management Framework (ESMF) and Resettlement Policy Framework (RPF) for the overall project were prepared and disclosed on December 20, 2011, after consultations with stakeholders and prior to appraisal. As some of the civil works in the area of the Lake Victoria North Water Services Board may affect or involve indigenous communities, an Indigenous Peoples Planning Framework was prepared and disclosed on December 15, 2011. No Indigenous Peoples are living in the area of the NCT1. An Environmental and Social Impact Assessment (ESIA) was prepared and cleared by the Bank on January 25, 2015 specifically for the NCT1 project.

9. The ESIA indicated that the most significant potential environmental and socioeconomic impacts that could result from the project would be related to the diversion of water, and the resulting reduction in downstream flows in the affected rivers. Such potential impacts, which could be long-term, required an assessment of the downstream "reserve flows/compensation flow,"² and of the tunnel design. The selected design and mitigation measures were informed by the ESIA to ensure that no long-term environmental and socioeconomic impacts occur. Additional impacts were related to the construction of the facilities themselves, but these were expected to be local and relatively short-term.

10. Finally, given the possible inclusion of dam rehabilitation works at Thika dam and that dam safety plans might consequently be required, OP4.37, Safety of Dams, was applied.

11. **Project Status.** The original WaSSIP credit is fully disbursed and the project is closed. The closing date of the WaSSIP Additional Financing is December 15, 2017. It has disbursed about 63 percent to date. The NCT1 construction is currently ongoing (see photos in Annex 1).

12. **Master Plan.** The total developed water production capacity for Nairobi City is 550,000m³/day, against a current projected demand of 760,000m³/day. The Master Plan, which was launched in 2012, provided a development blueprint comprising least cost development options based on a multi-criteria analysis to meet demand up to 2035. The analysis included, among other criteria, the potential environmental impacts and impacts on downstream water users. Five phases of development were recommended for Nairobi City:

- **Phase 1 (2012-2015):** Groundwater exploration and development of a wellfield subject to supporting results from exploratory phase, yield 45,000m³/d;

² The *compensation flow* is defined as the water flow which will at no time be affected by the NCT1 intakes, to ensure the environmental flow and to satisfy the water demand of the downstream users. Only flows above the compensation flow can enter the NCT1.

- *Phase 2 (2012-2016)*: Northern Collector 1, diverting water from Irati, Gikigie, and Maragua Rivers to Thika dam and construction of transmission mains and a water treatment plant, yield 140,000m³/d;
- *Phase 3 (2017-2020)*: 30Mm³ Maragua dam, South Mathioya tunnel to transfer 1.02 m³/s to Maragua dam and 0.64m³/s to Thika dam and conveyance and treatment works, yield 132,000m³/d;
- *Phase 4 (2021-2025)*: Northern Collector 2, diverting water from Githugi, Hembe and North Mathioya Rivers and conveyance and treatment works, yield 120,000m³/d; and
- *Phase 5 (2026-2029)*: Ndarugu 1 dam and conveyance and treatment works, yield 216,000m³/d.

13. Following the exploratory phase, which showed that the groundwater is not sufficient to develop a wellfield, it was determined that efforts to improve water supply to Nairobi and surrounding towns should start with NCT1, which is currently under construction. It is unclear at this time whether the Bank will finance any future aspects of the Master Plan beyond the NCT1. A review of the Master Plan, financed by AFD and the Bank, is currently ongoing. It will consider and, where necessary, revise the recommendations for the next phases after the NCT1 is completed. This review process will include a comprehensive communication and consultation program. Any future engagement in the context of the Master Plan will be independent from NCT1 and will require a new set of safeguard analyses and instruments.

IV. MANAGEMENT'S RESPONSE

14. ***Management understands the concerns of the Requesters regarding potential impacts that might arise from the project. However, Management believes that the concerns raised by the Requesters are appropriately and adequately addressed by the project design and the mitigation measures that have been developed for the project.*** The design was informed by the ESIA consultation, and following further consultations with stakeholders from Murang'a County, appropriate changes to the design were made. A comprehensive monitoring plan is in place, which would trigger the application of mitigation measures (such as water delivery by truck) should there be any temporary impact on wells during construction.

15. ***The NCT1 is expected to have significant positive impacts on a large number of beneficiaries in Nairobi and Murang'a County. Management does not believe that there will be significant adverse impacts from the Project. Temporary impacts that may occur during construction have been carefully analyzed and mitigated.*** Since the project design is based only on using water from flood flows, there will be no change to the normal flow of the rivers. Analysis indicates that the project is not anticipated to have any significant hydrological impacts. The cumulative impacts of the project on hydropower generation schemes at Masinga dam, 90 km downstream of the NCT1 intakes, will be marginal, with an annual average reduction of inflow of about 2.7 percent. The intakes for the NCT1 are designed to use only water that comes from flood flows and nowhere else, thus allowing for the compensation flow to supply downstream ecological needs. Further detail is provided below and in Annex 1.

16. ***Management has repeatedly tried to engage with the Requesters, to discuss their concerns.³ Unfortunately, no meeting, video conference or phone call could be organized as the requesters either could not be available or declined to participate.*** In light of the complex nature of the project and the obvious misunderstandings on the Requesters' part, it would have been helpful for the Requesters to meet with Bank staff, in order to discuss their concerns and better explain where they disagreed with project documentation, and what additional mitigation measures could address their concerns.

17. ***Management underlines that it believes the project is technically sound and that its design is based on thorough studies that were undertaken by reputable international firms, and reviewed by the Bank and the IPE.*** The selected design of a fully lined watertight tunnel is a well-known and tested technology applied worldwide when tunnels need to pass through areas with aquifers, or under rivers or other water bodies. The lining of the NCT1 will prevent leakage or intrusion, and hence will not affect any surface or ground water in the tunnel's alignment.

18. ***Management also believes that the project complies with applicable environmental policies of the Bank.*** The potential risks and impacts pointed out by the Requesters have been identified and analyzed in the project design and ESIA, and

³ The GRS asked the Requesters to meet on seven separate occasions, by email on January 6, 2016; January 19, 2016; February 1, 2016; March 22, 2016; April 20, 2016; May 21, 2016; and October 17, 2016.

mitigation measures have been put in place to manage impacts. As required by Bank policy, the Borrower retained independent environmental assessment experts not affiliated with the project to carry out the ESIA.

19. ***Stakeholder consultation and information disclosure associated with the preparation of the ESIA was conducted in line with Bank policy.*** Public consultations on the ESIA were extensive, throughout the NCT1 project preparation, and relevant materials such as the draft ESIA report were made available to the public. Materials including a summary of the draft ESIA study report were distributed to stakeholders to inform their input ahead of each consultation session. The decision by the National Environmental Management Authority (NEMA) to grant the license for NCT1 construction was only taken after carrying out consultations with potentially affected persons and reviewing comments received from both members of the public and lead agencies. Management considers that project stakeholders, including the Requesters, have been sufficiently informed (see Annex 1, items 2 and 7 for more details).

20. ***The AWSB and Bank Management have made significant efforts to address local community concerns.*** After the completion of the ESIA consultations, the AWSB undertook further intensive consultations with key stakeholders in Murang'a County, including with the author of the Murang'a County Technical Committee's Report.⁴ Following these consultations, the AWSB agreed to increase the compensation flow above what was required by the ESIA, in order to address the remaining concerns of stakeholders in the county and to assure Murang'a County that there would be no impact on downstream uses.

21. ***Management notes that a lawsuit has been filed to contest the project and is still pending.*** An individual submitted an appeal to the National Environment Tribunal to contest the issuance of the NEMA license for the NCT1. After a lengthy process, the High Court ruled that the National Environmental Tribunal had no jurisdiction to hear the appeal. The complainant then appealed to the Court of Appeal but the case has not yet been heard.

22. ***Management notes that many of the Requesters' concerns are based on incorrect information from reports which were corrected later or from draft documents which were substantially revised prior to finalization.*** Specifically, the Requesters rely on the Murang'a County Technical Report, which purported to study project impacts but which did not undertake any site-specific studies and which was drafted without any input from or consultations with the implementing agency. Such consultations with the implementing agency took place only later and as a result, Murang'a County, including the author of the cited report, issued a revised set of recommendations in the form of a "consensus matrix," based on discussions between the implementing agency and the report's author. This consensus matrix (Annex 2) was later reviewed and approved by the Murang'a County Assembly.

23. ***As the Requesters state, they submitted a complaint to the Bank's Grievance Redress Service (GRS) in December 2015. The complaint raises the same issues that are***

⁴ Report of the Murang'a County Technical Committee's on Northern Collector Tunnel Project (MC TC).

now included in the Request for Inspection. The GRS asked the Requesters to meet or speak on the phone or by video on at least seven separate occasions, including the possibility to meet in person in Kenya. However, no meeting or phone conversation was possible as the Requesters were either not available, or declined to meet. Management remains committed to engage with the Requesters and other project-affected people to discuss their concerns and consider further mitigation or contingency measures that they may present.

24. The Requesters' claims, accompanied by Management's detailed responses, are provided in Annex 1. Specific issues are discussed below.

Specific Issues Raised in the Request

a. *Allegation: The environmental and social impact assessment for the NCT1 was not comprehensive and as a result, the NCT1 is being constructed without adequate geotechnical studies to map rocks, aquifers, water table, swamps, springs and associated mitigation measures. Tunneling will puncture aquifers, interrupt underground water flow paths and cause rivers and springs to dry up.*

25. ***Management has reviewed the ESIA and is confident that it was rigorous and thorough, complying in all aspects with the applicable Bank policies.*** A full ESIA for the NCT1 was conducted and finalized in January 2015. The ESIA was cleared by the Bank and the NEMA license was obtained before the construction commenced. The ESIA is a very comprehensive document that includes ecological field investigation, which led to a revision of the technical design to accommodate the ecological requirements of the rivers, especially for trout (this also guided the inclusion of fish ladders into the intake design). In addition, the Borrower convened an IPE to review the technical designs and construction methodology, as well as the project's potential environmental and social impacts, and also to assist during the implementation of the project. It is important to note that the process of establishing and operating the IPE has followed good international practice, and the IPE has drawn highly experienced expertise from key sectors nationally and globally. The IPE confirmed the design of the project and made minor suggestion for improvements, all of which were adopted and implemented (see also paragraphs 1-41).

26. ***Based on the comprehensive studies examining the project's potential impacts there are no indications that the NCT1 would cause adverse impacts to people living above the tunnel alignment.*** The design was informed by adequate geotechnical studies as described in Annex 1 (Items 8 and 43). It is not possible for the tunnel to interrupt groundwater flows, as alleged in the Request. Such groundwater flows occur over a large area, in the context of which the tunnel is a small obstacle that flows will pass around (see Figure 1 below). To avoid any water seepage into the tunnel, the entire tunnel will be lined with a watertight lining, following international best practice. Given that the tunnel will be fully watertight and grouted to the outside rock, it is not plausible that rivers or springs would "dry up" as alleged, nor can the NCT1 "puncture" aquifers.

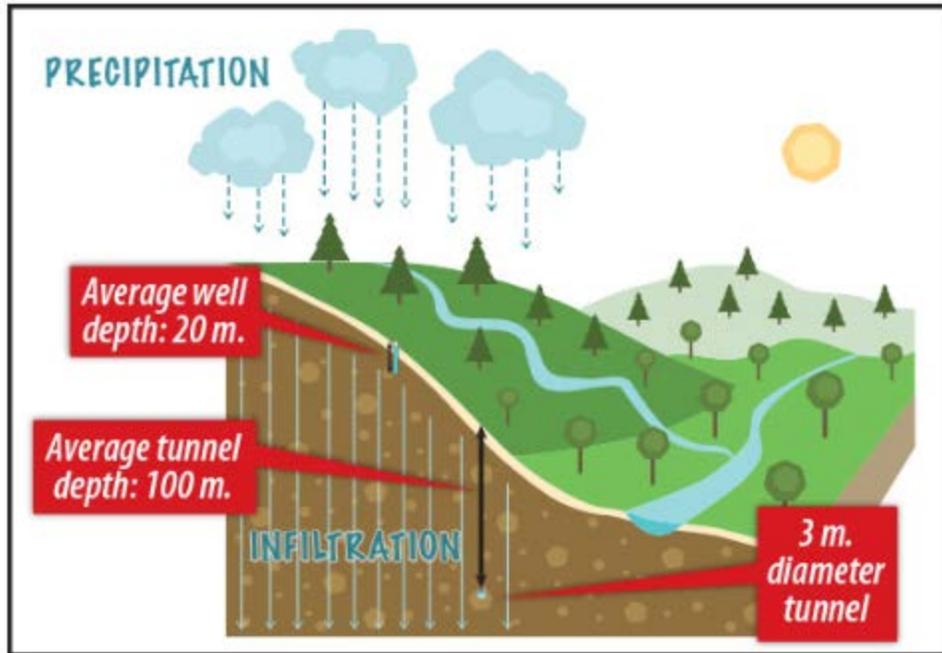


Figure 1: Schematic diagram of infiltration, wells, and tunnel, to show that the tunnel cannot block groundwater movement or replenishment.

27. **Management acknowledges that during construction, limited seepage into the tunnel may occur.** Measures to avoid any significant seepage during construction are part of the contract, such as grouting ahead of the tunnel face and measures to manage the potential impacts. There are monitoring programs for seepage into the tunnel during construction as well as for the water sources above the tunnel. In the unlikely event that wells above the tunnel are affected during construction, the AWSB would deliver water by tanker to the affected communities, as noted in the Environmental Management Plan. Once construction works are completed, it is expected that the water in these wells will be restored naturally when the aquifer returns to its original level following the next rains. In the interim, the AWSB has committed to ensure adequate water supply to the affected communities until affected wells are replenished.

b. Allegation: The AWSB has resisted performing a comprehensive environmental and social impact assessment for Phase 1 and Phase 2 of the NCT project. Phase 2 will extend the tunnel to another four stressed Murang'a County Rivers.

28. **An ESIA was conducted for the NCT1, in compliance with the Bank Operational Policy 4.01.** The NCT1 is a standalone project and its design and financial and economic viability are independent of any future investments. No second tunnel project (NCT2) is currently being developed by the Government of Kenya or considered by the Bank. Consequently, no ESIA has been conducted for the NCT2 that is one of the recommendations that the Master Plan proposed to be implemented after the NCT1 is completed. If such a tunnel were to be constructed, it would be part of Phases 3 and 4 of the Master Plan and would require a separate ESIA. Construction of NCT2 also would require a second dam, Maragua dam, to be built, as the tunnel would not be viable without

it. As mentioned in paragraph 12 above, the Master Plan is currently being revised. **Regardless of this, the NCT1 has been designed to be completely independent of any future phases of the Master Plan.**

- c. *Allegation: Diverting water into the NCT1 will cause water shortages for domestic, agricultural and industrial use when water from the rivers is diverted into the NCT1.*

29. ***The NCT1 intake infrastructure is designed in a way that ensures that only flood flows are abstracted.*** The rivers must rise to flood level before any water can physically spill over into the tunnel, so no abstraction can take place below flood level. ***Therefore, abstractions to the tunnel are not a cause of low flows in the rivers and the NCT1 will have no impact on water flows in the rivers below flood level.***

30. ***Studies have confirmed that the guaranteed compensation flow provides more water than is needed to satisfy the downstream water demand up to the design horizon of 2035.*** The downstream compensation flow was set in the ESIA to ensure that current and future downstream water demands, including ecological requirements, are met. It was then increased by the AWSB above these requirements to address stakeholder concerns.

31. ***A comprehensive analysis⁵ of the current and future downstream water demand was carried out to ensure the NCT1 would not have an adverse impact on it.*** All existing and future water abstractions in the three rivers up to Masinga dam were analysed, based on: (a) abstraction licences from the Water Resource Management Authority (WRMA), (b) information from Water Service Providers in Murang'a County and (c) design reports obtained from Tana Water Services Board. The future water supply demand for Murang'a County (up to 2035) was also estimated for actual locations along the streams and combined with the existing schemes based on their coverage areas and river abstraction locations. Future domestic, irrigation, industrial and livestock water needs were estimated based on the Ministry of Water and Irrigation (2005) Guidelines. This is a very conservative approach, which assumes that all abstraction points for existing and future water supply schemes are situated right after the intake, whereas in reality they are distributed along the rivers, where they benefit from additional, significant tributary inflow joining the main river between the NCT1 intakes and the intake points for any local schemes. However, for the purposes of a conservative design, the contribution of these tributaries was ignored.

32. ***The downstream compensation flow was then determined to ensure that current and future downstream water demands will be met.*** To ensure sufficient flows, the required water supply demand was multiplied by a factor of 1.2 to create an additional buffer. The resulting water volume required to satisfy the estimated future 2035 downstream (i.e., up to Masinga dam) consumption is 40,000 m³/day. However, the water flow available for domestic and others consumption will be 64,000 m³/day at the intakes, and due to the tributaries before Masinga dam, the total water volume available up to Masinga dam will be about 984,000 m³/day, or about 25 times the forecasted demand. ***This***

⁵ The *Yield Analysis Report* is part of the design document.

demonstrates that regardless of the margin of error any forecast has, after completion of the NCT1, sufficient water for future downstream use remains in the rivers and the abstractions made are negligible.

33. ***The Requesters incorrectly quote the flow thresholds above which the NCT1 will abstract water. What is correct is that the NCT1 will only use flood water.*** The adoption of Q80 flows⁶ and above (see flood flows illustrated in Annex 3) ensures that there are no downstream impacts on existing and future downstream abstractions in the three rivers. On an annual average, the NCT1 will use 38.8 percent (equal to 97,500 m³/day) of the rivers' flood flow volume at the intake locations. This leaves about 154,000 m³/day of flood flows in the rivers at the intake location and 1,387,000 m³/day at Masinga dam. The current licensed consumption⁷ of flood water all the way down to Masinga dam is only about 5,700 m³/day (and not all of it is used). This means that less than 3.7 percent of the flood water that is already available immediately after the NCT1 intakes will be used, and about 0.4 percent of the flood water available up to Masinga dam. Therefore, enough water will remain in the rivers to supply storage dams that might be built in future.⁸ In addition, the abstraction permit issued by the WRMA needs to be renewed annually. Thus, the WRMA has the ability to reduce the water abstraction into the NCT1 at any time if additional water demands for downstream use emerge. Moreover, the AWSB will measure continuously the flows entering the tunnel and the compensation flow, and will make these data available to the public. It is also important to note that the withdrawal of floodwater by the NCT1 will have no measurable impact on the aquifers. The aquifers immediately downstream of the NCT1 receive almost all their water from rainfall and only to a much lesser extent from the low and normal flows of the rivers. Because they do not flood a significant area, the flood flows, from which the NCT1 takes only a negligible part, themselves contribute only negligible amounts to the aquifer recharge.

34. ***The NCT1 will have minimal impact on flood recession agriculture in downstream areas.*** Flood recession agriculture is undertaken using the water and nutrients provided by the floods once the floods have receded. This is only possible in flat landscapes where sizeable areas are flooded regularly. Such agricultural practices, however, cannot take place in hilly areas, such as the steep valleys above and below the NCT1 intakes. Therefore, flood recession agriculture is practiced only about 200 km downstream of the intakes, around Garissa. The maximum combined water inflow in the NCT1 intakes is about 18.4 m³/s, while average peak flood flow at Garissa (which allows for recession agriculture) is about 850 m³/s (based on 1934 to 1989 data). Therefore, the theoretical

⁶ Q80 flows are defined by the Kenya Water Resources Authority as the natural flows which would occur in rivers 80 percent of the time if no abstraction takes place. Higher, flood flows would occur during the remaining 20 percent of time. The scheme presented in Annex 3 illustrates the different flows referred to in this Management Response.

⁷ This excludes water used for hydropower generation because this will be returned to the rivers and not consumed.

⁸ There are no potential, economically viable sites for storage dams of significant size upstream from Masinga dam on the NCT1 rivers, other than the sites recommended in the Nairobi Water Master Plan, which gave priority to building NCT1 before any dam. Dam sites for power generation have also not been identified in studies by KenGen (the national Kenyan power generation company). Finally, the National Kenya Water Resources Masterplan did not identify potential economically viable sites for irrigation upstream of Masinga dam on the NCT1 rivers.

NCT1 also includes the construction of a new water treatment plant. Hence, while the NCT1 will create an additional inflow into Ndakaini dam, the new treatment plant will create an additional water outtake from the dam. The new plant is needed to enhance the domestic water supply. However, without the tunnel, the new and existing treatment plants would together draw so much water from the dam that even the rainy season inflow would not be sufficient to refill the dam. The NCT1 tunnel is therefore needed to increase the inflow into the dam during the rainy season to ensure the dam is at its full capacity to provide water during the dry season.

36. ***The NCT1 will lead to a substantial increase in the water supply available for Nairobi and Murang'a County.*** It is important to note that in addition to Nairobi residents, about ***480,000 current Murang'a County residents (790,000 at the design horizon 2035) will be provided with water supply services through the NCT1 community projects.*** This will be particularly important to counter drought impacts on the poorest people, who cannot afford the much higher water prices that are charged during drought and are often forced to use unsafe water sources.

e. *Allegation: Impacts from the NCT1 were not properly explained to relevant communities.*

37. ***It is not correct that the potentially affected communities were not informed about the project and its potential impacts.*** The ESIA Study Report provided all information required to assess the potential impacts of the project and proposed mitigation measures and was widely consulted upon. In line with Bank policy, project-affected groups and local nongovernmental organizations were consulted by the Borrower regarding the project's potential environmental impacts and their views have been taken into account. These consultations have occurred on about 30 documented occasions, in which a total of 1,423 representatives of project-affected people are on record as having participated, over the period from November 19, 2011 to January 30, 2015, including a disclosure workshop on October 2, 2014. The consultations took place after environmental screening and before the terms of reference for the ESIA were finalized, as well as on the draft ESIA report. Moreover, the Borrower continues to consult relevant stakeholders throughout project implementation as necessary. Consultations were held with a large group of stakeholders, including those in areas with potentially significant project impacts. As detailed in Annex 1 (Item 5) all consultations required by the Bank and by NEMA were conducted. Out of the documented sessions, six public meetings were held with communities living within the tunnel alignment. Additional consultations were also undertaken during the ESIA studies for the NCT1 community projects. The 20 meetings with 961 participants that have been held so far are listed in Annex 1 (Item 7). The communities who attended these meetings were informed of the NCT1 project. Consultations were held in both official languages in Kenya, i.e., English and Swahili. Additional radio broadcasts on the project and announcing the consultations also used Kikuyu.

38. ***The AWSB provided detailed project descriptions in the consultations and has also made all relevant reports available through its webpage.*** The AWSB summarized

the project in newspaper ads, talk shows, and brochures,⁹ and has also produced a video that was aired and which is available on its webpage as well as on YouTube.¹⁰

f. *Allegation: The Borrower-formed IPE to study the project is not impartial.*

39. ***Management considers that the approach to establishing the IPE has followed good international practice, and that the Panel is highly credible and impartial. The IPE, composed of international and Kenyan experts, was initiated by the AWSB to review the technical designs and construction methodology, as well as the project's potential environmental and social impacts, and to review the implementation of the project until commissioning and initial operation stage.*** Members of the IPE were selected by different organizations under the leadership of the independent Water Sector Regulator and with no input from the AWSB. The members of the selection committee included the Geological Society of Kenya, the Hydrological Society of Kenya, the Environmental Institute of Kenya, and the Institute of Engineers of Kenya. To date, the IPE has conducted two missions to Kenya, confirmed the soundness of NCT1 design and construction methodology, and recommended close monitoring of the environmental and social aspects of the project, including stakeholder engagement. A summary of the IPE's findings is provided in Annex 4.

40. ***In Management's view no credible evidence has been presented that would put the IPE Chairman's independence into question.*** He is a Member of the National Irrigation Board (NIB), which is a state corporation mandated to provide for development, control and improvement of irrigation schemes within the country. He was appointed in order to provide his professional expertise as a registered Dam Expert in the country. The NCT1 is a water supply project and not an irrigation project (for which NIB would have a mandate), hence no conflict of interest can be derived from that function.

41. ***The Chairman of the IPE also is not an employee of the NCT1 design firm, as alleged in the Request.*** The IPE Chairman worked as a sub-consultant for the firm outside Kenya in 2012 and 2013, but was never an employee. It is quite common that engineering consultants work as freelancers on short-term assignments for companies, without being regular staff of such companies. Having worked for a company in the past does not bind a consultant permanently to that company. Every company in the market remains a potential employer for a consultant, regardless of whether they have worked for the company before. In Management's view, therefore, there is no credible conflict of interest.

42. ***In Management's view, the IPE conducted its activities in an independent and highly professional manner. The Requesters have not provided any credible evidence to support allegations concerning the alleged bias.*** As explained above, the IPE was selected independently from the implementing agency and the Bank considers it to be an independent body.

⁹ http://awsboard.go.ke/wp-content/uploads/2016/01/NCT-Commissioning-booklet_05.pdf

¹⁰ <http://awsboard.go.ke/our-projects/nct-1-project/nct-1-3d-documentary/>

Actions Going Forward

43. *Management will continue to closely monitor the impact of the NCT1 construction on the water resources above the tunnel alignment.* In order to effectively monitor the impacts of the tunnel works on groundwater, the AWSB has prepared a baseline survey of all wells and boreholes in the zone of potential impact above the NCT1. This survey was prepared with the intention of using it to monitor any possible impact and identify and initiate mitigation measures if needed. The survey is publicly available on the AWSB's webpage,¹¹ where follow-up monitoring data will also be published.

44. Management is committed to support the AWSB to undertake additional efforts to ensure successful implementation of the project, and, it is hoped, allay the concerns raised by the Requesters.

45. *Management will support the AWSB in implementing its existing Social Management Plan (SMP, see Annex 5), which includes a procedure for stakeholder engagement. The SMP will be updated to take into consideration mitigation measures that will be proposed from a scheduled Social Impact Assessment (SIA).* The SMP that the AWSB has already developed is a useful tool to facilitate a common understanding among stakeholders during implementation and subsequent phases of the project. This will be achieved through broad, dynamic and active stakeholder engagement, coupled with effective communication between the various stakeholders. The SMP will be used to monitor identified social concerns, potential impacts and other emerging concerns resulting from project implementation, and to suggest timely mitigations measures to counter any negative impacts. This will include some of the impacts alleged by the Requesters. The SMP has identified a list of key stakeholders within the project area/relevant to the project to be consulted every two months on project progress, including potential project impacts. The SMP has also prepared an approach and appropriate communication tools to be used in the engagement process. In addition to already ongoing activities, the Bank agreed with the AWSB to conduct an SIA that includes the population living above the tunnel alignment and in the downstream area of influence of the tunnel. Draft Terms of References for the SIA have already been developed.

Conclusion

46. *In Management's view, the Bank has followed the policies and procedures applicable to the matters raised by the Request. As a result, Management believes that the Requesters' rights or interests have not been, nor will they be, directly and adversely affected by a failure of the Bank to implement its policies and procedures.*

¹¹ <http://awsboard.go.ke/wp-content/uploads/2016/02/Final-Baseline-Survey-Reports-for-Boreholes-along-NCT1-alignment.pdf>

**ANNEX 1
CLAIMS AND RESPONSES**

No.	Claim	Response
	1st submission	
1.	<p>We have complained to World Bank staff on the following occasions: 12-18-15 - submitted a list of Grievances to the WB GRS by e-mail. In August this year, GRS and AWSB formed an "independent" panel of experts to study the project (IPE). No response was received, [or] we believe that the response received is not satisfactory as it does not answer or solve our problems for the following reasons:</p> <ol style="list-style-type: none"> 1. The IPE is slow and has only responded to one submission 2. Response does not address the primary issues. Rather, they appear to be focused on providing assurance that concerns will be resolved during construction through the guidance of the IPE. 	<p>Management has repeatedly tried to engage with the Requesters, to discuss their concerns. Unfortunately, the Requesters have not been available for meetings with the Bank and have not been willing to engage in dialogue with the Bank or the Borrower. As the Requesters state, they submitted a complaint to the GRS in December 2015. The complaint raises the same issues that are now included in the Request for Inspection.</p> <p>The GRS' engagement with the Requesters, however, was significantly hampered since the Requesters' were not available to speak by phone or through video, or meet in person with the GRS team and/or the Bank project team in order to discuss the issues of concern and possible options to address such concerns. This includes the GRS' offer to meet in Nairobi in May 2016, for which the Requesters could not be available. The GRS suggested a meeting on at least 7 occasions which were not taken up by the requesters.</p> <p>In Management's view, this low-key engagement by the Requesters is reflected in their characterization of the GRS process expressed in the Request. However, Management remains committed to engage with the Requesters and other project-affected people to discuss their concerns and consider further mitigation or contingency measures that they may present.</p> <p>The IPE for the project provided a comprehensive response to the issues raised in a complaint to the IPE (which are identical to the Request) and offered to meet the Requesters, but they said that they were unable to meet the IPE during its mission to Kenya. The complaint and the response from the IPE are included in this Annex (Items 40 to 53).</p> <p>The IPE, composed of international and Kenyan experts, was initiated by the AWSB to review the technical designs and construction methodology, as well as the project's potential environmental and social impacts, and to review the implementation of the project until commissioning and initial operation stage. Members of the IPE were selected by different organizations under the leadership of the independent Water Sector Regulator with no input from the AWSB. The members of the selection committee included the Geological Society of Kenya, the Hydrological Society of Kenya, the Environmental Institute of Kenya, and the Institute of Engineers of Kenya. The IPE has conducted two missions to Kenya, confirmed the</p>

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		<p>soundness of NCT1 design and construction methodology, and recommended close monitoring of the environmental and social aspects of the project, including stakeholder engagement.</p> <p>After acknowledging the letter from the Requesters on August 29, 2016, the IPE issued an initial response to it on October 31, 2016 after its first mission, which was held in August 2016. On November 3, 2016, the IPE invited the Requesters to a discussion meeting to be held on November 15, 2016.</p> <p>The Requesters provided feedback to the IPE's initial response on November 7, 2016. The IPE issued detailed responses to the feedback on November 26, 2016, after completing a detailed review of project study reports, designs and construction methodologies during its second mission, of November 18, 2016.</p> <p>To date the Requesters have not replied to the detailed responses from the IPE. Management considers that the IPE answered the allegation comprehensively and regrets that the Requesters did not continue direct dialogue with the IPE.</p>												
2.	<p>ENVIRONMENTAL ASSESSMENT AND PERMITTING</p> <p>The Northern Collector Tunnel is classified as category A, requiring a full Environmental Assessment (EA). This is because the environmental and social impacts of NCT were anticipated to be significant.</p>	<p>A full ESIA study for the NCT1 project was undertaken between July 2014 and November 2014 in accordance with Bank policy and the procedures laid down in the Kenya Environmental Management and Coordination Act (1999) and Environmental Impact Assessment and Audit (EIA/EA) regulations of 2003.</p> <p>The following steps were undertaken as part of the ESIA study report preparation:</p> <table border="1" data-bbox="756 1234 1502 1841"> <thead> <tr> <th data-bbox="756 1234 943 1312">Report</th> <th data-bbox="943 1234 1130 1312">Submission Date</th> <th data-bbox="1130 1234 1502 1312">Comment</th> </tr> </thead> <tbody> <tr> <td data-bbox="756 1312 943 1472">Project Report (NEMA/PR/5/2/12495)</td> <td data-bbox="943 1312 1130 1472">June 27, 2014</td> <td data-bbox="1130 1312 1502 1472">NEMA issued a letter on July 11, 2014 requesting Terms of Reference for full ESIA studies</td> </tr> <tr> <td data-bbox="756 1472 943 1577">Terms of Reference</td> <td data-bbox="943 1472 1130 1577">July 24, 2014</td> <td data-bbox="1130 1472 1502 1577">NEMA approved the Terms of Reference on July 24, 2014</td> </tr> <tr> <td data-bbox="756 1577 943 1841">Preparation of ESIA Study Report (NEMA/EIA/5/2/1188)</td> <td data-bbox="943 1577 1130 1841">Nov. 5, 2014</td> <td data-bbox="1130 1577 1502 1841">ESIA study was <u>carried out between</u> July 2014 and November 5, 2014, which included specialist studies (e.g., Biodiversity assessment, Hydrological assessment) and a set of public consultations.</td> </tr> </tbody> </table>	Report	Submission Date	Comment	Project Report (NEMA/PR/5/2/12495)	June 27, 2014	NEMA issued a letter on July 11, 2014 requesting Terms of Reference for full ESIA studies	Terms of Reference	July 24, 2014	NEMA approved the Terms of Reference on July 24, 2014	Preparation of ESIA Study Report (NEMA/EIA/5/2/1188)	Nov. 5, 2014	ESIA study was <u>carried out between</u> July 2014 and November 5, 2014, which included specialist studies (e.g., Biodiversity assessment, Hydrological assessment) and a set of public consultations.
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No.	Claim	Response		
				The RSA approved the final ESIA Study report on January 25, 2015. NEMA issued a license on February 9, 2015.
3.	<p>1. The AWSB engaged a contractor in September 2014, paid advance payment of Kshs 1.365 billion in October, before EIA 1188 [the ESIA] was approved and released to public on Nov 4, 2014. The NEMA license was issued on 9th Feb 2015.</p> <p>By starting the project before the EIA 1188 objections were resolved, the AWSB denied impacted groups the opportunity to have the objections reviewed through the relevant processes. Some members of our group have spent over \$ 20,000 contesting the EIA 1188. This is contrary to the WB funded projects approval policies.</p>	<p>The commencement letter was only issued after the NEMA license was issued. That is in line with both Bank and Kenya procurement guidelines. This claim is not justified because:</p> <ol style="list-style-type: none"> 1) The construction works did <u>not</u> commence before the public had ample opportunities to raise objections. 2) The ESIA preparation and finalization included the required consultation sessions (see details in Item 5). The ESIA was then revised to include the information discussed during these consultation sessions. 3) Construction commenced <u>after</u> the EIA license was issued. Under the Public Procurement and Asset Disposal Act 2005 and regulations made under the Act, the procuring entity may execute a contract with the winning bidder within 14 days of contract award. <p>The executed contract made provision for advance payment to the contractor of 20 percent of the contract sum. Such a disbursement is aimed at enabling the Contractor to mobilize to undertake the works once the Works Commencement Notice is issued. The payment facilitates the Contractor in preparation and mobilization by sourcing equipment and required raw materials, and securing relevant international staff and work permits, among other things.</p> <p>The timeline was as follows:</p> <p>July 7, 2014 – AWSB awarded the contract to the Contractor. October 10, 2014 – The Board made an Advance Payment to the Contractor. January 25, 2015 – World Bank provided no objection to the ESIA report. February 9, 2015 – NEMA issued the EIA License for the project. February 19, 2015 - The Engineer’s Notice to Commence Work was issued February 24, 2015 - Indicated commencement date for the civil works.</p> <p>See also Item 5.</p>		
4.	2. The AWSB has resisted performing a comprehensive environmental and social impact assessment for Phase 1 and Phase II of the NCT project. Phase II will extend the	<p>A full ESIA was conducted and cleared by the Regional Safeguard Adviser on January 25, 2015. This study included an assessment of cumulative impacts.</p>		

No.	Claim	Response
	<p>tunnel to another four stressed MC Rivers. The rivers share a common water catchment and hydrology and have integrated uses within the County. Comprehensive Environmental Assessment (EA) is standard for projects that depend on a common water catchment, rivers and shared utilization.</p>	<p>Master Plan for Developing New Water Sources for Nairobi and 13 Satellite Towns: The total developed water production capacity for Nairobi City is 550,000m³/day against a current projected demand of 760,000m³/day. In 2010, the Ministry of Water and Irrigation through the AWSB, with the support of the Bank and AFD, undertook a Feasibility Study and prepared a Master Plan for Developing New Water Sources for Nairobi and 13 Satellite Towns. The key objective of the study was to identify sufficient water sources to meet the short- and long-term water needs for Nairobi City and the Satellite Towns.</p> <p>The Master Plan was launched in 2012 and provided a development blueprint comprising least-cost development options based on a multi criteria analysis to meet demand up to a 2035 horizon. The analysis included, among other criteria, the potential environmental impact and impact on downstream water users.</p> <p>Five phases of development were recommended for Nairobi City:</p> <ul style="list-style-type: none"> • <i>Phase 1 (2012-2015):</i> Groundwater exploration and development subject to supporting results from exploratory phase, yield 45,000m³/d; • <i>Phase 2 (2012-2016):</i> Northern Collector 1, diverting water from Irati, Gikigie, and Maragua Rivers to Thika dam and conveyance and treatment works, yield 140,000m³/d; • <i>Phase 3 (2017-2020):</i> 30Mm³ Maragua dam, South Mathioya tunnel to transfer 1.02 m³/s to Maragua dam and 0.64m³/s to Thika dam and conveyance and treatment works, yield 132,000m³/d; • <i>Phase 4 (2021-2025):</i> Northern Collector 2, diverting water from Githugi, Hembe and N. Mathioya Rivers and conveyance and treatment works, yield 120,000m³/d; and • <i>Phase 5 (2026-2029):</i> Ndarugu 1 dam and conveyance and treatment works, yield 216,000m³/d. <p>Following the exploratory phase, it was determined that Phase I of the Master Plan could not be implemented because of the results from the yield analysis were negative. Phase 2, the NCT1, is currently under construction. As for Phase 3 (for which no preparatory work has commenced yet), it is unclear whether this should still be the next phase to be implemented given the results from Phase I. The Bank has not made any commitments to finance any of the future water works, beyond the NCT1. A review of the Master Plan, financed by AFD and the Bank, is currently ongoing; it will consider and where necessary revise</p>

No.	Claim	Response
		<p>the recommendations for the next phases after the NCT1 is completed. This review process will include a comprehensive communication and consultation program.</p> <p>The scope of the NCT1 project required a full ESIA, which was conducted in compliance with Bank Policy. The NCT1 is a standalone project and its design and financial and economic viability are independent of any future investments. No second tunnel project (NCT2) is currently being developed by the Government of Kenya or considered by the Bank. Consequently, no ESIA has been conducted for the NCT2 that is one of the recommendations that the Master Plan proposed to be implemented after the NCT1 is completed. If such a tunnel were to be constructed, it would be part of Phases 3 and 4 of the Master Plan and would require a separate ESIA. Construction of NCT2 also would require a second dam, Maragua dam, to be built, as the tunnel would not be viable without it. As mentioned in paragraph 12 of the main text, the Master Plan is currently being revised. Regardless of this, the NCT1 has been designed to be completely independent of any future phases of the Master Plan.</p>
5.	<p>3. Our group and others are harmed by the listed omissions by denial of opportunity to contest EIA 1188 within the allowed time and (2) lack of disclosure of the comprehensive environmental and social impacts due to the combined projects. Comprehensive impacts will be more severe than independent impacts.</p>	<p>Consultations on the ESIA were extensive and relevant materials, including the full ESIA study report, were distributed to stakeholders to inform their input. The decision by NEMA to grant the license for the NCT1 construction was only taken after carrying out consultations with potentially affected persons and reviewing comments received from both members of the public and lead agencies. Management considers that project stakeholders, including the Requesters, have been sufficiently informed.</p> <p>Consultation details are also provided under Item 7.</p> <p>The Requesters claim that the AWSB denied potentially affected persons an opportunity to contest the ESIA findings within the allowed time and secondly, that there was lack of disclosure of comprehensive environmental and social impact due to the combined projects, i.e., Phase I and Phase II of the NCT, and that the impacts of both project phases combined are more harmful than those identified in the ESIA for the NCT1.</p> <p>The reason why the ESIA was project specific and did not include potential future projects such as NCT2, is provided under Item 4 above.</p> <p>Contrary to the claim, the public was afforded adequate opportunity to comment on and provide input into the ESIA. After screening of the project's potential impacts, public consultations were undertaken between April 14, 2014 and April 25, 2014 before finalization of the ESIA Terms of References.</p>

No.	Claim	Response
		<p>Parties consulted included National Administration officials, utility managers, water resource users' associations' representatives and electoral wards representatives. After the draft ESIA was prepared, a dedicated public disclosure workshop was held on October 2, 2014 at Norkas Hotel, Murang'a County, which was attended by 160 people. The above fulfils the World Bank's consultation requirements in accordance with OP4.01.</p> <p>Under Part VI of the Environmental Management and Coordination Act, 1999 of Kenya, the EIA license is issued <u>after</u> the regulatory body, NEMA, has carried out stakeholder consultations with potentially affected persons, reviewed comments received from both members of the public and lead agencies (the latter are regulatory agencies with a mandate over the affected environment, such as the WRMA) and made a decision on whether or not to issue a license. The Act requires the Authority (NEMA) to inform the public through the media of an application for a license, and provide an opportunity to potentially affected stakeholders to provide comments. In appropriate cases NEMA may hold a public hearing to consider objections before making its decision on the application.</p> <p>As required under the Act, before approving the project, NEMA advertised it in the local dailies (<i>Standard Newspaper</i> on November 21, 2014 and November 28, 2014) and in the <i>Kenya Gazette</i> (1st notice on December 11, 2014 and the 2nd notice on December 24, 2014), and allowed the statutory 30-day window for the public to raise any issues relating to the proposed project. NEMA further convened a public hearing with an invitation publicized through an advertisement in the <i>Standard Newspaper</i> on January 21, 2015. The public hearing was held on January 30, 2015 at Kenyanyaini, Murang'a County. A list of attendees is available.</p>
6.	<p>COMMUNITY PARTICIPATION: 1. From the Report of the Technical Committee on Northern Collector Tunnel Project (RTCNCT), A3.1, AWSB engaged in "misinformation" when explaining the project to impacted communities. AWSB described the project as extracting flood flow while factually the project is designed to withdraw Q95 flow almost 365 days a year. AWSB has not disclosed the many negative impacts to the communities.</p>	<p>The ESIA Study Report provided all information required to assess the potential impacts of the project and proposed mitigation measures and was widely consulted upon. The report is available publicly on the AWSB's webpage. Q80 flows are defined by the Kenya Water Resources Authority as the natural flows which would occur in rivers 80 percent of the time if no abstraction takes place. Higher, flood flows would occur during the remaining 20 percent of time. The NCT1 will only take 38.8 percent of the rivers' annual flood water flows. In the case of the NCT1 the compensation flow was set higher than what the ESIA required, in order to assure Murang'a County that there would be no impact on downstream uses. The compensation flow is the water flow which will at no time be affected by the NCT1 intakes, to ensure the environmental flow and to satisfy the water demand of the downstream users. Only</p>

No.	Claim	Response																																																		
		flows above the compensation flow can enter the NCT1. See also Item 9.																																																		
7.	2. To satisfy the NEMA requirement to subject the project to public participation and scrutiny, AWSB selectively presented the project to the minimally impacted communities and beneficiaries of land compensation and avoided areas where the project has the most severe impacts. The most negatively impacted communities do not know about the project.	<p>It is not correct that the potentially impacted communities were not informed about the project. Consultations were held with a large group of stakeholders, including those in areas with significant project impacts. As detailed under Item 5, all consultations required by the Bank and by NEMA were conducted. About 30 documented stakeholder consultation sessions have been held by AWSB and NEMA between November 19, 2011 and January 30, 2015, and a total of 1,423 representatives are on record as having participated.</p> <p>Out of these sessions, six (6) public meetings were held with communities living within the tunnel alignment. These meetings were organized by the local administration through the area chiefs. They are:</p> <table border="1" data-bbox="748 764 1521 1440"> <thead> <tr> <th>No.</th> <th>Location</th> <th>Date</th> <th>Venue</th> <th>Participants</th> </tr> </thead> <tbody> <tr> <td colspan="5">Kangema Sub County</td> </tr> <tr> <td>1</td> <td>Ichichii and Karura</td> <td>Monday, August 11, 2014</td> <td>Ichichii Chief's Camp</td> <td>184</td> </tr> <tr> <td>2</td> <td>Kiruri</td> <td>Tuesday, August 12, 2014</td> <td>Kiruri Chief's Camp</td> <td>21</td> </tr> <tr> <td colspan="5">Kigumo Sub County</td> </tr> <tr> <td>3</td> <td>Makomboki/ Kandenderu</td> <td>Wednesday, August 13, 2014</td> <td>Makomboki Chief's Camp</td> <td>31</td> </tr> <tr> <td>4</td> <td>Kangari/ Mairi</td> <td>Wednesday, August 13, 2014</td> <td>Mairi Shopping Centre</td> <td>73</td> </tr> <tr> <td>5</td> <td>Kinyona</td> <td>Thursday, August 14, 2014</td> <td>AP- Line/ Kinyona Dispensary</td> <td>28</td> </tr> <tr> <td>6</td> <td>Gacharage</td> <td>Thursday, August 14, 2014</td> <td>Gikigie Primary School</td> <td>35</td> </tr> <tr> <td colspan="4">TOTAL</td> <td>372</td> </tr> </tbody> </table> <p>In addition, a total of five (5) Focus Group Discussion meetings were conducted with the project affected people in Kangema and Kigumo Sub Counties. The venues of the meetings were in Ichichii Chief's Camp and Makomboki Chief's Camp in Kangema and Kigumo Sub Counties, respectively. Of these meetings, 2 were with elders, 2 with youth and 1 with women. A total of 96 people participated in the Focus Group Discussions.</p> <p>Additional consultations were also undertaken during the ESIA studies for the NCT1 community projects. The communities who attended these meetings were informed of the NCT1 project. The meetings that have been held so far are as follows:</p>	No.	Location	Date	Venue	Participants	Kangema Sub County					1	Ichichii and Karura	Monday, August 11, 2014	Ichichii Chief's Camp	184	2	Kiruri	Tuesday, August 12, 2014	Kiruri Chief's Camp	21	Kigumo Sub County					3	Makomboki/ Kandenderu	Wednesday, August 13, 2014	Makomboki Chief's Camp	31	4	Kangari/ Mairi	Wednesday, August 13, 2014	Mairi Shopping Centre	73	5	Kinyona	Thursday, August 14, 2014	AP- Line/ Kinyona Dispensary	28	6	Gacharage	Thursday, August 14, 2014	Gikigie Primary School	35	TOTAL				372
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		<p><i>Note: All the projects are downstream of the NCT1 except Gatango water supply project.</i></p> <p>Records of these meetings are available in the ESIA reports for these projects.</p>
8.	<p>TUNNEL CONSTRUCTION: From EIA 1188, item 3.14 “<i>According to Kenya National Disaster Profile developed by the United Nations Development Program (UNDP), Murang’a County is considered as one of the landslide prone areas in the mountainous region of central Kenya</i>”. From EIA 1188 Item 7.3.5 states that “<i>studies have shown tunneling activities could dry rivers, streams and springs</i>”.</p> <p>From MC RTCNCT Section 2.3, “<i>From the final design report, it has been noted that there is limited available ground investigation hence limited geological and geotechnical information. However, from the regional geology as discussed in the Geological Report of the Kijabe Area (Geological Survey Kenya, 1964) and summarized in the Howard Humphreys Report, the area is composed almost entirely of volcanic rocks and their weathering products. This kind of geo-structure is susceptible to ground water seepage and consequently tunneling would have an impact on the hydrogeological environment in the region. This review therefore recommends further ground investigation to determine the impact of tunneling excavation on the hydrogeological environment in a regional area around the tunnel and local spring areas all along. The investigation should therefore be conducted in view of simulating groundwater flow pattern in the tunnel area and determining changes in the groundwater flow field due to tunnel construction far away in the surrounding regions.</i>”</p> <p>From MC RTCNCT, The Design engineer was instructed to proceed without the necessary geotechnical information, as quoted below in a disclaimer. “<i>1.3 Limitations of the Design – The appropriate level of geotechnical information</i></p>	<p>Project design reflects the danger of landslides in the area and implements strategies to minimize impacts. Landslide danger was assessed in the ESIA as well as through detailed geotechnical investigations, all of which were used to inform the final design. The Request incorrectly quotes the EIA and other studies. To avoid landslides, the tunnel portals were designed to international standards and the stability is constantly monitored. It should also be noted that other tunnels were constructed in the same geotechnical formation in the area and no landslides occurred.</p> <p>The quote from the ESIA is incorrect. The ESIA does not state that NCT1 will have these impacts. Rather, a general statement is made about potential impacts of tunnels, regardless of their specific location.</p> <p>To mitigate the general risks posed by tunnels, the NCT1 incorporates a fully circular and waterproof tunnel lining, which prevents any long-term leakage of groundwater into the tunnel and therefore cannot cause any drawdown of local aquifers, springs or rivers. The NCT1 will not cause any drying up of rivers, because no water will be withdrawn from the rivers during normal or low flow conditions. Only flood water will be withdrawn.</p> <p>The Contract Documents for the project provide the following safeguards to ensure the aquifers are protected:</p> <ul style="list-style-type: none"> • Probing ahead of tunneling in order to identify location and nature of aquifers, if any; • Drilling in the tunnel with and without core recovery for exploration, rock testing, grouting, drainage and rock stabilization prior to or after excavation, where the Engineer may consider; and • Grouting ahead of the tunnel face in areas where aquifers are indicated, so that the tunnel can be excavated in dry state. <p>Therefore, technical measures, such as contact grouting to fill any voids between the surrounding rock and the tunnel lining, are being incorporated during construction to ensure structural integrity and to avoid any ingress of groundwater from the outside of the tunnel.</p>

No.	Claim	Response
	<p><i>has not been made available for development of the Detailed Design and Project Construction Contract documentation at the time of preparation of this report. The Consultant has engaged with Athi WSB in an attempt to obtain the relevant information and delay delivery of the Detailed Design in order to enable use of the outstanding information in Detailed Design. However the information is not forthcoming and the Consultant has been instructed that the Detail Design and construction procurement documentation shall proceed on the basis of the available information to date.”</i></p> <p>The project is being constructed without geotechnical study to map rocks, aquifers, water table, swamps, springs and associated mitigation measures. We are concerned that tunneling will puncture aquifers, interrupt underground water flow paths and dry rivers and springs. These impacts could cause irreversible environmental damage, contrary to WB policies.</p>	<p>The tunnel will not interact with the aquifer once completed, and should water enter the tunnel during construction, mitigation measures are in place. Please see detailed response in Item 42.</p> <p>Further, a robust monitoring system has been put in place which includes:</p> <ul style="list-style-type: none"> • Six observation boreholes that have been drilled along the tunnel alignment: these observation boreholes/external piezometers are monitored weekly for any changes in groundwater pressures; • Fortnightly monitoring of surface markers for any surface movements; • Daily tunnel convergence monitoring; • Construction of unregulated intakes to allow downstream compensation flows without interruption; • Monitoring of water flowing out of the tunnel at the portal; • Monitoring of any changes in water levels in community boreholes/ shallow wells along tunnel alignment; • Monthly submission of surveillance manual containing all monitoring data collected. <p>The geotechnical parameters derived from the 2013-2015 test work confirmed that the estimates used in the initial draft design were correct and representative. These detailed investigations formed the basis of finalization of the tunnel designs. They also informed the tunnel construction and lining methodology that have been adopted.</p> <p>Subsequent to the draft design, detailed geotechnical investigations were undertaken, which were used to inform the final design. They included: 27 boreholes, and a geophysics resistivity survey¹² as listed below:</p> <ul style="list-style-type: none"> - Howard Humphreys 1998 (13 Boreholes drilled for investigation) - Egis/MIBP JV, 2013, “Geotechnical Investigation for Northern Collector Tunnel” – Factual Report (7 Boreholes) - AWSB 2013, Electrical Resistivity Tomography (ERT): Northern Collector Tunnel 1: Geophysical Resistivity Survey - AWSB 2015, Geotechnical Factual Report for the Northern Collector Tunnel Phase I (7 Boreholes) <p>In situ permeability tests were performed in the 2013 boreholes, and static groundwater level was recorded in all 27 boreholes.</p>

¹² A geophysical resistivity survey is a method to detect and map subsurface features and patterns by using electrical resistance meters.

No.	Claim	Response
		<p>The ESIA study report used draft design drawings made by the tunnel design consultant and as such they were not the final design drawings. For the final design, sufficient geotechnical investigations were carried out, which were confirmed by the design consultants, who have designed similar tunnels throughout the world, as well as in the findings of the IPE.</p> <p>The ESIA study report does not state that the NCT1 tunnel will cause drying up of springs and streams in the project area. Rather it notes, in reference to other studies, that this is a possible impact of unlined tunnels requiring mitigation measures to be put in place. The report rightly indicated the need for additional ground investigations, which have since been undertaken.</p> <p>Similarly, the Murang’a County Technical Report cited by the Requesters did not undertake any site-specific study for the NCT1 tunnel to confirm this. The Technical Report also just stated that “drawing evidence from similar projects tunneling may result to changes in the underground drainage and drying of springs and rivers.” This is a general reference to the potential effects of similar projects, as documented by other studies and quoted in the ESIA report, but which cannot be equated to the NCT1 project.</p>
9.	<p>COMMUNITY WATER DEMAND AND AGRICULTURAL WATER DEMAND: From ESIA 1188, Section 7.6.1: <i>Reduced flows as a result of diversion of a majority of the flows originating from the Aberdare at Irati, Gikigie and Maragua intakes to the Northern Collector, resulting in some short periods or single days with potentially zero flow or near-zero flow. These periods will normally be preceded and/or followed by further periods with extreme low flow, less flow available for use in existing and future domestic and agricultural activities (e.g. irrigation) in downstream areas.</i> From the MC RTCNCT, Section A.3.3:</p> <p>1. <i>“Impacts on flows downstream and Ground water Assessment of river hydrology finds that NCT-1 will result to significant reduction in downstream flows in the three rivers and unacceptable negative impacts downstream of the intakes”.</i></p> <p>2. <i>“The water supply master plan has completely overlooked water needs for</i></p>	<p>The Request incorrectly quotes the ESIA and other studies. The proposed NCT1 intake structure will not divert any part of the regular river flow, but will only affect flood flows. Regular river flows will not be reduced.</p> <p>This paragraph is taken out of context. The introductory paragraph states that cumulative effects described thereafter ‘...may also arise from additional factors or developments not directly related to the upstream diversion of water via the Northern Collector tunnel’.</p> <p>The proposed NCT1 intake structures will only divert flood flows, therefore no water will be diverted during normal or low river flow (i.e., when flows in the rivers fall below the Q80 flow threshold). Therefore, the NCT1 will have no impact on the occurrence of zero or close to zero flows.</p> <p>The <i>Murang’a County Technical Report (MC TC)</i>, which purported to study project impacts but which did not undertake any site-specific studies and which was drafted without any input from or consultations with the implementing agency. Such consultations with the implementing agency took place only later and as a result, Murang’a County, including the author of the cited report, issued a revised set of recommendations in the form of a “consensus matrix” about the NCT1. The consensus</p>

No.	Claim	Response
	<p><i>Murang'a County and other permitted users</i>".</p> <p>3. <i>"Proposed sources in Murang'a may last only for the next 15 years up to 2030 while population in Nairobi and Murang'a continue to grow"</i>.</p> <p>4. <i>"Combined normal flow (Q80) in the three rivers is 267,800 m³/day while NCT average abstraction is 259,200 m³/day, implying that NCT project will divert more than 97% of the river flow during 90% of the year"</i>.</p> <p>5. <i>"The upper catchment of Irati, Maragua and Gikigie contributes 64% of the low flow during dry season, meaning the downstream region is highly dependent on flows to be diverted for NCT"</i>.</p> <p>6. <i>"NCT abstraction as currently designed will result to 60% or approximately 216 days every year with zero or extremely low flow downstream"</i></p> <p>7. <i>"If Reserve Flows are limited to the release of Q95 or even 2xQ95, no investment in flood storage (dam) along the Irati, Gikigie and Maragua Rivers will be possible and any existing systems will no longer be viable"</i>.</p> <p>8. <i>The AWSB has justified substantial flow withdraw from the rivers by minimizing the</i></p>	<p>matrix (Annex 2) was later reviewed and approved by the Murang'a County Assembly.</p> <p>The IPE findings also confirm that the current and future needs of the downstream population were taken into account when determining the compensation flow.</p> <p>The water demand downstream of the NCT1 intakes up to Masinga dam was taken into account up to 2035 for the calculation of the compensation flow.</p> <p>The NCT1 is only abstracting above Q80 flows, which means the NCT1 will only abstract water once the combined rivers flows are above 157,852 m³/day (the combined Q80 flow is 146,189m³/day). The NCT1 will abstract approximately 37 percent of the rivers' average annual flow volume, and this was confirmed by the IPE.</p> <p>Detailed hydrological analysis shows that the volume for the combined Q95 and Q80 flows for the three NCT1 rivers are 93,744m³/day and 146,189m³/day, respectively. The adopted total Reserve/Compensation Flow is 157,852 m³/day, which is higher than both Q95 and Q80 flows. Therefore, the regular flow of the rivers will not be reduced. The Reserve Flows stated by the Requesters are not those that were ultimately adopted, and which were set to ensure that downstream ecological requirements and water needs are met.</p> <p>To ensure sufficient flows, the required water supply demand was multiplied by a factor of 1.2 to create an additional buffer. The resulting water volume required to satisfy the estimated future 2035 downstream (i.e., up to Masinga dam) consumption is 40,000 m³/day. However, the water flow available for domestic and others consumption will be 64,000 m³/day at the intakes, and due to the tributaries before Masinga dam, the total water volume available up to Masinga dam will be about 984,000 m³/day, or about 25 times the forecasted demand. <i>This demonstrates that regardless of the margin of error any forecast has, after completion of the NCT1, sufficient water for future downstream use remains in the rivers and the abstractions made are negligible.</i></p> <p><i>The Requesters incorrectly quote the flow thresholds above which the NCT1 will abstract water. What is correct is that the NCT1 will only use flood water.</i> The adoption of Q80 flows (see Item 6) and above (see flood flows illustrated in Annex 3) ensures that there are no downstream impacts on existing and future downstream abstractions in the three rivers. On an annual average, the NCT1 will use 38.8 percent (equal to 97,500 m³/day) of the</p>

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	<p><i>water needs of the County. For instance, from EIA 1188 Section, “majority (77.44%) of the community members have piped water”. From the MC RTCNCT, only 35% of the county population has access to piped water. It is obvious that doubling piped water to the county would significantly reduce the flow available for NCT1 and impact the economic justification of the tunnel.</i></p> <p>The MC RTCNCT recommended:</p> <p><i>I. “Project not to proceed pending revision of NCT design and Masterplan and Northern Collector Tunnel and Water Supply Master plan for Nairobi and Satellite Town are re-designed in view of hydrology and successive supply of water demand in Murang’a County. Explore alternatives.”</i></p> <p><i>II. “To mitigate the risk of low and zero flow downstream of NCT intakes, the abstraction Minimum Reserve flow shall not be less than Q50”</i></p> <p><i>III. “Detailed investigation to be undertaken before construction to establish wider changes and impacts on groundwater drainage.”</i></p> <p><i>IV. “Revise intake design to provide upstream by-pass for compensation”</i></p> <p>Instead of resolving major contradictions between EIA 1188 and MC RTCNCT, the MC and AWSB entered into a Consensus agreement which allowed the project to proceed. The agreement allows the AWSB to withdraw Q80 flow. This assignment appears to be arbitrary and not based on a study of comprehensive immediate and long term county water requirements. Resolving the contradictions would require significant engineering. We are not aware that this has been done.</p>	<p>rivers’ flood flow volume at the intake locations. This leaves about 154,000 m³/day of flood flows in the rivers at the intake location and 1,387,000 m³/day at Masinga dam. The current licensed consumption¹³ of flood water all the way down to Masinga dam is only about 5,700 m³/day (and not all of it is used). This means that less than 3.7 percent of the flood water that is already available immediately after the NCT1 intakes will be used, and about 0.4 percent of the flood water available up to Masinga dam. Therefore, enough water will remain in the rivers to supply storage dams that might be built in future.¹⁴ In addition, the abstraction permit issued by the WRMA needs to be renewed annually. Thus, the WRMA has the ability to reduce the water abstraction into the NCT1 at any time if additional water demands for downstream use emerge. Moreover, the AWSB will measure continuously the flows entering the tunnel and the compensation flow, and will make these data available to the public. It is also important to note that the withdrawal of floodwater by the NCT1 will have no measurable impact on the aquifers. The aquifers immediately downstream of the NCT1 receive almost all their water from rainfall and only to a much lesser extent from the low and normal flows of the rivers. Because they do not flood a significant area, the flood flows, from which the NCT1 takes only a negligible part, themselves contribute only negligible amounts to the aquifer recharge.</p> <p>As noted above, the proposed NCT1 intake structures will only divert flood flows. The hydraulic designs for the NCT1 are such that flows above Q80 will be abstracted only after the downstream compensation flows have been achieved. The intake structures will have an unregulated compensation flow channel (cannot be regulated or even closed with valves or other structures) and the compensation flow channel is provided for at an invert level lower than the tunnel invert level to ensure water only gets into the tunnel after the river flows are above Q80 flow threshold value (within the flood flow range). The tunnel entry at the intake structures will be equipped with valves which will be closed once Ndakaini dam is full.</p> <p><i>A comprehensive analysis of the current and future downstream water demand was carried out to ensure the NCT1 would not have an adverse impact on it.</i></p>

¹³ This excludes water used for hydropower generation because this will be returned to the rivers and not consumed.

¹⁴ There are no potential, economically viable sites for storage dams of significant size upstream from Masinga dam on the NCT1 rivers, other than the sites recommended in the Nairobi Water Master Plan, which gave priority to building NCT1 before any dam. Dam sites for power generation have also not been identified in studies by KenGen (the national Kenyan power generation company). Finally, the National Kenya Water Resources Masterplan did not identify potential economically viable sites for irrigation upstream of Masinga dam on the NCT1 rivers.

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		<p>All existing and future water abstractions in the three rivers were analysed, based on: (a) WRMA abstraction licences, (b) information from Water Service Providers in Murang'a County and (c) design reports obtained from Tana Water Services Board. The future water supply demand for Murang'a County (up to 2035) was also estimated for actual locations along the streams and combined with the existing schemes based on their coverage areas and river abstraction locations. Future domestic, irrigation, industrial and livestock water needs were estimated based on the Ministry of Water and Irrigation (2005) Guidelines. This is a very conservative approach which assumes that all abstraction points for existing and future water supply schemes are situated right after the intake, while in reality they are distributed along the rivers, where they are supplied by inflows. This means that significant volumes of additional water are available from tributaries joining the main river between the NCT1 intakes and the intake points for any local schemes. However, for the purposes of a conservative design, the contributions of these tributaries was ignored.</p> <p>The AWSB is developing an integrated water supply and irrigation master plan for Murang'a County and the surrounding areas (different from the Master Plan for Developing New Water Sources). This master plan will extend the investigations which were already done for the areas downstream of the NCT1 intakes to other areas of the county which are not downstream of the NCT1 intakes. While this is not linked to the NCT1, it was one request which came up during the consultations and the AWSB agreed to support the county in this. The terms of reference were developed in collaboration with the NIB.</p> <p>The Request is correct to point out that the agreement was changed to allow abstraction of above Q80 flows only. However, this change was not arbitrary nor was it made to circumvent project "contradictions." Rather, WRMA Rules from 2007 recommend that if the project targets abstraction of flood waters, then the minimum compensation flows should be Q80 flows. This recommendation was implemented to ensure there will be absolutely no abstraction during normal and low river flows.</p> <p>Therefore, this change, based on WRMA Rules 2007, was agreed with Murang'a County. It did not affect the initial tunnel design as the diameter of the tunnel was determined by construction methodology. However, there was a need to revise the intake structure designs, which has been completed. Construction of intakes has not commenced yet.</p> <p>The hydraulic design report and hydrological assessment report of December 2016 as well as the yield analysis report are</p>

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		<p>available at the AWSB upon request, as indicated on the AWSB webpage.¹⁵</p> <p>Please see also responses in Item 15.</p>
10.	<p>By withdrawing significant amount of water from the three rivers, our group and other community members are harmed by lack of water for drinking, agriculture, industrial (e.g. coffee processing) and recreational. This will perpetuate poverty in the County, contrary to policies regarding WB funded projects.</p>	<p>The NCT1 does not target abstraction of normal river flows but only some of the flood waters. The adoption of above Q80 flows guarantees that there will be no downstream impacts on existing and future downstream abstractions in the three NCT1 rivers.</p> <p>Further, current and future water demand were considered in determining the compensation flows. See Item 9 above.</p> <p>The downstream compensation flow was set to ensure that the current and future downstream water demands are met. To ensure sufficient flows, the required water supply intake was multiplied by a factor of 1.2 to create an additional buffer. The resulting volume is the minimum compensation flow.</p>
11.	<p>It is noted that severe competing needs for water will be experienced in the dry months of December to March and July to October of each year since it is during these periods that irrigation water requirements would be at the highest.</p>	<p>The proposed NCT1 intake structures will only divert flood flows. No water will be diverted during normal and low flows, i.e., when flows in the rivers fall below the Q80 flow threshold. Therefore, the NCT1 will have no impact on the occurrence of zero or close to zero flows.</p>
12.	<p>THIKA DAM CAPACITY: From MC RTCNCT, Section 2.2.2: <i>“The buffering capacity of Thika Dam is limited in case the inflows are increased. The Storage Ratio shows that there is inadequate capacity of the reservoir to buffer any additional inflows.”</i> <i>“Thika River is very productive and fills the dam in almost each and every rainy season that is the dam spills twice a year and in a period of less than month. Moreover the dam also draws very fast when almost solely meeting the demand at the Ngethu treatment works. This clearly indicates that the dam cannot sustain higher drawdown rates and if not well supplemented. An in- depth analysis is needed to evaluate its response when flow of 1.6m³/s and more and the proposed increase drawdown to Kigoro water treatment works to avoid putting the utility of the plant at of risk utilizing only half the capacity.”</i></p>	<p>The NCT1 will lead to a substantial increase in the water supply available for Nairobi. This will be particularly important to counter drought impacts on the poorest people, who cannot afford the substantially increased water prices during drought and are often forced to use unsafe water sources, which can cause harm to their health.</p> <p>After the development of the NCT1, Ndakaini dam will not only sustain the inflow into the existing Ngethu water treatment plant, but will also provide 1.4 m³/s of daily additional flow to the new Kigoro water treatment plant, which is part of the NCT1 project.</p> <p>While it is correct that without the new water treatment plant, the Ndakaini dam often overflows after the rainy season, this is not the case under drought conditions. During the drought in 2009, the seasonal rains were insufficient to fill the dam and Nairobi suffered a severe water shortage. In 2016, the rainy season was again short and failed to replenish the water in Ndakaini dam, leading to additional rationing in Nairobi because there is not enough water available to use the existing (low) water treatment capacity fully. If the NCT1 had already been built, the flood flows from the NCT1 rivers would have contributed an additional 1.4m³/s volume to Nairobi during the</p>

¹⁵ <http://awsboard.go.ke/our-projects/nct-1-project/contact-us/>

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	<p>From above, it appears that the tunnel is not the most cost effective method of optimizing the seasonal flood flows. Operating the tunnel and the dam will require spillage at the dam for 3-4 months in a year. We and other residents of MC are harmed because flood flow will be wasted or redirected. Flood flow contributes to food security in MC since it replenishes the low lands, keeps the water table high and makes it possible to farm during the dry weather. Food insecurity will increase poverty, contrary to WB policies.</p>	<p>months preceding the drought. Conversely, if the new treatment plant were to be built without the tunnel, the new and existing treatment plants would together draw so much water from the dam, that the rainy season inflow to the dam would not be sufficient to refill the dam. The NCT1 tunnel is therefore needed to increase the inflow into the dam during the rainy season to ensure the dam is at its full capacity to provide water during the dry season.</p> <p>The NCT1 will not lead to spillage at Ndakaini dam (Thika dam) nor to the waste of flood water. The NCT1 intakes will be closed if the Ndakaini dam is full and before it would overflow. Moreover, any spillage from Ndakaini dam would not be wasted as the water would flow back into the Thika River and end up at Masinga dam.</p>
	<p>2nd submission - Background</p>	
13.	<p>The community advocates for holistic equitable utilization of Aberdare river waters. Our mission is to provide information and empowerment to communities that depend on the Nyandarua watershed so that they can make participate and shape public policy regarding projects that are planned to withdraw water from the rivers. The NCT project has direct negative impacts to our family and community.</p> <p>Like other County residents, XXX recognizes that water is a shared national resource, necessary for the accomplishment of VISION 2030 goals. For the NCT project, the group opposes the conveyance method, the excessive volumes of water being withdrawn and the location of intakes. The group supports sharing of Aberdare river waters through multi-purpose dams, constructed in the lower areas of the County.</p> <p>The XXX together with other county residents has made consistent effort to engage with the AWSB and World Bank, in order to resolve the environmental and water sharing issues as described below:</p>	<p>The NCT1 project will not have negative impacts on the Requesters for the reasons explained above. In a consultative meeting on the NCT1 with Murang’a County on October 17, 2016, all stakeholders present agreed that the NCT1 project should proceed as planned.</p> <p>Water benefit sharing between counties such as Murang’a and Nairobi county is a national issue in Kenya; it is not project-specific. Currently, all water abstraction fees such as the ones Nairobi is paying for the water from Murang’a County go to the national WRMA. Counties are arguing that the current legislation should be changed and all or some proceeds of the abstraction fee should go directly to the county. This issue was raised again during this consultative meeting between the Ministry of Water and Irrigation and Murang’a County and the discussions are presently at the Cabinet Level to determine a lasting solution.</p> <p>It is incorrect that the Requesters have “made consistent effort to engage with the AWSB and World Bank”. See Item 1.</p>
14.	<p>1. In XXX submitted an appeal to the National Environment Tribunal to contest the issuance of the NEMA license. The appeal is allowed under Section 129 of the Environmental Management 7 Coordination Act, 1999 and Rules 4(1) of the National Environmental Tribunal Procedures Rules 2003. Instead of acting in good faith and</p>	<p>Management is not in a position to comment on ongoing legal proceedings in Kenyan courts. (See also Item 5).</p>

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	<p>responding to the project environmental issues as would be expected of a WB funded project, the AWSB has applied legal procedures to block the appeal. As of now, the appeal is still at the Courts of Appeal, and its merits have not been litigated. The AWSB is able to do this because, compared to ., it has massive financial resources and the support of its Ministry of Water & Irrigation sister agencies, all under a common Cabinet Secretary.</p>	
15.	<p>2. In January 2015, with other stakeholders, members of the group convinced the MC government to constitute the MC TC. County residents wanted an independent review of the project since the AWSB was dismissive of valid technical concerns regarding the NCT project. The Committee submitted the report to the County in April, 2015 and it became a public document in May 2015. The report validated most of the primary concerns against the project. The Committee recommended the County to direct AWSB to stop the NCT project until major environmental, technical and administrative issues were resolved.</p> <p>In particular the MC TC concluded:</p> <p><i>a. "Impacts on flows downstream and Ground water Assessment of river hydrology finds that NCT-1 will result to significant reduction in downstream flows in the three rivers and unacceptable negative impacts downstream of the intakes".</i></p> <p><i>b. "The water supply master plan has completely overlooked water needs for Murang'a County and other permitted users".</i></p> <p><i>c. "Proposed sources in Murang'a may last only for the next 15 years up to 2030 while population in Nairobi and Murang'a continue to grow".</i></p> <p><i>d. "The upper catchment of Irati, Maragua and Gikigie contributes 64% of the low flows during dry season, meaning the downstream region is highly dependent on flows to be diverted for NCT".</i></p> <p><i>e. "If Reserve Flows are limited to the release of Q95 or even 2xQ95, no investment in flood storage (dam) along the Irati, Gikigie and</i></p>	<p>While the implementing agency has worked with the community and other stakeholders to resolve any concerns, the report cited by the Request was published without input from the agency and includes several misrepresentations of facts. After the AWSB clarified these misconceptions in various consultations, Murang'a County, including the author of the report, signed a consensus matrix revising the major findings of the Murang'a County Technical Report.</p> <p>The establishment of the Technical Committee was the outcome of various consultations between the AWSB, Murang'a County Government, area leaders, church leaders, local communities and other stakeholders. During a meeting with the Murang'a County Leader's Forum on January 21, 2015, the Murang'a County Senator, the Governor, area MPs, MCAs, other County and National Government officials, project-affected persons and local residents agreed to set up an independent County Technical Committee to review the NCT1 project, advise the County on the efficacy of the project, and respond to concerns raised at the Forum on, among others, project effects on hydrology, tunnel design and benefits accruing to Murang'a County. The meeting agreed that the Murang'a County Government should establish the Technical Committee, comprised of representatives from Murang'a County and other stakeholders in Murang'a and supported by consultants from M/s BeAssociates Consulting Engineers. It was considered appropriate that to enhance the Committee's independence, the AWSB would not participate in its proceeding but would be available to respond to any issue that required clarification. The Committee finalized and published its report in April 2015 without any clarifications being sought from the AWSB.</p> <p>On receipt of the report, the AWSB noted that there were several misrepresentations of facts in the Committee's report. The AWSB therefore requested the County for an opportunity to clarify issues as contained in the report. This was done at the Murang'a County Assembly on June 9, 2015, where the AWSB again explained the project and responded to the findings of the report.</p>

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	<p><i>Maragua Rivers will be possible and any existing systems will no longer be viable".</i></p> <p><i>f. "The Aberdare streams have very strong base/lows and are also highly productive during the rainy seasons. The impact of cutting off all the streams at the headwaters is costly to the environment and other users downstream. 11</i></p> <p><i>g. "Information available to the committee reveals that hydrogeological investigation has (been) not completed. However drawings evidence from similar projects tunneling may result to changes in the underground drainage and drying of springs and rivers."</i></p> <p>Among the primary MC TC recommendations:</p> <p><i>a. "Project not to proceed pending revision of NCT design and Masterplan - Northern Collector Tunnel and Water Supply Master plan for Nairobi and Satellite Town are re-designed in view of hydrology and successive supply of water demand in Murang'a County explore alternatives sources for Nairobi and ensure measures for efficient water use pursuant to Water Act 32 (b) as perquisite"</i></p> <p><i>b. "NCT to abstract flows level lower than QSO To mitigate the risk of low and zero flow downstream of NCT intakes"</i></p> <p>For a complete list of recommendations, refer to MC TC Section A 4.2</p> <p>Instead of implementing the recommendation, MC government and AWSB signed a Consensus Agreement, allowing the project to proceed. The agreement was negotiated without including the stakeholders. Our group and others learnt of the agreement several months after it had been signed. Neither the MC government nor the AWSB has explained how the numerous contradictions between the GIBB EIA 1188 and the MC TC report were resolved. For instance, according to EIA 1188,</p>	<p>After the AWSB's clarifications, the Murang'a County Technical Committee revised its presentation of the report, incorporating some of those clarification. The revised County presentations were made in a second stakeholder's forum held on June 18, 2015.</p> <p>During this forum, it was further resolved that the Murang'a County Government together with the Technical Committee and the AWSB should jointly prepare a memorandum indicating the issues on which there was consensus and also the areas where there were divergent views. The Technical Committee and Murang'a County finalized and signed the consensus matrix in January 2016, and it was adopted in the Murang'a County Assembly in April 2016.</p> <p>The author of the Murang'a County Technical Report on the NCT1 referred to by the Requesters was the chairman of the Joint Technical Committee which reviewed the report, comprised of Murang'a County representatives and an AWSB representative.</p> <p>A further stakeholder forum was held on October 17, 2016, during which it was unanimously agreed that the NCT1 project should proceed and commitments in the consensus be adhered to. The key issues on soil and water conservation works, and formation of a bulk water company and water benefit sharing, are largely policy issues which cannot be addressed by the AWSB under the project, but are now being discussed at the level of the cabinet.</p> <p>The cited conclusions raised in the report are responded to elsewhere in the Annex, as listed below.</p> <p>For (a) - See Item 8.</p> <p>For (b) - See Item 9.</p> <p>For (c) - See Item 9.</p> <p>For (d) - See Item 9.</p> <p>For (e) - See Item 9.</p> <p>For (f) - The NCT1 is not cutting off any stream. Fish ladders are provided and no water will be taken from the stream during normal or low flow.</p> <p>For (g) - See Items 8 and 43.</p>

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	<p>74 % of MC residents have access to piped water. The MC TC states that piped water is only available to approx. 35% of MC residents. Resolving such a contradiction requires significant engineering and could double the necessary compensational flows.</p>	<p>Regarding the cited recommendations:</p> <p>For (a) - The downstream water demand was considered during the design and the methodology is described in Item 10.</p> <p>For (b) - See Item 8.</p> <p>The Maragua County report was not consulted on with the implementing agency and subsequently main findings had to be revised, to reflect the studies and input provided by the AWSB.</p> <p>The figures about the access to piped water in the entire Murang'a County are not relevant, because only a portion of Murang'a County residents live downstream of the NCT1 intakes. As described in Item 10, their current and future water demand was taken into account for the design of the NCT1.</p>
16.	<p>3. In December 2015, after realizing that the AWSB and the MC government would not respond to the Findings and Conclusions of the MC TC, the Community group submitted a grievance to the World Bank Grievance Resolution services (GRS). After some conversation, the GRS offered to assemble an Independent Panel of Experts (IPE) to review the project, since the GRS confirmed that it lacked technical capacity. The SA had an opportunity to review the TOR and the group expressed reservation regarding the bias of the TORS towards the goals of the AWSB and preconceived outcomes, and the promise of consultant services to the IPE members. The SA also wanted the IPE to be "independent", by not having a previous role in the project and to be dissolved after submitting a report. The GRS affirmed that the IPE would be "independent" in accordance with WB guidelines. The PE started work in August, 2016. The SA immediately submitted concerns to the IPE and we to date have received two responses.</p> <p>a. We disagree with most of the response and we can explain if necessary.</p> <p>b. We feel that the GRS process is not structured to be fully independent and it is taking too long, considering that our primary focus is the protection of the environment and other irreversible negative impacts.</p> <p>c. We believe that the IPE lacks independency because, based on an on line resume, the Chairman of the IPE appears to</p>	<p>Regarding the formation of the IPE, see Item 1.</p> <p>In Management's view no credible evidence has been presented that would put the IPE Chairman's independence into question. He is a Member of the NIB, which is a state corporation mandated to provide for development, control and improvement of irrigation schemes within the country. He was appointed in order to provide his professional expertise as a registered Dam Expert in the country. The NCT1 is a water supply project and not an irrigation project (for which NIB would have a mandate), hence no conflict of interest can be derived from that function.</p> <p>The Chairman of the IPE also is not an employee of the NCT1 design firm, as alleged in the Request. The IPE Chairman worked as a sub-consultant for the firm outside Kenya in 2012 and 2013, but was never an employee. It is quite common that engineering consultants work as freelancers on short-term assignments for companies without being regular staff of such companies. Having worked for a company in the past does not bind a consultant permanently to that company. Every company in the market remains a potential employer for a consultant, regardless of whether they have worked for the company before. In Management's view, therefore, there is no credible conflict of interest.</p> <p>Management has reviewed the concerns presented by the Requesters and concluded that there is no reason to assume that the IPE Chairman is influencing the other IPE members who are responsible for the areas that concern the Requesters (tunnel construction and downstream water resources). As explained above, the IPE was selected</p>

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	<p>be an employee of SMEC, the Tunneling consultant. AWSB is relying on the recommendations from SMEC and we are contesting the recommendations. Also, the Chairman is a board Member of the National Irrigation Board. The National irrigation Board and the AWSB are under the Cabinet Secretary for the Ministry of Water and Irrigation. The IPE Chairman is answerable to the CS. The CS has emphatically stated that the project will progress, despite concerns by local residents. There is no expectation that the IPE Chairman will act against the will of the CS. We therefore view the IPE as structured to diffuse and not to respond to our concerns. This is why we have decided to appeal the WB Inspection Panel. We urge you to study the Murang'a County government Technical Committee Report on Northern Collector Tunnel Project, in tandem with our letter and provide unbiased decision regarding the NCT project. The. believes that due to the significant number of unresolved issues, most of which will cause irreversible environmental harm, the project should stop until the issues are resolved.</p> <p>We also hope that the IPE will visit the project site, inspect the tunnel construction and observe the three rivers. If you do, you will note that the rivers do not have very much flow, as demonstrated by the following photos.</p> <p>I am also attaching a link to an article by Korinna Horta, titled "Troubled Waters" "World Bank Disasters along Kenya's Tana River". The article explains the environmental and social consequences when projects go wrong. Refer to: http://www.multinationalmonitor.org/hyper/issues/1994/08/mm0894_08.html</p>	<p>independently from the implementing agency and the Bank considers it to be an independent body.</p>
	<p>3rd submission</p>	
17.	<p>1. The project owner, Athi Water Service Board (AWSB) has engaged in “misinformation” when describing the project to impacted communities. For instance, they have presented superficial project impacts to uniformed community members who have no understanding of</p>	<p>The NCT1 will abstract water only when flows are above Q80. Therefore, the NCT1 abstractions will only be limited to flood flows. This minimum reserve flow was adopted after consultations with the County Government and local leaders. The IPE has reviewed and confirmed this threshold. The IPE also reviewed the NCT1’s impacts on communities. A summary of its findings is published on the AWSB webpage¹⁶.</p>

¹⁶ <http://awsboard.go.ke/our-projects/nct-1-project/summary-of-findings-by-ipes/>

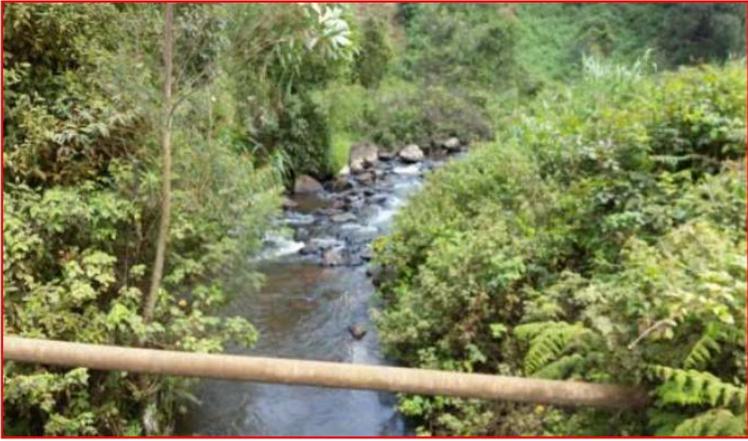
No.	Claim	Response
	<p>technical terms. They have described the project as extracting flood flow while factually the project has been designed to withdraw Q95 flow for 365 days a year. Refer to Murang’a county Technical Report, Section A.3.1. The AWSB has avoided describing any of the negative impacts to the communities. The AWSB has told the impacted communities that the project will withdraw flood flow. This seems to be a strategy for providing false assurance and discouraging objection as the communities do not feel threatened since they expect the rivers to function at the same non-flood level. However, this is not what has been designed or is being constructed.</p>	<p>See also Item 9 above.</p>
18.	<p>2. In order to appear to comply with National Environmental Management Authority (NEMA) requirement to subject the project to public participation and scrutiny, the AWSB selectively presented the project to communities that are minimally impacted and will benefit financially from land compensation and avoided the communities where the project has the most severe impacts. The most negatively impacted communities live in lower Murang’a County and are not aware of the project. Those who have obtained information are opposed as they understand the severe impacts.</p>	<p>See Item 7.</p>
19.	<p>3. Recently due to pressure from community groups, the AWSB and the Murang’a county government signed a Consensus agreement. In the agreement, the AWSB offered to lower the flow extraction to Q85. However, this extraction rate appears to be arbitrary and not based on comprehensive factors such as the factual hydrology of the rivers, the immediate or long term needs of the county or the necessary environmental flows. The Murang’a County Rivers are heavily utilized by local communities and some are maxed out. A Q95, Q85 or other percentile extraction regime is highly biased towards the AWSB. Percentile allocation formulas are more reliable for rivers without competing uses. Flow in the Murang’a Rivers can only be shared fairly and holistically after a basin wide, data driven study that identifies the</p>	<p>As noted earlier, the threshold for water extraction is Q80. This minimum flow was established after consultations with government and community leaders. It is also based on the national abstraction rules and WRMA Rules of 2007.</p> <p>The approach to hydrological assessment of the NCT1 rivers is described in response to Item 10.</p>

No.	Claim	Response
	environmental, immediate and long term water needs of all the river dependents.	
20.	4. In order to maximize flow extraction from the rivers, the AWSB has used a static allocation formula for the county residents. The AWSB has conveniently failed to recognize that as county residents achieve the 2030 Vision, life styles will change; small towns will become bigger cities, communities will require more water for agriculture and recreation. Predicting future water needs for the county would require the AWSB to develop a predictive model, based on population growth, life style trends, climate change etc. Such a model would support the Murang'a County government Technical report that the Murang'a Rivers cannot support designed flow for extraction.	The water demand forecast of Murang'a County up to year 2035 was based on population growth and projections as per the Ministry of Water and Irrigation (2005) Water Design Guidelines. See more details above under Item 10.
21.	5. Regardless of the Consensus Agreement, there is no evidence that the AWSB has redesigned, or intends to redesign the intake structures to withdraw the lower Q85 flow. The Consensus agreement could therefore be viewed as an effort to silence those who are against the project.	Revision of the hydraulic design of the NCT1 intakes has been concluded and reviewed by the IPE. The IPE report is available on the AWSB's webpage and can be requested from the AWSB. ¹⁷ The changes to the intake designs will allow the public to check that no water is withdrawn during normal and low flow periods.
22.	6. There is a wide gap between the conclusions of the AWSB consultants and the Technical report prepared by Murang'a County government. The Murang'a County government report is more factual and credible. It predicts county wide water shortages if the project is constructed as planned. It clearly states that the project is not feasible and should not be constructed.	The gaps between the AWSB's conclusions and those of the Technical Committee were closed after public discussions between both. See Item 16 above.
23.	7. The Murang'a County government report, has questioned the technical validity of diverting additional flood flow to the Ndaikaini dam through the NCT since this dam already fills rapidly from its current sources and over-spills frequently during heavy rains. Unless the dam is raised (not technically feasible, due to challenges encountered during construction) most of the diverted flood flow will be spilt as soon as it is delivered to the dam. The WASB should not waste flood flow as it replenishes downstream farms and wetlands and most of	The NCT1 will lead to a substantial increase in the water supply available for Nairobi (see response to Item 5 for more details). The NCT1 will have minimal impact on flood recession agriculture in downstream areas. Flood recession agriculture is undertaken using the water and nutrients provided by the floods once the floods have receded. This is only possible in flat landscapes where sizeable areas are flooded regularly. Such agricultural practices, however, cannot take place in hilly areas, such as the steep valleys before and after the NCT1 intakes. Therefore, flood recession agriculture is practiced only about 200 km downstream of the intakes, around Garissa. . The

¹⁷ <http://awsboard.go.ke/our-projects/nct-1-project/contact-us/>

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	<p>the agriculture in lower Murang’ a County occurs on the flooded wetlands. Because of this scenario, there is concern that the real reason for the tunnel is to withdraw water from the rivers during the dry months.</p>	<p>maximum combined water inflow in the NCT1 intakes is about 18.4 m³/s, while average peak flood flow at Garissa (which allows for recession agriculture) is about 850 m³/s (based on 1934 to 1989 data). Therefore, the theoretical maximum impact of the NCT1 on flood flows in Garissa is about 2.2 percent. In reality, the impact is much less given that there are four dams downstream of Masinga dam before the Tana River reaches Garissa, which attenuate and buffer the flood flows. That the NCT1 will have no measurable impact on flood recession agriculture also becomes clear when looking at the catchment areas, which are the areas from which rainwater drains into streams and rivers, where it can cause flooding. The NCT1 intakes have a catchment area of about 86 km², at Masinga dam the catchment area is 7,335 km², and at Garissa it is 18,000 km² (see Figure 2). The three rivers, from which the NCT1 diverts flood water, represent about 0.5 percent of the entire Garissa catchment area. Moreover, the NCT1 only takes about 38.8 percent of the three rivers’ average annual flood flow, making any impact in that area even more negligible.</p> <p>The NCT1 will not withdraw water during the dry months. The intakes are designed in a way that only flood water can enter.</p>
24.	<p>8. The AWSB should disclose the # of days or months during which the tunnel would be not operational based on the designed operation structure, which requires the tunnel to be shut when flow in rivers falls below Q95 (now Q85?) . Considering that this is likely to happen during periods of draught when both Nairobi and the county needs water the most, how does AWSB justify such a major investment?</p>	<p>The NCT1 is not designed to transfer water to Ndakaini every day, because it is only supposed to operate during flood flows. It is important to note that the NCT1 will substantially increase the water supply to Nairobi, which is detailed in the yield analysis report that can be requested from the AWSB using this link.</p> <div data-bbox="760 1276 1497 1745" data-label="Image"> </div> <p>Figure A1.6 Main Tunnel Progress Works.</p>
25.	<p>9. Project will cause severe water shortage to Murang’ a county communities, prevent</p>	<p>See responses under Items 10 and 41.</p>

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	<p>farming through irrigation and cause water shortages to existing community water projects. Refer to MCG TR, Findings and Conclusions. EIA 1188 Item 7.6.1 states that the three rivers would potentially be having zero or near zero flow, implying that the rivers will become dry river beds.</p>	
<p>26.</p>	<p>10. Project will eliminate the potential for micro hydropower generation and water sports. These activities are important in creating youth employment and reducing rural poverty, which is overwhelming in the county.</p>	<p>The NCT1 will not have significant effects on existing and future hydropower generation. Abstraction permits for existing and future hydropower generation were considered in the calculation of the compensation flow to ensure that the flow was sufficient. This is described in the yield analysis report, which can be requested from the AWSB using the following link.</p> <p>The reduction of inflow into Masinga dam, which is used for hydropower generation, was calculated at 2.7 percent, which is insignificant.</p> <p>It also should be noted that drinking water supply is prioritized over other uses, including hydropower generation.</p> <p>To the best of the Bank’s knowledge, the rivers in question are not used for water sports. Their size and depth do not make them suitable for sport. See photos below.</p> <div data-bbox="751 1104 1507 1549" data-label="Image"> </div> <p data-bbox="938 1560 1321 1581">Plate 19 Maragua Tunnel Intake Site (02/08/2016)</p>

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		 <p data-bbox="938 682 1321 737">Plate 14 Irati River –Site for Intake and Shaft River (02/08/2016)</p>
27.	<p>11. All the listed impacts will impoverish our community and make it worse than it is now. This is contrary to WB policies which require projects to be balanced, not impoverish people and provide benefits to all and not diminish the environment. In this respect it is important to note that communities that lose the ability to benefit from the nearest river will have no other sources as the AWSB has targeted all the Murang’a county rivers. Unlike the AWSB, rural residents do not have the financial ability to build expensive delivery projects.</p>	<p>The Bank does not agree with the Requesters’ claim of harm. All Bank policies were followed and any negative impact will be compensated for in accordance with the Resettlement Action Plan. It is important to note that, together with Nairobi, 480,000 current residents (790,000 at the design horizon 2035) of Murang’a will be provided with water supply services through the NCT1.</p>
	<p>4th submission</p>	
28.	<p>My complaints are as follows:- 1) The Water Resources Management Authority was throughout the ESIA study kept in the periphery of the decision making process, contrary to its statutory mandate under the Water Act 2002 and Regulations thereunder as exemplified by the following observations:-</p> <p>a) possibility of creation of water conflict to downstream water users as a result of reduced water flows as observed by WRMA’s Upper Tana sub-regional manager has been disregarded. Refer to Appendix VI-II: Stakeholder consultation forms and notes to meetings, WRMA stakeholder consultation guide page 3.</p>	<p>It is not correct that the WRMA was kept at the periphery of the decision making process. The WRMA was involved from the conceptual phase of the NCT1 project onwards throughout project development. It also had already participated during the Master Plan preparation by attending preliminary consultation meetings held at Nokras Hotel on September 13, 2012.</p> <p>During the ESIA study phase, the WRMA was consulted and participated in several meetings including:</p> <ol style="list-style-type: none"> 1. During scoping studies as indicated in section 6.2 and 6.3 of the ESIA; 2. In key informant interviews during the ESIA studies, see ESIA Appendix VI-II page 377 3. In a meeting held at the County Commissioners office on 22/9/2014, ESIA Appendix VI-II page 455. 4. A public disclosure workshop held at Nokras Hotel on 02/10/2014. See ESIA Appendix VI-IV page 526.

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	<p>b) at paragraph 6.2.1 of the ESIA report, according to the Murang'a WRMA, service Water officer, the Irati River is "tapped". Yet the AWSB has proceeded to design extraction as if this information was not relevant.</p>	<p>5. Meeting with Murang'a Heads of Departments at County Commissioners Boardroom on 27/11/2014.</p> <p>6. Represented by Water Resource Users Association in a public hearing organized by NEMA on 30/1/2015. The meeting was held in Kanyenyaini, Murang'a County.</p> <p>NEMA also identified the WRMA as a lead agency (state corporation in which any law vests functions of control or management of any element of the environment or natural resources) and submitted a copy of the report to it for comments before the environmental license was issued.</p> <p>The possibility of water allocation conflict downstream was raised as a possible negative impact. To mitigate this, it was agreed that the proposed NCT1 would abstract the flood flow only and not the normal flows.</p> <p>The issue was addressed further during the ESIA studies, in which the reserve flow of the Irati river was pegged at Q68, which meant that abstractions would only be done during very high flood flows.</p>
29.	<p>2) Whereas six number public consultations in areas along and adjoining the tunnel alignment were held between 11/8/2014 to 14/8/2014 (refer to Appendix VI-I: Public meetings), people living downstream of the tunnel alignment who would be adversely affected by the project were not consulted. Further, the meetings were held for a duration of two hours only.</p>	<p>The response is in Item 7.</p>
30.	<p>3) With the nature of the project being highly technical, it should have been important that the general public be given prior and written notice of the substance and proposal of the project:-</p> <p>a) in a translated summary in a language they understood, so that their participation would have been more meaningful; and</p> <p>b) so as to guard against different disclosures being made to different categories of persons to be affected by the project - most people in Murang'a actually think of flood flow as water that flows past the bank during a rainy event which is very different from the AWSB definition</p>	<p>Prior notice of the ESIA consultations was provided (see Item 5).</p> <p>Consultations were held in both English and Kiswahili (the official languages in Kenya). Radio broadcasts were also in Kikuyu.</p> <p>A schematic explanation of the different river flows is provided in Annex 3.</p>
31.	<p>4) Inadequate baseline information,</p> <p>a) Quote from ESIA Page 3-4</p>	<p>As stated earlier, the ESIA study report utilized draft designs, following which additional geological and geotechnical investigations were undertaken as the basis for the final designs.</p>

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	<p>“Due to the limited extent of information available, the rock types were reduced to 3 with upper, intermediate and lower bound conditions (rock class designations), as appropriate, as described in Tables 3-2 below.” End of quote</p> <p>b) Quote from ESIA Appendix 1 Tunnel Drawings: <i>Drawings No 50830023-TUN-01502 Rev B, 50830023-TUN-01511 Rev B, 50830023-TUN-01512 Rev B, 50830023-TUN-01513 Rev B, 50830023-TUN-01514 Rev B Consultant: SMEC, Northern Collector Tunnel. Stamped: “PROVISIONAL PENDING GEOTECHNICAL INVESTIGATION”</i> End of quote.</p> <p>The stamp on the drawings confirms that geotechnical investigation has not been done. Note the drawings do not show existing aquifers or geological data. How is the assessment of the likely effects caused by the tunneling action (i.e blasting, drilling etc) and the tunnel alignment on existing aquifers possible without comprehensive geotechnical investigations?</p>	<p>The NCT1 final design report analyzed the rock formation along the tunnel alignment using six geotechnical units based on two main rock classifications and clay residual soil, as follows:</p> <ul style="list-style-type: none"> - Agglomerate, which has been classified as Upper Bound, Intermediately Fractured and Lower Bound depending on strength and level weathering - Basalt, also classified into three categories Upper Bound, Intermediate and Lower Bound depending on strength, category of rock mass and level weathering. <p>The final design is based on comprehensive geotechnical and hydrogeological investigations. Final design and construction methodologies are based on additional ground investigations, which confirmed that the parameters assumed during draft design were correct and representative. Please see more detail in Items 8 and 43.</p>
32.	<p>5) Possibility of springs and streams drying up as a result of tunneling Quote from ESIA item 7.3.5: <i>“Tunneling activities may lead to alterations of underground drainage and fracture flow. During the drilling, water intrushes may occur at fracture zones. Studies have shown that tunnels can lead to drying up of springs and streams leading to severe socio-economic and ecological effects such as the total disappearance of fish, amphibians and aquatic invertebrates in the dry stream sections. Several streams and rivers will be crossed by the tunnel (see section 3.1.4). However, no major fractures are anticipated and underground water is also not a major source of community water supply (only accounts for 2.26%).”</i> End of quote.</p> <p>a) Not only springs and streams are likely to dry up; see ESIA item 7.3.5. Rivers are supplied water by streams and springs, and entire rivers may dry up, because of the proposed tunnel. This would leave entire</p>	<p>The Request incorrectly quotes the ESIA and other studies. The ESIA study report does not state that the NCT1 tunnel will cause drying up of springs and streams in the project area. Rather it notes, in reference to other studies, that this is a possible impact of unlined tunnels. Because of this, the NCT1 incorporates a fully circular and waterproof lining for the tunnel, which prevents any long-term leakage of groundwater into the tunnel and therefore cannot cause any drawdown of local aquifers, springs or rivers. See Item 8.</p> <p>The design of the NCT1 also took cognizance of the previous tunnel designs in the project area, which have a similar geological setting, as follows:</p> <ul style="list-style-type: none"> • Mathioya Tunnel – about 87 percent of the tunnel is not lined with concrete • Thika-Chania tunnel – most of it is concrete lined up to the tunnel shoulder level (the crown is not lined in most sections). <p>The Mathioya tunnel is 5km long with a nominal diameter of 3.05m and is located approximately 15km to the northeast of the NCT1.</p>

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	<p>community which relies on the rivers devastated.</p> <p>b) Springs and streams emanate from aquifers. The latter have recharge zones that enable the soakage of rainwater underground. Springs and streams surfacing downstream of tunnel alignment may emanate from aquifers with recharge zones upstream of the tunnel alignment. If such aquifers are ruptured due to tunneling action, such springs and streams will dry up.</p> <p>c) Is it accurate to assume that no major fractures are anticipated without hydro-geological data?</p> <p>d) The matter of interaction of groundwater with surface water is not addressed. In particular, the recharge zones of streams surfacing downstream of the tunnel alignment have not been studied.</p> <p>e) Working without actual hydro-geological reports along tunnel profile is a recipe for environmental disaster. It puts people's lives in danger due to potential landslides and environmental degradation. In absence of data showing location(s), sizes and nature of aquifers (confined/unconfined), it would be difficult to put in place mitigation measures during construction. The hydrogeological reports have not been availed to-date.</p>	<p>The Thika-Chania tunnel is also 3m diameter and starts at Thika dam about 3km south of the NCT1</p> <p>Inspections done on these two tunnels indicated that there can be limited interaction between the underground water and the tunnel sections which are not concrete lined.</p> <p>Therefore, in order to ensure that the NCT1 does not interfere with underground water, the tunnel is fully lined with waterproof concrete. As such this will ensure there is no ingress of groundwater from the surroundings to the tunnel. The inspection report and photos of this tunnels are available at the AWSB office on request.</p> <p>Additional technical measures, such as contact grouting, will be incorporated during construction to ensure structural integrity and to avoid any ingress of groundwater from the outside of the tunnel. Ultimately, based on sound engineering practice, no interaction between groundwater and surface water is expected once the tunnel is constructed, as the tunnel will be fully lined with waterproof concrete, isolating it from the groundwater regime.</p> <p><i>Management acknowledges that during construction, limited seepage into the tunnel may occur.</i> Measures to avoid any significant seepage into the tunnel during construction are part of the contract, such as grouting ahead of the tunnel face and measures to manage the potential impacts. There are monitoring programs for water seepage into the tunnel during construction as well as for the water sources above the tunnel. All monitoring results will be made public.</p> <p>In the unlikely event that wells above the tunnel are affected during construction, the AWSB would deliver water by tanker to the affected communities, as noted in the Environmental Management Plan. Once construction works are completed, it is expected that the water in these wells will be restored naturally when the aquifer returns to its original level following the next rains. In the interim, the AWSB has committed to ensure adequate water supply to the affected communities, until affected wells are replenished.</p> <p>A baseline study for existing water resources along the tunnel corridor has been undertaken. The study report is available on the AWSB website for community and stakeholder input.</p> <p>During the ESIA studies, the AWSB undertook a comprehensive ecological survey of the aquatic and terrestrial fauna and flora in the rivers and riparian areas in the NCT1 project area. These</p>

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		<p>included the upstream areas of Maragua river up to the confluence of river Maragua and Sagana. The ESIA report recommended wet season survey and subsequent annual aquatic fauna surveys for both wet and dry seasons to monitor trends and inform any further management interventions during construction and operational phases of the project. The AWSB has engaged the ecologist to undertake these monitoring studies for a period of one year divided into four quarters (April-June 2016, July-September 2016, October-December 2016 and January 2017-March 2017). Results of the first two quarters undertaken so far indicate that there is no difference in species diversity noted during the baseline studies and the two monitoring studies.</p> <p>See also Items 8, 42, and 43 for more details.</p>
33.	<p>6) Lack of information on effect of tunneling action along existing Thika-Chania tunnel on water resources along and downstream of the tunnel alignment. Such information would inform effect of the northern collector tunnel on water resources along and downstream of its alignment.</p> <p>It is not sufficient to state that this particular tunnel is not fully lined. The matter in question is:- to what extent did springs and streams dry up as a result of the tunneling action? And the drying up referred to here should not be compounded with global warming.</p>	<p>The EIB financed Thika-Chania tunnel is an existing half lined tunnel and cannot be compared to the NCT1.</p> <p>See Item 32 above.</p>
34.	<p>7) Assumptions regarding existing geological/hydrogeological conditions at the final design stage without current data puts a disclaimer on the whole project.</p> <p>a) Assumptions have been made in the ESIA report some of which may not be correct (eg see item 5 above).</p> <p>b) Which party takes responsibility for inaccurate data/assumptions?</p>	<p>See Item 43.</p>
35.	<p>8) Misrepresentation of project area Quote from ESIA item 3.1.7. Page 3-11 <i>“3.1.7 Water Resources and key uses (a) Surface water resources Water is used for multiple purposes among them being domestic, livestock, agriculture (irrigation minor) and industry (tea processing).”</i> End of quote.</p> <p>a) This appears to define project area as a restricted strip along tunnel alignment focusing on the tea growing areas only. The</p>	<p>The downstream impact was considered up to Masinga dam, where the change in annual flow was considered negligible at 2.7 percent. All downstream water demands were considered. See Item 10.</p>

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	environmental effect of the project goes downstream way beyond the tea growing zone.	
36.	<p>9) Unclear definition of cumulative impacts as they apply to day to day activities of the local population</p> <p>Quote from ESIA item 7.6.1, <i>“The cumulative impacts at Maragua 4BE01 are expected to include the following: Reduced flows as a result of diversion of a majority of the flows originating from the Aberdares at Irati, Gikigie and Maragua intakes to the Northern Collector, resulting in: Reduction in the flow reaching Masinga Reservoir and therefore a reduced flow available for hydroelectric power generation; Some short periods or single days with potentially zero flow or near-zero flow. These periods will normally be preceded and/or followed by further periods with extreme low flow; Less flow available for use in existing and future domestic and agricultural activities (e.g. irrigation) in downstream areas. Potential factors that may ultimately interact with impacts from changed downstream flows on the Irati and Maragua Rivers include the requirements for increased food resources for an increased population in Nairobi, some of which may require increased use of irrigation. Siltation of Masinga reservoir is also a factor that is likely to interact with the changes in flow. Reduction of reservoir capacity by 30% by 2050 due to siltation is considered likely”.</i>End of quote</p> <p>Item 7.6.1 Cumulative impacts on downstream hydrology are not clear eg a) what will be the effect on current, proposed and future irrigation schemes within the Maragua river basin b) what will be the effect on current and proposed hydro-power projects c) the increased demand for food resources would also apply to the local population</p>	See Items 9, 10, 41 and 42.

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	<p>It is noted that the cumulative impacts will leave the project affected population poorer than they are today.</p>	
37.	<p>10) Impractical mitigation measures Quote from ESIA item 7.3.5 “ Mitigation: <i>Any shallow wells and boreholes affected by the project will need to be re-established during the project operation; and AWSB has proposed projects to supply piped water to the area covered by the project”</i> End of quote. (a) Under item 7.3.5, one mitigation measure proposes that AWSB would restore wells and boreholes that may dry up during tunneling. This may not be practical noting the likely causes of the drying up of the water sources. (b) The likely cause of drying up of wells and boreholes would be leakages through cracks that may develop in the subterranean due to the tunneling action especially when blasting is carried out. This will result in a lowering of the water table. (c) Since these are irreversible acts, how does one re-establish the shallow wells and boreholes? (d) Since it is likely that the springs and streams may have dried up due to tunneling effect, where does one get piped water from to the area covered by the project?</p>	<p>Any impact on the aquifer will be limited to the construction period, during which the AWSB will supply water to any affected area. A comprehensive monitoring program is in place and so far no impact has been detected (see Item 42 for more details).</p>
38.	<p>11) The northern collector tunnel project has a phase 2 component. Why deal with phase 1 in exclusion while the river resources are shared within the region?</p>	<p>See Item 4.</p>
39.	<p>12) Lack of a water balance of the affected river basins taking into consideration all categories of current and future water needs. (a) Has a water balance been established entailing all categories of water demand within the project affected area i.e domestic, livestock, industrial and irrigation with respect to water transfer to Nairobi. (b) The historical Chinese “great leap forward” has of late come under scrutiny due to the heavy cost in terms of human lives. I draw a parallel to the northern collector tunnel. This is a venture that will create misery in the lives of thousands if not</p>	<p>For (a) and (b), see Item 10. For (c) – Surface dams were considered in the Master Plan, and the Maragua dam was recommended as the next investment to be implemented after the NCT1. Currently an update of the Master Plan is ongoing and it is not yet known what will be recommended as the next phase.</p>

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	<p>millions of unsuspecting Kenyans both in the short and long runs</p> <p>(c) Why is the option of surface dams without tunnels not adopted? If it is on basis of energy considerations, is it not possible that power is generated at dam spillway to enable pumping of water?</p>	
	<p>5th submission - Letter to IPE July 30, 2016 Ref: Environmental concerns about proposed Northern Collector Tunnel (NCT) permanently damaging elevated aquifers in Aberdares-Murang'a Kenya and drying springs, streams and rivers.</p>	<p>The IPE has acknowledged this and other letters and responded in detail to questions and comments. However, to date the Requesters have not been available to participate in a dialogue with the IPE.</p> <p>The IPE issued an initial response to the letter on October 31, 2016. The Requesters provided feedback to these initial responses on November 7, 2016. The IPE issued detailed responses to the questions on November 26, 2016 after completing a detailed review of project study reports, designs and construction methodologies during the IPE second mission of November 18, 2016. The IPE invited the Requesters to a discussion on November 3, 2016 but they were not available according to their reply of November 15, 2016.</p> <p>To date the Requesters have not provided feedback on the detailed responses to their questions sent on November 26, 2016. Management found that the IPE answers to the allegations were well done. The IPE's response are cited below and the full response can be found in Annex 4.</p>
40.	<p>1. Environmental and Social Impact Assessment (ESIA), EIA-1188, report prepared under the direction of AWSB which they signed on 4th November 2014.</p> <p>2. The ESIA report communicated the following. ESIA item 7.3.5 and we quote "<i>Studies have shown that tunnels can lead to drying up of springs and streams leading to severe socio-economic and ecological effects. ...</i>". There are no mitigating factors on the ESIA addressing drying of springs, streams and rivers.</p>	See Item 8.
41.	<p>3. ESIA item 7.6.1, showed that the proposed tunneling would lead to, "Some short periods or single days with potentially zero flow or near-zero flow. These periods will normally be preceded and/or followed by further periods with extreme low flow"</p>	<p>The IPE has reviewed the project and has found no reason for it to be stopped due to environmental or technical design issues.</p> <p>We also draw attention to ESIA §7.6.1 introductory paragraph that points out that cumulative effects listed thereafter '<i>...may also arise from additional factors or developments not directly related to the upstream diversion of water via the Northern Collector tunnel ...</i>' A continuous monitoring of environmental and technical issues as is nonetheless being implemented and reviewed as well as interventions proposed by the IPE when</p>

No.	Claim	Response
		necessary will ensure that this effect is highly unlikely to occur. ¹⁸
42.	4. The proposed tunnel would be more than 3 meters diameter, 11.8 km long, running approx. 20 meters to 250 meters below ground surface. Runs deep within the local water table, below existing small rivers (streams) potentially intercepting various aquifers and permanently altering underground drainage. Has the proposed tunnels irreversible negative impact been addressed?	<p>The tunnel construction methods limit any negative impacts.</p> <p>The IPE has reviewed the construction methods. Most of the tunnel will be excavated using mechanical excavators causing minimal disturbance in the surrounding ground formations. A very small part of the tunnel is to be excavated by controlled smooth blasting. No massive explosions will be used for the tunnel excavation. On the contrary the Technical Specifications clearly limit the explosives used and provide very strict requirements for it.</p> <p><i>AWSB-Northern Collector Tunnel Phase 1 Project IPE-Mission No 2: Report</i> <i>NCT –IPE - MISSION 2 REPORT November 2016 Page 50</i></p> <p>According to the design and the Technical Specifications, the tunnel will be fully lined by concrete. The lining is constructed in two stages. The first stage includes the continuous installation of watertight primary lining (sprayed concrete) allowing very little water seepage. This sprayed concrete primary lining is applied immediately after each excavation step. Taking into account [a] that the formations that will be encountered are of very small permeability and [b] that the primary lining is continuous and practically watertight, very small quantities of water are expected to drain into the tunnel. Any ingress of water into the face of the excavation, in case that open structure fault zones are met, will be treated quickly by grouting (pumping cement based sealants into the surrounding rock). Small seepage into the tunnel during this stage of construction cannot be ruled out. The Geological – Hydrogeological studies (see Item 44) indicate that this will have no permanent negative effect on the aquifers. A monitoring system is already in place to continuously monitor the ground water levels.</p> <p>The Technical Specifications of the project (par. S5.4.3) specifically cover the case that high water inflow is encountered during excavation by stating that:</p> <p><i>High water inflow may occur, particularly when crossing tectonic features or highly jointed, fractured and sheared zones. The Engineer may, or may upon the Contractor's request, direct drilling and grouting ahead of the face, as described in Section S9, Subclause 9.2.3.4, Drilling for Consolidation Grouting. Payment for grouting ahead of the face is included in the pay items related to consolidation grouting.</i></p> <p>This is further specified in the T.S. §9.3.7.5 <i>Grouting Criteria for the Control of Water Inflow at the Face.</i></p> <p>As far as we know, no such case has been yet encountered. The Consultant supervising the works (Engineer) is aware of the</p>

¹⁸ Independent Panel of Experts (IPE) 14th to 18th November 2016 Mission Report, Part A: IPE Joint Report (November 2016).

No.	Claim	Response
		<p>need to act quickly issuing orders – as foreseen in the Technical Specifications - in order to minimize water seepage into the tunnel during excavation and primary support.</p> <p>At a second stage, a final concrete lining is to be constructed along the whole tunnel length. The high pressure contact and consolidation grouting, which will be carried out around the perimeter after the concreting of the final lining, will fill any space left between the concrete lining and the surrounding ground and seal any cracks that either pre-existed or resulted by the tunnel excavation. Defects in the lining construction will be repaired by grouting.</p> <p>Following the construction of the final lining, any minor local drainage paths towards the tunnel or along the perimeter of the tunnel will be blocked and the old drainage paths will be re-established.</p> <p>The IPE visited all three active tunnel excavation portals and noted that in one of them (Makomboki outfall) there was a very small seepage of water out of the tunnel. No water was exiting the two other portals (Gikigie and Maragua).¹⁹</p>
43.	5. On the entire ESIA report, discussion of existing aquifers (underground water systems) along the proposed tunnel profile has been missed out. Why is it omitted?	<p>Geological and Geotechnical studies have been carried out that include analyses of existing aquifers.</p> <p>1998 Geological and Geotechnical investigations with 13 boreholes (Howard Humphreys & Partners Ltd). Ground permeability and Water Table depths recorded during drilling are included in the report.</p> <p>2012 Geological and Geotechnical investigations including additional 7 boreholes (Turn-O-Metal Engineering Ltd).</p> <p>2013 Electrical resistivity tomography was performed in 2013 locally at the water intakes at Maragua River, Gikigie River and Irati River, at the adit portal at Kaanja and at the Makomboki outfall.</p> <p>2015 During the Final Design in 2015 by SMEC another 7 boreholes were drilled and presented in two reports on September and November 2015.</p> <p>2016 “Study for location of monitoring wells along the Northern Collector Tunnel”, by Geotechnical & Allied Ltd. A Geological – Hydrogeological study and Geophysical investigations for the aquifers along the NCT1 and proposal of monitoring locations.</p> <p>2016 Construction of six (6) stand pipe type piezometric wells in order to continuously monitor ground water tables by “Geotechnical & Allied Ltd”, following the recommendations of the previous study by a specialist Hydrogeologist. This was suggested by the IPE and immediately implemented.</p> <p>The Tender Drawings 5083023-TUN-01511 to 5083023-TUN-01515 present a detailed longitudinal section including geological strata.</p>

¹⁹ Independent Panel of Experts (IPE) 14th to 18th November 2016 Mission Report, Part A: IPE Joint Report (November 2016).

No.	Claim	Response
		<p>Having reviewed all the above, as well as the established Surveillance Manual reporting, the IPE considers that the monitoring requirements for water resources stated in the ESIA report are met.</p> <p>Also, having reviewed the ESIA report, the IPE considers the statements about “<i>Low negative impacts</i>” regarding Geological and Seismic hazards (7.3.2), Impact on soils (7.3.3) and Changes in ground water levels and flow (7.3.5) reasonable.</p> <p>The IPE therefore has no reason to ask for stopping the construction.</p>
44.	6. During tunnel excavation, impermeable rocks or water seals that separate various aquifers (underground water systems) would be ruptured. The water seals may be ruptured horizontally along the tunnel and vertically along the various large diameter shafts.	This is answered in Items 42 and 43.
45.	7. The ESIA Appendix has drawings prepared by SMEC which are stamped “Provisional Pending Geotechnical Investigation”. That conveys the message that the rock structure has not been studied and therefore existing aquifers have not been studied.	This is answered in Items 42 and 43.
46.	8. When one ruptures aquifer seals vertically and horizontally on such a massive scale; is there a contingency plan to repair the aquifer water seals? Is it practically possible to repair seals at depths in excess of 100meters, particularly when actual boundaries of various aquifers have not been studied, mapped and demarcated?	This is answered in Items 42 and 43.
47.	9. We note the concern expressed by the ESIA author, about potential leakages in the concrete lining of the tunnel.	<p>The tunnel will be fully lined and grouted to prevent any leakages. The grouting operations for filling any voids left around the cast in situ final concrete lining are clearly described in the Contract Technical Specifications, §9.3.7.2 <i>Contact and Cavity Grouting</i> and §9.3.7.3 <i>Consolidation Grouting</i>. An allowance for this cost is included in the original contract. These construction methods follow international standards. It is a universally applied and proven technology to prevent water leaking into a tunnel.</p>
48.	10. Our concern is how you propose to repair ruptured aquifer seals when you have a large concrete tunnel that is prone to water leakage itself.	The grouting operations described above target in particular the crown and the walls of the tunnel. The consolidation grouting pressures prescribed in the T.S. §9.3.7.3 are very high in order to ensure not just filling of any large voids but also any cracks that might result by the tunnel excavation.
49.	11. We understand that explosives would be used during tunneling. If one uses explosives to blast through the hard rocks along the tunnel, one creates a large irregular cavity.	<p>The Technical Specifications of the contract have foreseen the complete sealing of any space left between the concrete final lining and the surrounding rock, as described the IPE’s response to the requesters (see item 47 and 48 above).</p>

No.	Claim	Response
	<p>How do you seal the large voids/spaces between the tunnel wall and the large irregular cavity created by explosives? Would these large unsealed cavities create alternative underground drainage routes that would damage aquifers permanently?</p>	<p>No massive explosives will be used in excavating the tunnel. As stated in the ESIA and reviewed by the IPE for the small part of the tunnel that will be excavated using explosives, a technique called smooth blasting will be used, as clearly described in the contract Technical Specifications §4.4.3 <i>Excavation by Drill and Blast (Smooth Blasting)</i>. All necessary steps are to be followed in order to minimize the shattered zone to an “<i>absolute practicable minimum</i>”.</p> <p>The contact and consolidation grouting is performed after the construction of the concrete final lining and not after the placement of the primary lining.²⁰</p>
50.	<p>12. How do you seal large cracks generated in rocks as a result of use of massive explosives?</p>	<p>This is answered in Item 49.</p>
51.	<p>13. What safety measures have been put in place to address potential water intrusions within the proposed tunnel, while using explosives to blast through rocks that separate various aquifers?</p>	<p>The Technical Specifications cover this concern as stated in QMC4 (T.S. §9.3.7.5 <i>Grouting Criteria for the Control of Water Inflow at the Face</i>). Probing ahead and consolidation grouting ahead of the tunnel face are prescribed in the T.S. as some of the means of minimizing the risk of sudden water inflows.</p>
52.	<p>14. Have issues of potential landslides been addressed, particularly when blasting with explosives.</p>	<p>Project design reflects the danger of landslides in the area and implements strategies to minimize impacts. Landslide danger was assessed in the ESIA as well as through detailed geotechnical investigations, all of which were used to inform the final design.</p> <p>To avoid landslides the tunnel portals were designed to international standards and the stability is constantly monitored.</p> 

²⁰ Independent Panel of Experts (IPE) 14th to 18th November 2016 Mission Report, Part A: IPE Joint Report (November 2016).

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		<p>Close to each portal, the open excavations are performed by mechanical means of low disturbance. Heavy support measures are subsequently applied in order to ensure stability (sprayed concrete, rock bolts, drainage holes and pile walls). The stability is constantly monitored and additional measures will be applied in the improbable event of slope movements. Monitoring is in place in order to assess the stability at the portals during and after construction.</p> <p>As also stated in the ESIA (§7.3.2) the risk of aggravating slope failures is moderate to low, and will be limited to the portals. The project will have no effect elsewhere. Further, continuous monitoring of geotechnical stability through an Excavation Performance Review (EPR) is proposed during the construction phase. The EPR comprises three trigger levels, namely Alert, Alarm and Action. Community safety is also considered through the recommendation for the formulation of an emergency communication plan, which includes community emergency trigger thresholds, clear protocol and roles for notification and follow-up actions.</p> <p>Further inside the hills, the tunnel construction and subsequent operation will have no impact (positive or negative) on slope stability.</p> <p>Blasting will be used well inside the hills at large depths following smooth blasting techniques in order to limit rock disturbance. Vibrations on the surface will be very small and will be monitored in order to be kept below absolutely safe limits for structures and natural slopes. No slope movements are expected due to tunnel excavation by blasting.</p> <p>The natural slope geomorphological processes elsewhere, including slope movements, will go on unaffected by the NCT1 construction.²¹</p>

²¹ Independent Panel of Experts (IPE) 14th to 18th November 2016 Mission Report, Part A: IPE Joint Report (November 2016).

No.	Claim	Response
		
53.	<p>15. Please look at the existing aquifers system very carefully, without rushing the project. Ruptured aquifer seals on such a massive scale and depth would result in permanent damage to underground water systems in the area, which may be extremely difficult or impossible to repair. That calls for careful well thought out plan, which is missing in the ESIA Final Study Report.</p>	<p>The environmental risk posed by NTC1 is low. The IPE supports this assessment of the ESIA. Mitigation measures are in place and will ensure that all environmental, social and technical facets of the project are treated in the best possible way for the benefit of the local communities and the project.</p>