

# Initial Environmental Examination

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Loan Number: 3793-INO  
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Republic of Indonesia: Emergency Assistance for Rehabilitation  
and Reconstruction – Paneki Raw Water Supply System, Sigi  
Regency, Central Sulawesi

Submitted by:  
Directorate General of Water Resources

Through:  
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Housing

To:  
The Asian Development Bank

This initial environmental examination is a document of the Borrower. The views expressed herein do not necessarily represent those of ADB's Board of Directors, Management, or staff, and may be preliminary in nature.

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## ABBREVIATION

ADB	: Asian Development Bank
ADB's SPS	: ADB's Safeguard Policy Statement
AMDAL	: Environmental Impact Assessment in MOEF Regulation (Analisis Mengendai Dampak Lingkungan)
ASL	: Above Sea Level
BAPPEDA	: Development Planning Agency at Sub-National Level
BAPPENAS	: National Development Planning Agency in Indonesia (Badan Perencanaan Nasional)
BMKG	: Indonesian Meteorology Climatology and Geophysics Council
BNPB	: Indonesian National Disaster Management Authority
BPN	: National Land Agency in Indonesia
CEMP	: Construction Environmental Management Plan
CPMU	: Central Project Management Unit
DAS	: Watershed (Daerah Aliran Sungai)
DED	: detailed engineering design
DGWR	: Directorate General of Water Resources
DLH	: City or Provincial Environment Agency in Indonesia (Dinas Lingkungan Hidup)
DT	: Dump Truck
EA	: Executing Agency
EARF	: Environmental Assessment and Review Framework
EARR	: Emergency Assistance for Reconstruction and Rehabilitation
EHS	: Environment, Health, and Safety
EMP	: Environmental Management Plan
GIP	: Galvanized Iron Pipe
GR	: Government Regulation
GRM	: Grievance Redress Mechanism
Huntap	: Permanent Resident (Hunian tetap)
IAs	: Implementing Agencies
IEE	: Initial Environmental Examination
IFC	: International Finance Corporation
KBA	: Key Biodiversity Area
MEMR	: Indonesia Ministry of Energy and Mineral Resources
MPWH	: Indonesian Ministry of Public Works and Housing
MOEF	: Indonesian Ministry of Environmental and Forest
PCO	: Public Complaints Officer
PIC	: Person in Charge
PIU	: Project Implementing Unit
PIUA	: Project Implementing Unit Agency
PIPPIB	: Primary Forest and Peatland Permit Moratorium (Peta Indikatif Penghentian Pemberian Izin Baru)
PMU	: Project Management Unit
PMC	: Project Management Consultant

PMSC	: Project Management and Supervision Consultant
PPE	: Personal Protective Equipment
RTRW	: Regional Spatial Plan (Rencana Tata Ruang Wilayah)
RWSS	: Raw Water Supply System
S3RBO	: Central Sulawesi III River Basin Organization
SNI	: Indonesian standard (Standar Nasional Indonesia)
SPPL	: statement of the proponent to implement environmental management and monitoring activities (Surat Pernyataan Pengelolaan Lingkungan Hidup)
UKL-UPL	: Environmental management effort and environmental monitoring effort in MOEF Regulation (Upaya Pengelolaan Lingkungan Hidup – Upaya Pemantauan Lingkungan Hidup)
WTP	: Water Treatment Plant

## I. EXECUTIVE SUMMARY

1. **Scope of the subproject.** This Initial Environmental Examination (IEE) is prepared for the proposed Paneki raw water supply system (Paneki RWSS) in Sigi Regency, Central Sulawesi under the Emergency Assistance for Rehabilitation and Reconstruction (EARR) project financed by the Asian Development Bank (ADB). The Paneki RWSS, as a subproject of the EARR, will be constructed to supply raw water from Paneki river to a water treatment plant (WTP) at Pombewe permanent settlement (under construction). The construction of Paneki RWSS will consist of weir and intake that has a width of 12 m and height of 1.5 m, and a single 4.4-km galvanized iron pipe of 250-mm diameter. The intake and pipeline are designed to supply a raw water flow of 25 liters per second using gravitational system. Figure 1 shows the schematic diagram of the Paneki RWSS including its water distribution system. The construction of the WTP, ground reservoir, and clean water distribution systems to Pombewe permanent residence (known as 'Huntap Pombewe'), and Loru and Pombewe villages are not financed by ADB.

2. Based on the environmental screening and categorization, the Paneki RWSS is considered as Category B subproject for environment, and therefore qualifies to be funded under the EARR loan. For this purpose, the IEE including corresponding environmental management plan (EMP) is prepared as a reference document to mitigate and monitor impacts of this subproject. Similarly, the Sulawesi III River Basin Organization (S3RBO) has developed an environmental management and monitoring plan (UKL-UPL) according to the requirement of Indonesian Government. The UKL-UPL of this subproject has been approved and the Environmental Permit No. 09/DPM-PTSP-SIGI/2020 (dated 27 August 2020) has been issued by the Government of Sigi Regency.

3. The Paneki RWSS is located in the proximity of Poboya-Paneki Grand Forest Park (also known as Tahura Palu), Sigi Regency, approximately 10 - 15 km east of Palu City. This grand forest park is classified as conservation according to the Ministry of Forestry Decree No. 24/1999 (dated 29 January 1999). It is managed by the Poboya-Paneki forest management unit of the Central Sulawesi Province based on the Governor Decree No. 05/2009. Accordingly, the grand forest park is intended for flora and fauna conservation, nature recreational purpose, and water resource protection. The mentioned grand forest park is part of the Tokalekaju mountain forest recognized as a key biodiversity area in Central Sulawesi according to the Integrated Biodiversity Assessment Tool (2020). It was reported in 2015 that approximately 150 – 200 ha of the Palu Grand Forest Park was encroached by illegal gold mining activities. Some disturbance to flora habitat and availability of clean water were also reported.<sup>1</sup> Based on this condition, there was a proposal to relocate the grand forest park to areas where the forest condition is considered intact.<sup>2</sup> However, further development of this proposal is unknown to date.

4. **Anticipated impacts and environmental management plan.** Key environmental impacts during the construction phase of the Paneki RWSS are, among others, likely to be interim increases in air pollutants, noise level, and suspended solids in Paneki river; encroachment and fauna hunting due to improved access to the Poboya-Paneki grand forest park; limited, local business employment and opportunities; and health risk due to COVID-19 pandemic. These environmental impacts are anticipated to be limited within the subproject's footprint and short-term during the 8-month construction period of the subproject, expected to start in January 2021.

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<sup>1</sup><https://www.mongabay.co.id/2015/01/31/tahura-poboya-paneki-terusik-tambang-emas-bagaimana-ini>, 2015.

<sup>2</sup><https://kabar24.bisnis.com/read/20180508/78/793075/relokasi-taman-hutan-rakyat-poboya-mendapatkan-dukungan>, 2018.

5. This IEE also defines the environmental management plan (EMP), enabling the contractor (to be appointed), the implementing unit, i.e. The Sulawesi III River Basin Organization, and the project management unit, i.e. the Directorate General of Water Resources of Ministry of Public Works and Housing, to mitigate and monitor key environmental impacts according to its institutional roles and responsibilities. Further, the EMP provides an estimated budget of IDR 244 million (approximately USD 17,500 at an exchange rate of USD 1 = IDR 14,000) that should be allocated by the subproject to implement the EMP including COVID-19 mitigation protocol/screening, and to submit semi-annual environmental monitoring report to ADB.

6. **Analysis of subproject's alternatives.** The detailed engineering design (DED) of Paneki RWSS considers the following alternatives on the Paneki RWSS, particularly to site the water intake whether inside or outside the Poboya-Paneki Grand Forest Park and due consideration on the gravitational head required to transmit the water using gravitational system to the future WTP at 'Huntap Pombewe.' Subsequently, it was decided during the DED to locate of the water intake is approximately 40 meter outside the boundary of the mentioned grand forest park at an elevation of 238-m above sea level to allow the raw water be transmitted gravitationally to the WTP at an elevation of 200-m above sea level.

7. **Information disclosure and public consultation.** The public consultations on Paneki RWSS were held on March 2, 2020 at the Gumbasa Irrigation Observer Office (participants 33 people) and March 12, 2020 at the Mandala Paneki Scout Building. These events were attended by a total of approximately 80 people. The participants who attended this public consultation included the representatives of S3RBO, local governments, community groups and traditional leaders. The participants generally supported the subproject and expected to receive the clean water supply from this subproject. Further, they also suggest that the public consultation is conducted again to provide a better understanding of this subproject to a wider community member.

8. **Grievance redress mechanism (GRM).** The GRM procedure for the EARR has been established and will apply for the Paneki RWSS. The focal points of the GRM at the S3RBO shall be appointed and grievance procedure including register maintained and reported during implementation of the subproject.

## II. INTRODUCTION

### A. Background of the Subproject

9. The devastating natural disaster that occurred on September, 28<sup>th</sup>2018 in Central Sulawesi Province has caused tsunami, earthquake, and liquefaction that hit several areas in Palu City, Sigi Regency, and Donggala Regency. This disaster has caused thousands of victims, lost and injured and hundreds of thousands of people lost their houses. In addition, this disaster has damage to residential facilities and infrastructure, sources of raw water and drinking water, irrigation channels, roads, bridges, airports, and harbor.

10. As an impact of the tsunami and liquefaction, the Government plans to relocate the community from areas that are affected by the earthquake which are considered as the red zone to the areas that are considered safer. One of the selected areas is Pombewe Village, Sigi Regency. In this village, the government is constructing the permanent resident (called *huniantetap* or *huntap*), including construction of 1,500 residential units, a water treatment plant and drinking water supply networks.

11. To provide drinking water for Pombewe *huntap* and the surrounding community, the Government will build a Paneki raw water supply system (“Paneki RWSS”) in Pombewe Village with the Paneki River as the water source. This subproject aims to provide raw water with a capacity of 25 liters / second to meet the water needs of up to 1,500 houses, and the surrounding communities in Pombewe and Loru Villages, in Sigi Regency. The scope of Paneki RWSS consists of: (a) construction of a weir and intake from the Paneki River, and (b) construction of approximately 4.3-km transmission pipe starting from the Paneki Intake to the Water Treatment Plant to be constructed at Pombewe *huntap*. Discharge planning of Paneki Intake is 25 liters per second.

### B. Objectives and Scopes of the IEE

12. Based on the environmental assessment and review framework (EARF) document of the Emergency Assistance for Reconstruction and Rehabilitation (EARR) dated May 2019 and related environmental screening and categorization, the Paneki RWSS development activities are considered as Category B subproject for environment, and therefore qualifies for ADB funding under the EARR. Therefore, the preparation of an Initial Environmental Examination (IEE) including an environmental management plan (EMP) is required for this subproject. The IEE is conducted if the subproject is likely to have minor or limited impacts, and for which common mitigation measures for the development can be readily applied.

13. The objectives of the preparing the IEE including its EMP are to: (a) provide information about the general environmental settings of the subproject area as baseline data; (b) predict potential impacts of the subproject on the environment and the characteristic and magnitude of the impact; (c) define mitigation measures to minimize the impact and monitoring requirements; (d) assess alternatives of the subproject in terms of financial, social, and environment; and (e) setup institutional matters and capacity building related to implementation of EMP.

14. The IEE includes the following chapters: (a) policy, legal, and administrative framework; (b) describing the environmental condition of the subproject area covering aspects of physical-chemical, biology, social and economic, and public health; (b) assessing the potential impact of activities of the raw water supply system; (c) formulating an environmental management plan, and (d) formulating environmental monitoring plan.

### III. POLICY, LEGAL AND ADMINISTRATIVE FRAMEWORK

15. **ADB’s Safeguard Policy Statement (2009).** All projects supported by ADB must comply with this policy statement, known as ADB’s SPS (2009), sets out the policy objectives, scope and triggers, and principles for Environmental safeguard areas to be followed across all aspects of its operations. ADB adopts a set of specific environmental safeguard requirements that borrowers/clients are required to meet in addressing environmental impacts and risks. As stated earlier that the construction and operation of Paneki RWSSis screened for their impacts significance and classified as Category B for environment. Therefore, the IEE including EMP should be prepared to comply with the requirement of ADB’s SPS (2009) - Environmental Safeguard. The ADB’s environmental screening and categorization for environment is presented in and completed using related checklist and form included in Appendix 1.

16. **Environmental Regulatory Framework in Indonesia.** In addition to ADB’s SPS (2009), the EARR’s project should also comply with the requirements of Indonesian environmental laws and regulations. The Indonesian environmental assessment and permitting procedure for a subproject is the Government Regulation No. 27 year 2012 (GR No. 27/2012) on Environmental Permitting (see ). This GR is applicable for the EARR’s subprojects and stipulates the key procedures and requirement to conduct the environmental assessment and seek its approval as well as apply for corresponding Environmental Permit. This GR also defines the division of responsibility within the government authorities at national, provincial, and local (district/municipality) levels on the approval process of Amdal, UKL-UPL, and SPPL including issuing Environmental Permit.

**Table 1. Environmental Screening and Categorization for Environment**

ADB’s Screening and Categorization	Government of Indonesia’s Screening
<p><b>Category A</b> - A proposed subproject is classified as category A if it is likely to have significant adverse environmental impacts that are irreversible, diverse, or unprecedented. These impacts may affect an area larger than the sites or facilities subject to physical works. An environmental impact assessment (EIA) is required.</p>	<p><b>Amdal</b> – A proposed subproject that are likely to generate significant impacts on the environment and listed in the MOEF regulation No. P.38/2019 requires an environmental impact assessment (known as Amdal). The criteria and scale of the subproject that trigger an Amdal are defined in the MOEF regulation mentioned earlier.</p>
<p><b>Category B</b> - A proposed subproject is classified as category B if its potential adverse environmental impacts are less adverse than those of category A subprojects. These impacts are site-specific, few if any of them are irreversible, and in most cases mitigation measures can be designed more readily than for category A subprojects. An initial environmental examination (IEE) is required.</p>	<p><b>UKL-UPL</b> – A proposed subproject that does not require AMDAL as stipulated in the MOEF regulation No. P.38/2019 shall be completed with an environmental management effort and environmental monitoring effort (known as UKL-UPL) document.</p>
<p><b>Category C</b> - A proposed subproject is classified as Category C if it is likely to have minimal or no adverse environmental impacts. No EIA or IEE is required, but environmental implication of the subproject needs to be reviewed. A due diligence report or environmental management system is required.</p>	<p><b>SPPL</b> – A proposed subproject that does not require AMDAL or UKL-UPL shall be completed with a SPPL, which is written statement of the proponent to implement environmental management and monitoring activities.</p>

Source: EARR’s Environmental Assessment and Review Framework (May 2019).

Note: SPPL: *Surat Pernyataan Kesanggupan untuk Pengelolaan dan Pemantauan Lingkungan Hidup* (a statement letter of the proponent to implement environmental management and monitoring associated with an activity/small-scale project).

17. The types and scale of subproject subject to AMDAL are defined in the MOEF regulation No. P.38/2019. The procedures to develop environmental documents i.e., AMDAL, UKL-UPL, and SPPL including its detailed content requirements are included in the MOE regulation No. 16/2012. The procedures to evaluate these environmental documents are described in the MOE regulation No. 8/2013. Specific for construction and operation of the Paneki RWSS, the Environmental Agency of Sigi Regency provided an advisory letter No. 800.802/1476/PPLH (dated 25 June 2020) stating this subproject should be completed with an UKL-UPL and Environmental Permit.

18. **Good Industry International Practices.** The ADB's SPS (2009) requires that during the design, construction, and operation of the project the borrower/client will also apply pollution prevention and control technologies and best practices consistent with international standards. These standards include the Environment, Health, and Safety (EHS) General Guidelines issued by the International Finance Corporation (IFC), the World Bank Group (2007). These EHS guidelines contain the performance levels and measures that are generally considered to be achievable in new facilities by existing technology at reasonable costs. However, the use of this guideline should be commensurate with the hazards and risks in which site-specific variables, such as host country context, assimilative capacity of the environment, and other subproject factors, are considered. When host country regulations differ from these EHS guidelines, the borrower/client will achieve whichever is more stringent. As the Paneki RWSS is to be funded under the EARR, these IFC's EHS General Guidelines apply for this subproject and this requirement should be included in the EMP and/or construction environmental management plan (CEMP).



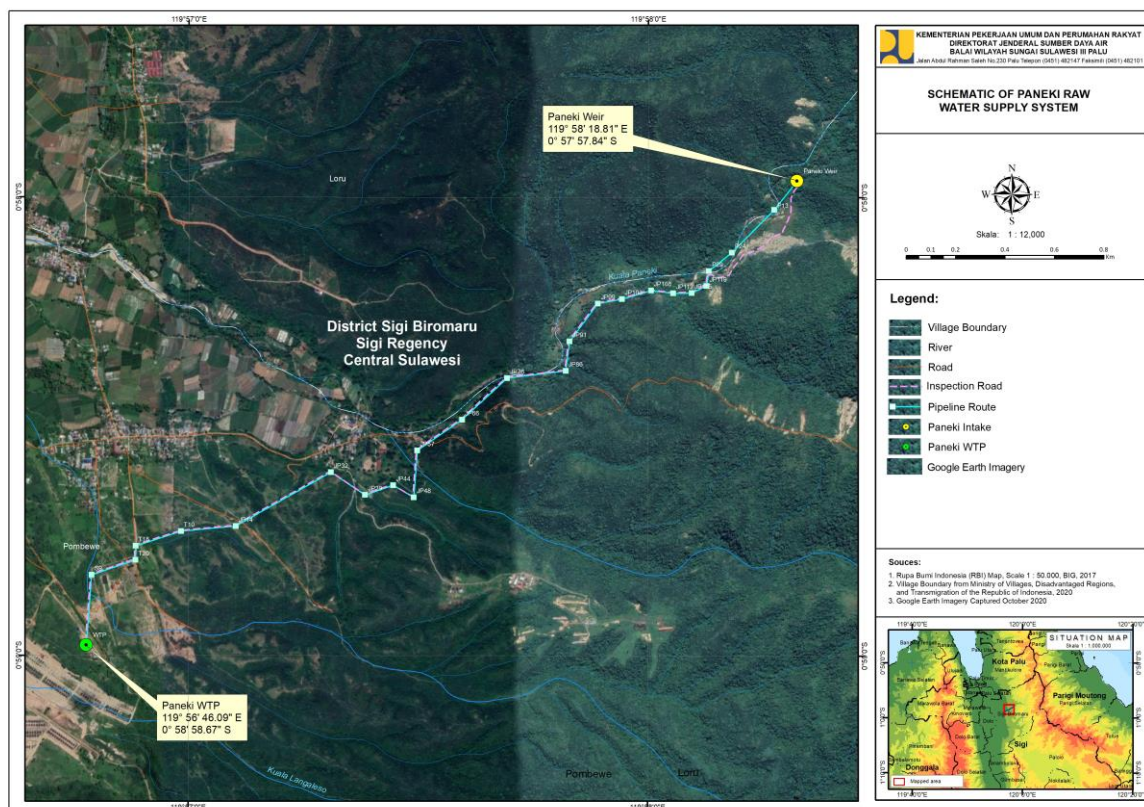
## IV. DESCRIPTION OF THE SUBPROJECT

### A. Overview of Paneki Raw Water Supply System

19. The Paneki raw water supply system (RWSS) to be constructed consists of a weir and intake, and also raw water transmission pipes to a water treatment plant. The weir and intake are located on the Paneki River which will be the source of raw water. The weir has a width of 12 m and a height of 1.5 m. The intake consists of 2 units with a width of 0.8 m for each, which is designed to supply raw water with a discharge of 25 liters per second.

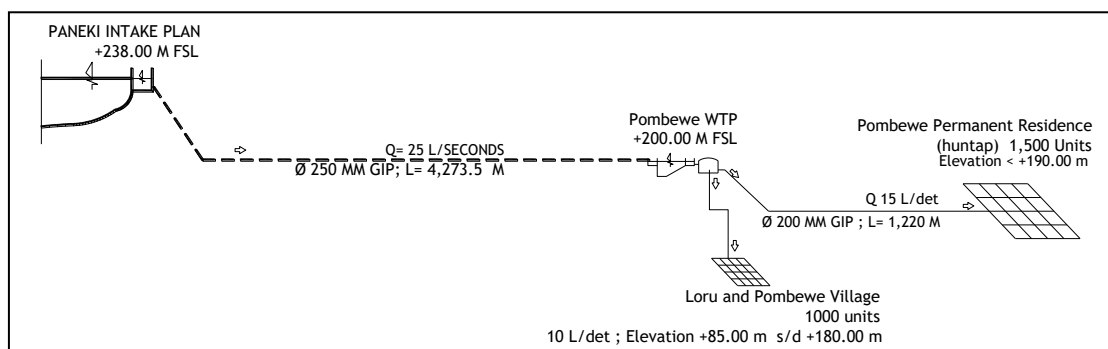
20. The transmission pipe that conveys raw water from the intake is a galvanized iron pipe (GIP) with a diameter of 250 mm. This pipe meets the Indonesian standard of SNI 0039-2013. The GIP is made of low carbon steel with a galvanized coating made of zinc. This type of pipe is corrosion-resistant. The length of the transmission pipeline from the intake at Paneki River to the Pombewe WTP is about 4.4 km. In this IEE, the Pombewe WTP is not included as it is subject to separate financing arrangement. The Paneki RWSS is shown in Figure 1.

**Figure 1. Schematic of Paneki Raw Water Supply System**



21. The Paneki RWSS will use a gravity system. The planned location of the intake is at an altitude of 238-m above sea level (asl), the inlet pipe is at the level of 234-m asl, while the planned location of the Pombewe WTP is at the level of 200 m asl. The raw water supply system schematic is presented in Figure 2.

**Figure 2. Schematic of Paneki Raw Water Supply System**



## B. Alignment of the Subproject with Key Thematic Maps

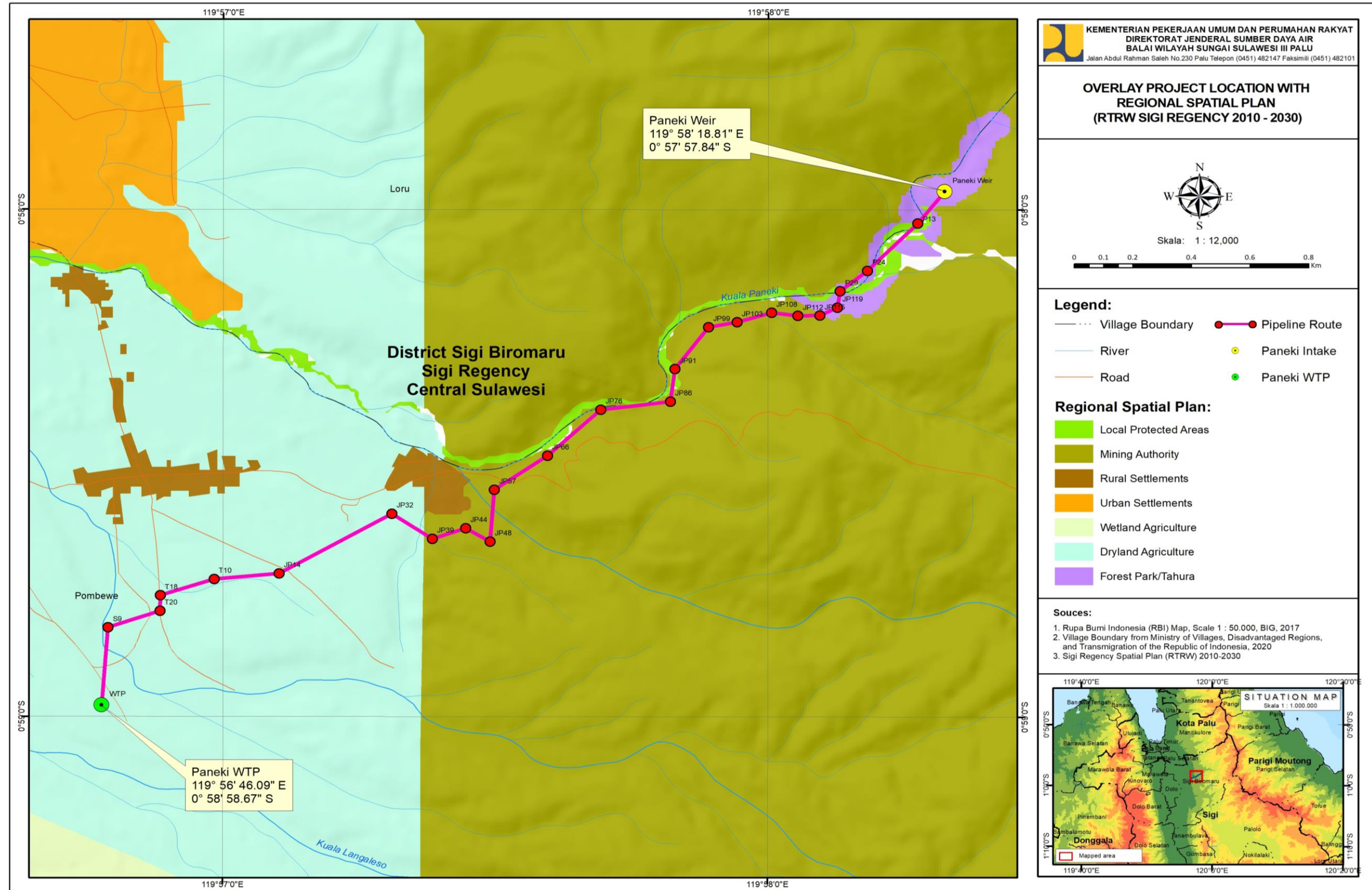
22. **The Spatial Planning of Sigi Regency.** The analysis of the spatial suitability of the Paneki RWS refers to the Regional Regulation of Sigi Regency No. 21/2011 concerning the Regional Spatial Plan (RTRW) of Sigi Regency in 2010-2030, Attachment VI of the Spatial Plan for Protected and Cultivated Areas. The overlay results with the RTRW Map of Sigi Regency shows that the intake location is included in the community forest zone. In the community forest zone, spatial activities that do not have the potential to damage ecosystems and biodiversity are permitted. In dryland / horticultural areas, activities that land convert can be carried out as long as it becomes a residential function including the provision of basic residential facilities.

23. **The Forest and Peatland Moratorium Map.**<sup>6</sup> Based on the results of a review of the Indicative Map for the Primary Forest and Peatland Permit Moratorium (known as PIPPIB), which refers to the Decree of the MOEF Decree No. SK.851/2020 (dated February, 26th 2020), the Paneki RWS is located outside the primary forest and peatland areas subject to the permit moratorium. The closest location to the grand forest park (known as *Taman Hutan Raya* or Tahura) of Poboya-Paneki is about 40 meters from the weir and intake on the Paneki River. Figure 3 shows the overlay of the Paneki RWS and the PIPPIB area.

<sup>6</sup>Penetapan Peta Indikatif Penundaan Pemberian Izin Baru Pemanfaatan Hutan, Penggunaan Kawasan Hutan dan Perubahan Peruntukan Kawasan Hutan dan Areal Penggunaan Lain Semester 1/2020.



Figure 3. The overlay of the subproject location with the RTRW Sigi Regency



24. **The Disaster Risk Zonation Map.**<sup>7</sup> Based on the results of the overlay of subproject location with the Disaster Risk Zonation map of Palu and Surrounding Areas (December 2018), the location of intake, weir, and raw water transmission pipe along approximately 3 km to the southwest / WTP is located in a moderate disaster risk zone, while the location of the transmission pipe along approximately 1.3 km and the WTP is located in a low disaster risk zone. The fault line/ground movement prone crossed from north to south at the location of the raw water transmission pipe 1 km from the intake. The result of overlaying the location of activities with the disaster risk zonation map mentioned earlier is presented in Figure 5.

25. **Key Biodiversity Area (KBA).**<sup>8</sup> Based on the results of the Paneki RWS overlay on the presence of key biodiversity areas (Figure 6), the subproject location is between the biodiversity area of Lore Lindu National Park and Tokalekaju Montane Forests. Lore Lindu National Park, which is located in the south of Donggala regency and the western part of Poso, water catchment area for three major rivers in Central Sulawesi, namely the Lariang river, the Gumbasa river and the Palu river. The Tokalekaju mountain area is a hilly area with wide grasslands, old forests with large trees and there are important watersheds (DAS) such as the Lariang Watershed which flows into Central Sulawesi and West Sulawesi, the Budong-budong Watershed to West Sulawesi and the Rongkong watershed to South Sulawesi. In this area, the elevation of the Kasinturu, Kambuno and Baliase mountain ranges is around 2,000 - 2,800 m above sea level (asl).

### C. The Proposed Paneki Raw Water Supply System

26. **Subproject location.** Administratively, the Paneki RWSS is located in Pombewe Village and Loru Village, SigiBiomaru District, Sigi Regency, Central Sulawesi Province. The intake and weir locations are in Pombewe Village, while transmission pipelines of approximately 4.3 km are in Pombewe and Loru Villages. Geographically, the coordinates of the location of the intake and weir are as follows.

Right side of Intake	: 0° 57' 56.43"S, 119° 58' 19.98"E
Left side of Intake	: 0° 57' 56.73"S, 119° 58' 20.21"E
Right side of Weir	: 0° 57' 56.43"S, 119° 58' 19.98"E
Left side of Weir	: 0° 57' 56.73"S, 119° 58' 20.21"E

27. **Scope of Work.** The Paneki RWSS subproject includes the construction of a weir crossing the Paneki River with intake structure on the right side of the weir, a raw water transmission pipeline system, and supporting facilities. The weir has a width of 12 m and a height of 1.5 m. The intake consists of 2 units with a width of 0.8 m for each, which is designed to supply raw water as much as 25 liters per second. The Paneki intake is at an elevation of 238 m above sea level, the pipe inlet level is at 234 m above sea level and the location of the WTP at Pombewe is at the level of 200 m above sea level. The raw water supply is designed to provide drinking water to the Pombewe WTP (to be constructed) to serve the Pombewe huntap and the Pombewe and Loru Villages.

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<sup>7</sup>The map (Alternative 1) discussed by Ministry of National Development Planning (BAPPENAS), MEMR, Ministry of ATR/BPN, MPWH, BMKG, BNPB, Provincial Governor and Chief of the House of Representatives of Central Sulawesi, Major of Palu, Head of Sigi District, and Head of Donggala District on the meeting at the Indonesian Vice President office (12 December 2018).

<sup>8</sup> KBA maps accessed through the Integrated Biodiversity Assessment Tool (IBAT) in October 2020.



Figure 4. Paneki Raw Water Supply within the Forest and Peatland Moratorium Area

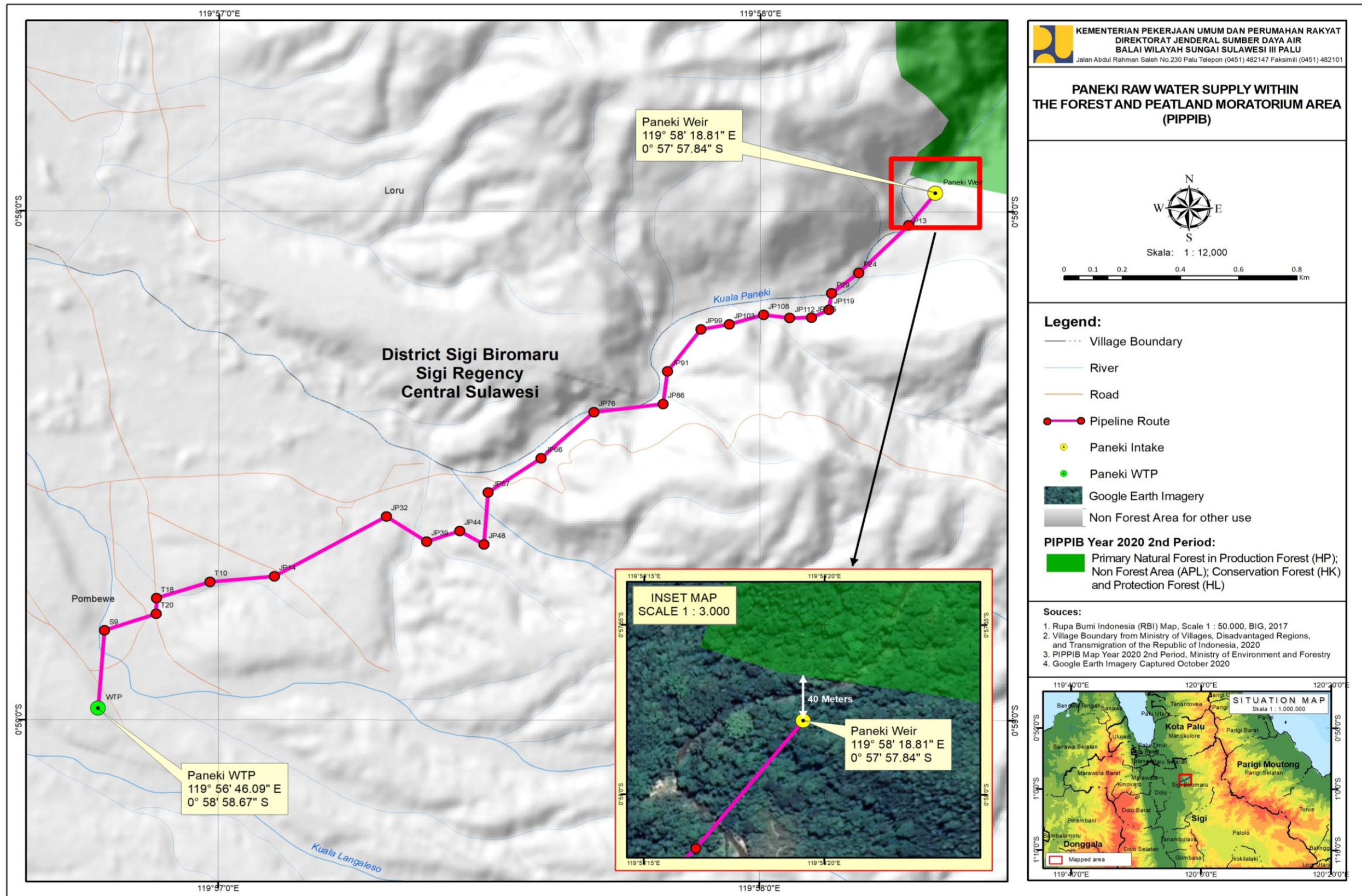




Figure 5. The overlay of Paneki RWS with the Disaster Risk Zonation Map

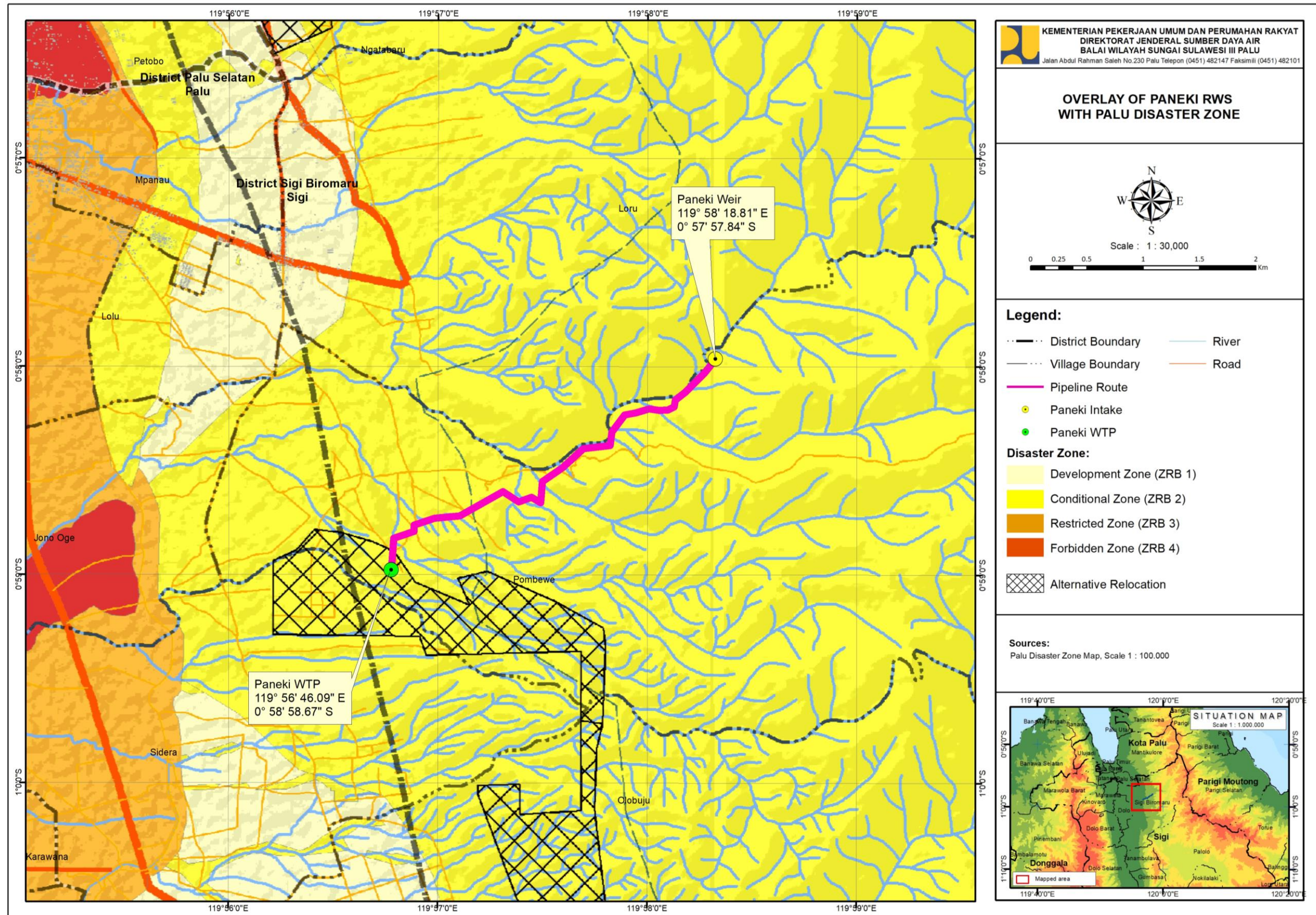
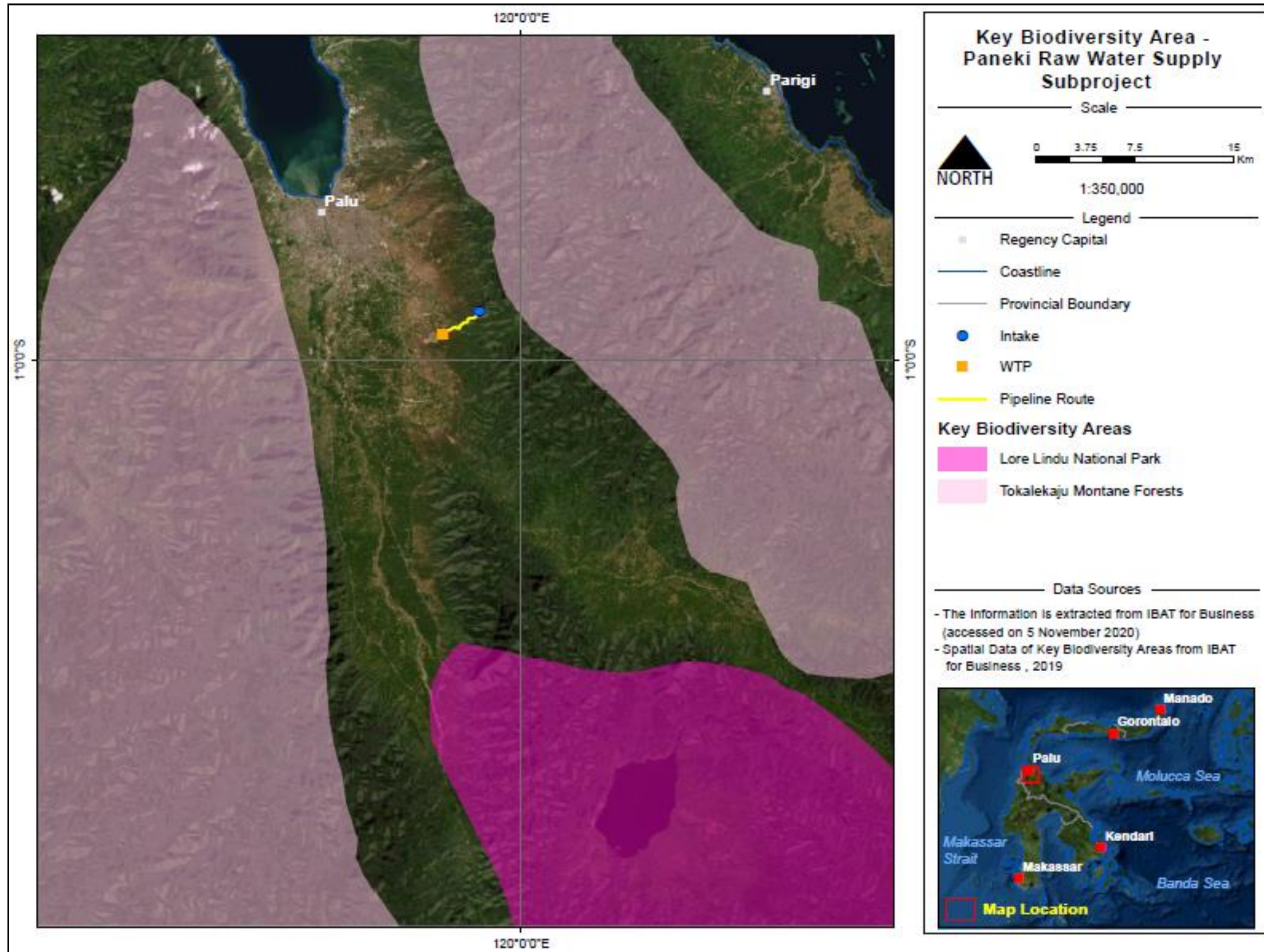




Figure 6. The Overlay The Location Of Activities With The Key Biodiversity Area



28. The raw water transmission pipeline is planned to be placed on the embankment of Paneki river, which is on the right side of the river starting from JP (Polygon Bench Mark)145 down to JP 118 where the pipeline will cross the river to the left side of the Paneki river. Furthermore, the transmission pipe is continued along the left side of the Paneki River to the WTP at Pombewe. The land status of the transmission pipeline installation plan along the Paneki River owns by the community and is outside the forest area. The 4.3-km raw water pipeline is designed to have a diameter of 250 mm and made of galvanized iron pipe (GIP).

29. The supporting facilities will include 7 air valve units, 8 washout units, 1 pedestrian bridge unit for maintenance access, 4-km road access with a width of 3 m that passes along the alignment of the transmission pipeline.

#### **D. Pre-Construction Activities**

30. Activities during the pre-construction stage that have the potential to impact the environment are field surveys and land acquisition.

31. **Field survey and land acquisition.** The activities carried out are the activities of measuring and installing stakes to ensure the availability of land for the intake area, transmission pipe, and supporting facilities. The land required for the intake area, transmission pipe, and supporting facilities are around 3.7 hectares. The current land status is community-owned land. Land acquisition is the responsibility of the Sulawesi III River Basin Organization, and in its acquisition will coordinate with the Sigi Regency Government and related agencies, namely: Bappeda, BPN, and the Forestry Office at the regency and provincial levels as required.

#### **E. Construction Activities**

32. Activities at the construction stage that have the potential to have an impact on the environment are: (a) recruitment of construction workers, (b) construction and operation of basecamp, (c) construction of supporting facilities, (d) mobilization of heavy equipment and materials, (e) construction of a weir with intake, (f) installation of transmission pipelines and bridges, and (g) demobilization of heavy equipment and manpower.

33. **Recruitment of construction workers.** Construction workers recruitment will be carried out when construction work begins, namely from land clearing activities to operation of the weir and its supporting buildings. The number of workers needed in the weir and transmission system works is estimated at 102 people with details of 3 people in the management section, 8 foremen, 4 operators, 12 masons, and 75 field workers. The workers will be employed for approximately 6 months of the construction period.

34. **Construction and operation of basecamp.** To support the construction implementation, a semi-permanent building will be built at the site which will later function as a storage area for materials and work tools. In addition, a basecamp will be built as an office for the subproject implementation, a workshop for maintenance and repair of work tools, storage of materials, and a temporary place to stay for the workers.

35. **Construction of inspection road.** Supporting facilities that will be built are access road for material transportation and heavy equipment access. The entrance road will be starting from Pombewe Village to the garden area on the right side of the river. Currently, this road is used by the community as a road to their garden. The road to be built will be constructed with a simple construction first (compacted soil, gravel, etc and unpaved) with a length of about 4 km with a width of 3 m. This road will then be used as a transport road for heavy equipment and materials during the weir and intake construction and pipe installation. After the subproject is completed, the existing road will be paved with 1 km of rebate concrete (a mixture of concentrate and cement in its manufacture and the quality of the

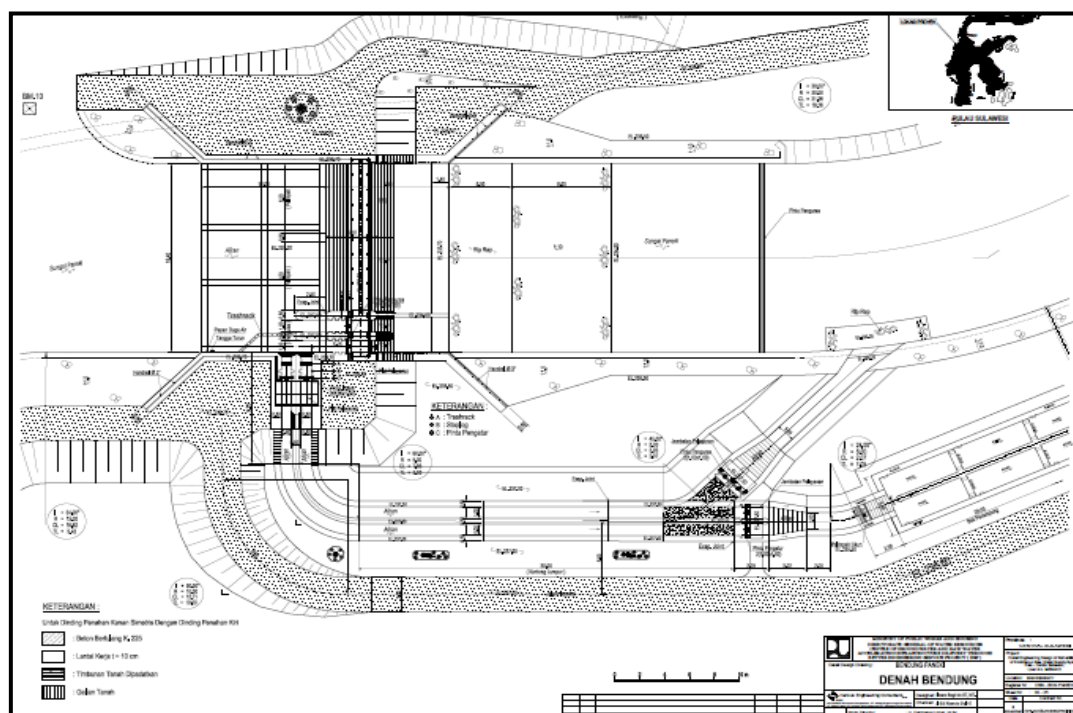


concrete that the rebate concrete has a lower quality). The construction of this type road is considering the road alignment that will pass through areas with potentially unstable cliff passageways.

**36. Heavy equipment and material mobilization.** The activities of mobilizing heavy equipment and materials are to supply building materials, transportation in and out of the subproject site. Heavy equipment that will be mobilized includes 2 of PC 200 excavators, 1 mini excavator, 5 dump trucks of about 7 tons (DT 7), 2 pipe welding machines, 2 pumps, 1 crane unit with a capacity of 2 tons, 2 compressors, and 2 units tracker. The needs for material mobilization include pipes, stones, sand, bricks, wood, iron, ceramics, and tiles. The source of the material comes from the surrounding area by considering the efficiency of transportation and has legality of a C-type quarry permit.

**37. Weir and intake construction.** The works that will be carried out in the construction of the weir include land clearing; excavation, stockpiling, and leveling work; and concrete and masonry work. The land clearing work is carried out to clear the land used for the construction of the weir with intake and the transmission pipeline from trees, obstructions, bushes, and other objects. Excavation, stockpiling, and leveling work are carried out by excavating the ground according to the depth of the transmission pipe to be installed based on topographic conditions. Concrete works are the main activities in the construction of the weir and intake, including iron/reinforcement work, formwork/ molding work, and pouring/ concreting work. The weir with intake design to be built is presented in Figure 7.

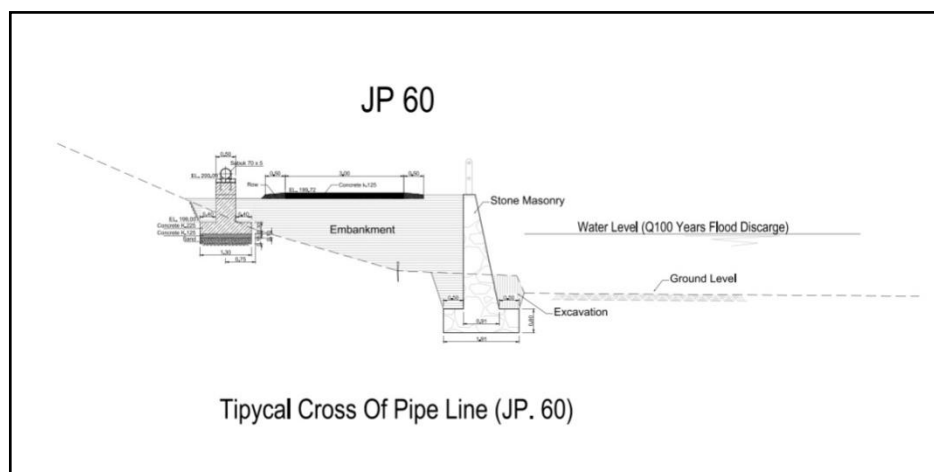
**Figure 7. Design and Lay Out of Weir**



**38. Construction of transmission pipe and bridges.** The work to be carried out are land clearing; excavation for pipe foundations and pipe bridges; pipe conveyance; pipe alignment; and pipe pressure testing. Land clearing is carried out to clear the land that is used for the the transmission pipeline from trees, obstructions, bushes, and other objects. Excavation for constructing the pipe and pipe bridge foundations will be conducted. Transportation of pipes from the warehouse to the place of installation will be carried out by trucks, and pipe connections will be made by welding in accordance with SNI 03-6405-2000. Pipe pressure

tests on the pipeline will be carried out to ensure that pipe joints and fittings are in good condition and have no leakage.

**Figure 8. Typical Design of Access Road and Transmission Pipeline**



39. **Demobilization of heavy equipment and workers.** Heavy equipment demobilization is the process of cleaning equipment and demolishing building/basecamp remains around the subproject area. Meanwhile, the demobilization of workers is the release of labor which is carried out gradually in accordance with the activity stages. Manpower demobilization will be carried out in accordance with the work agreement based on the prevailing laws and regulations.

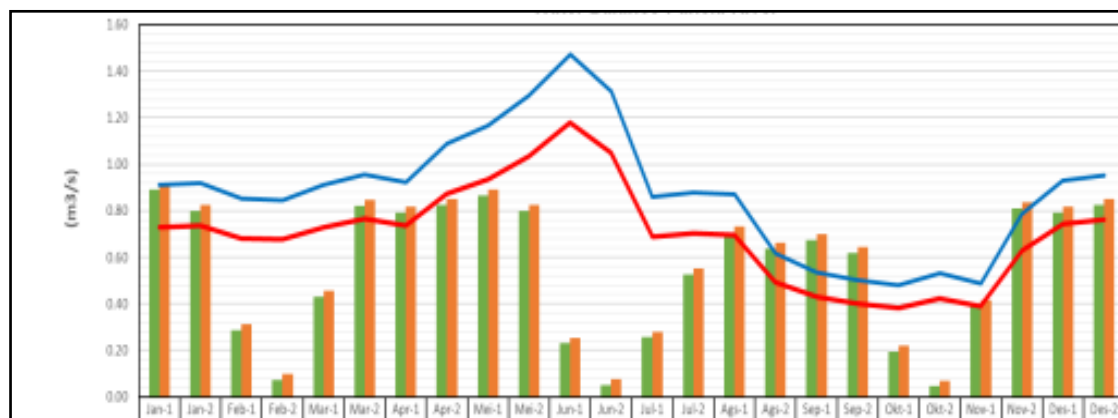
#### **F. Operation and Maintenance**

40. **The operation and maintenance of weir and intake.** This activity includes managing the supply of raw water and monitoring its quality. The maximum supply of raw water tapped is 25 liters per second as designed. In case of low discharge in the Paneki river during the low-flow period, the raw water supply may have to be reduced to meet the water requirements for irrigation and other conservation purpose downstream of the weir.

41. Based on the Feasibility Study Report for Regional Drinking Water Supply Systems for PASIGALA (Egis, 2019), the graph below shows the monthly average of raw water availability for 1 year (black line), the existing use of water for agricultural irrigation (red bars), and additional utilization plans for drinking water (green bars). A shortfall of 5 to 25% of the raw water volume is anticipated between January and March, and up to 25% in October. Considering this, the operation of the weir is differentiated between a flood discharge state and a normal discharge state. When the flood discharge is carried out, if the water level above the weir overflow is more than 0.70 m, the intake gate will be fully closed. If a certain amount of discharge is required in the transmission pipeline system, the intake gate can be opened sufficiently. The flushing gate will remain closed to prevent large water pressure around the flush gate. When the flood subsides, the flushing gate will be fully opened, and the intake gate is opened sufficiently according to raw water needs.

42. In normal discharge conditions, if the water level above the weir overflow is 0.30 m high after the flood subsided, the flushing gate is opened to drain the silt that is in front of the surface gate. The opening of the intake gate is adjusted to the required flow rate. If the available discharge is lower than 80% of the required discharge, the flushing gate will be closed. The procedure for flushing the silt is conducted by closing the inlet gate, then letting the water level get higher after the flushing gate is opened 1/3 -1/2 of the opening to obtain good draining power. If possible, the situation is left for 0.5 hours.

**Figure 9. Water balance chart from the Paneki River**



Source: DED of PASIGALA Raw Water Supply (Hankuk JV, October 2020)

43. **The operation and maintenance of the transmission pipeline.** Pipe is exposed, when no disaster, periodic inspections, routine maintenance and immediate repairs can be carried out (Proactive Action Maintenance), if a disaster occurs and a pipe breakdown occurs, it will be faster and easier to repair (Reactive Action Maintenance and Corrective Action Maintenance), therefore the operational reliability is higher compared with a buried pipeline. Material and jointing equipment can easily be ordered and stored at the nearest warehouse.

**Table 2. Maintenance of the transmission pipeline**

No	Item	Description	Remark
1	Inspection the internal condition of the Pipe	Pigging Detector, because it is made of metal, the accuracy is higher	Proactive maintenance
3	Leak detection	Pigging Detector and Visually	Proactive maintenance
2	Leak spot handling	With rubber coated clamps	Proactive/Reactive maintenance
3	Corrosion handling	<ul style="list-style-type: none"> <li>• Installed "sacrificial anode" every 12 m and replaced every 6 months.</li> <li>• Repair corrosion of pipe joints:                             <ul style="list-style-type: none"> <li>○ Scraped off.</li> <li>○ Primary coating by zinc.</li> <li>○ Secondary coating by epoxy.</li> <li>○ Polyuritane coating.</li> </ul> </li> </ul>	Preventive maintenance  Reactive maintenance
4	Monitoring	Pressure Gauge dan Flowmeter Gauge	At WTP inlet

Source: DED of PASIGALA Raw Water Supply (Hankuk JV, October 2020)

44. Target performance :Paneki RWSS is earthquake resistant, for catastrophic conditions the operation can be restored in 2 days, it is necessary :
- a. Personnel : 1 welder Level II or III certified, 1 driver, 1 crane operator and 1 weir keeper.
  - b. Equipment : 1 unit car with mobile crane, 1 unit motor cycle, 1 unit weld equipment, 1 unit manual crane, Pigging detector. Note : provided during construction.

- c. Material : 250 m GIP dia.250, 350 unit sacrificial anode, 50 kg weld material, gate grease, paint. Note : pipes, sacrificial anode, weld material provided during construction.
- d. 1 unit 10 x 10 m warehouse.

## **G. Implementation Schedule**

45. MPWH has designated the Central Sulawesi III River Basin Organization (S3RBO) based in Palu as the subproject's implementing unit. The S3RBO will be assisted by the Project Management and Supervision Consultant (PMSC) in implementation supervision.

46. The subproject works will be constructed through one civil works contract. The S3RBO initiated the procurement of this contract on September, 2020 in accordance with ADB's procurement procedures.

47. The construction will be start in January 2021, the subproject completion is planned for in the end of August 2021. Since the realization of the subproject's benefits depend on the implementation of the complementary works, the schedule for these works are also shown.

**Table 3.** Implementation schedule

NO	TYPE OF ACTIVITIES	2020					2021											
		8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12
<b>I</b>	<b>Paneki Raw Water Supply Subproject</b>																	
1	Procurement of civil works		■	■	■	■												
2	Land acquisition (LARP)					■	■	■										
3	Construction of Weir and Intake						■	■	■	■	■	■	■					
4	Construction of the Transmission Pipeline							■	■	■	■	■	■	■	■			
<b>II</b>	<b>Complementary Works</b>																	
1	Procurement Stage 2						■	■	■									
2	Construction of Reservoir 500 m3 (Stage 1)	■	■	■	■	■												
3	Construction of Distribution Pipeline (HuntapPombewe) (Stage 1)	■	■	■	■	■												
4	Construction of WTP Pombewe (Stage 2)										■	■	■	■	■			
5	Construction of Distribution Pipeline (Pombewe and Loru - Village - Stage 2)										■	■	■	■	■			

## V. DESCRIPTION OF THE BASELINE ENVIRONMENT

### A. Physical Environment

48. **Climatic conditions.** The climatological data in the Paneki area consisted of temperature, relative humidity, wind speed, and average monthly sun exposure time for the last 12 years (2007-2018) obtained from the closest observation station to the activity location, namely the Bora Weather Station. The data is presented in Table 4.

**Table 4. Monthly Average Climate Data for 2007-2018**

Parameter	Month					
	Jan	Feb	Mar	Apr	May	Jun
Temperature (°C)	28.36	28.44	28.88	28.95	29.23	29.21
Relative Humidity (%)	80.74	79.23	78.78	78.49	78.14	78.80
Wind Speed (km/day)	58.76	64.50	75.91	76.91	64.71	62.13
Sun Exposure Time (%)	46.39	41.60	50.34	50.55	58.87	55.26

Parameter	Month					
	Jul	Aug	Sep	Oct	Nov	Dec
Temperature (°C)	28.67	29.09	29.33	29.47	29.11	28.68
Relative Humidity (%)	80.16	77.98	78.27	79.49	80.61	79.25
Wind Speed (km/day)	61.73	67.74	71.69	76.46	68.53	59.89
Sun Exposure Time (%)	55.60	61.89	60.84	57.62	56.29	47.85

SOURCE: BORA WEATHER STATION, (2007-2018)

49. **Land and Land used.** Rock formations around the Gneiss region, are a common and widespread type of metamorphic rock. Gneiss is formed by high temperature and high pressure metamorphic processes that act on formations consisting of igneous or sedimentary rock. The land use in the watershed is forest with a good thickness and has the status of Community Forest Park (Tahura). The location of the intake weir is a cocoa plantation area that is almost the same as Tahura. The pipeline will cover cocoa gardens, agricultural land, a small part of production forest and riverbanks.

50. Rainfall data is taken from the two closest rainfall stations to the Paneki River Basin, namely Bora Station and Palolo Station. Maximum daily rainfall data for the last 12 years (2007-2018) at the two rain stations are presented in Table 5

**Table 5. Maximum Daily Rainfall in the Paneki Watershed**

Year	Unit	Rainfall Station		Area Rainfall
		Bora	Palolo	
2007	mm/day	23.0	36.0	29.5
2008	mm/day	8.0	35.7	21.9
2009	mm/day	-	37.8	37.8
2010	mm/day	-	25.4	25.4
2011	mm/day	99.5	29.1	64.3

Year	Unit	Rainfall Station		Area Rainfall
		Bora	Palolo	
2012	mm/day	50.0	30.6	40.3
2013	mm/day	45.4	84.5	65.0
2014	mm/day	51.4	82.5	67.0
2015	mm/day	71.7	95.6	83.7
2016	mm/day	54.5	-	54.5
2017	mm/day	48.0	68.5	58.3
2018	mm/day	65.5	84.3	74.9

SOURCE: HYDROLOGY STUDY REPORT(TIM PAK HADI), 2020

**51. Ambient Air Quality and Noise Level. Based on measurement data of UKL / UPL study activities.** Measurement of air quality and noise level is carried out at two observation stations, namely: (a) the location of the end of the transmission pipe near the future Pombewe WTP (coordinates: 00° 58' 58.67" S; 119° 56' 46.07" E), and (b) residential areas around the transmission pipe (coordinates 00° 58' 32.45" S; 119° 57' 29.65" E). The results of measurements of air quality and noise levels are presented in Table 6.

**Table 6. Results of Ambient Air Quality and Noise Level Analysis**

Parameter	Unit	Observation Location		Quality standard
		Near the Future WTP	Existing Settlement	
Carbon monoxide (CO)	µg/Nm <sup>3</sup>	53.11	44,66	30,000
Nitrogen Dioxide (NO <sub>2</sub> )	µg/Nm <sup>3</sup>	23.36	18,35	400
Sulfur Dioxide (SO <sub>2</sub> )	µg/Nm <sup>3</sup>	42.58	26,94	900
Lead (Pb)	µg/Nm <sup>3</sup>	0	0	2
Dust	µg/Nm <sup>3</sup>	10.93	8,67	230
Noise Level	dB(A)	46.3 – 54.2	56.7 – 57.2	55

SOURCES: DATA SEKUNDER, UKL/UPL\_LAB. Analisis Sumber Daya Alam dan Lingkungan UNTAD, JUNE 2020

52. The results of air quality measurements in the area around WTP Paneki and settlement areas show that the concentration of the parameters analyzed is still well under their respective threshold values stipulated in the Government Regulation of the Republic of Indonesia No. 41 of 1999 concerning Air Pollution Control. This represents the baseline condition of ambient air quality that is relatively good within those two locations.

53. Unlike the case with ambient air quality conditions, the noise level at the existing settlement of the future transmission pipeline alignment shows a slightly higher than the standard noise level based on the Decree of the Minister of Environment of the Republic of Indonesia No. 48 / MENLH / II / 1996 which sets the standard for the noise level for residential areas is 55 dB(A).

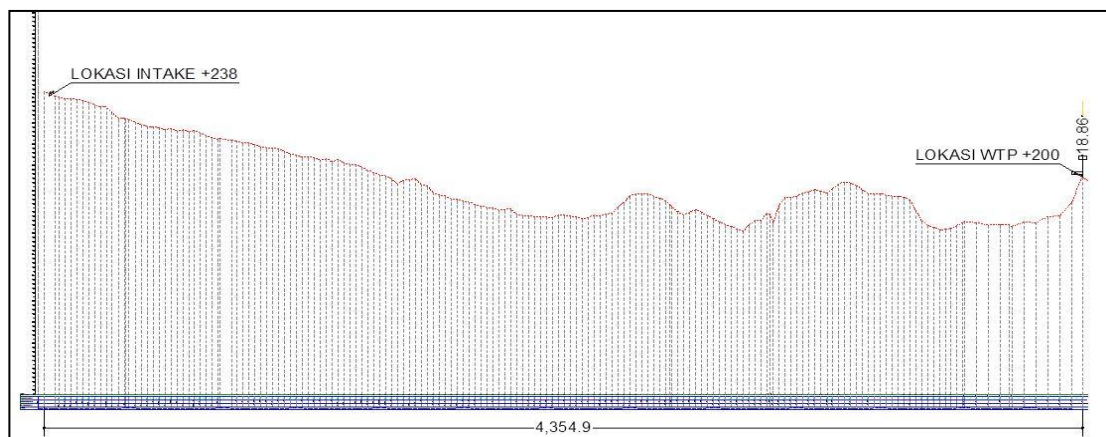
54. **Geology.** The location of the Paneki RWSS is included in the Geomorphic Formation Structural Origin unit. This unit occupies 70% of the entire length of Paneki's raw water transmission pipeline. This unit has a morphology of medium-strong wavy hills with steep slope morphometry at an altitude (elevation) of 80 m to 160 m above sea level. The



geomorphological unit of the fluvial origin is the alluvial plain sub-unit with the characteristics in the field having an area of 40% of the total area of the entire map; has a flat slope between 0% -2%; consists of loose material as a result of the fluvial process which is shredded material carried by rivers (alluvial deposits) and colluvial deposits in the form of rock scraps deposited on the slopes of mountainside.

55. **Topographic Conditions.** The intake building is planned to be constructed at an altitude of 238 m above sea level while the WTP plan is at an altitude of 200 m asl. An overview of the topographical conditions of the Paneki RWSS study area can be seen in Figure 3.

**Figure 10. Topographic Conditions at the Subproject Site**



56. **Water quality.** Measurement of Paneki river water quality was carried out at two observation locations, namely: (a) the river at the future intake location (coordinates 00° 57' 57.5" S, 119° 58' 18,50"; ) and, (b) rivers around residential areas (coordinate 00°58' 29.31" S; 119°57' 31.93" E). The observed river conditions are presented in Figure 4.

**Figure 11. River Water Condition at Intake Location (Left) and Near Community Settlements (Right)**



57. Based on the results of laboratory analysis of water samples obtained during sampling on June 13, 2020, all measured parameters meet the requirements of Class I standard based on Government Regulation (GR) of the Republic of Indonesia No 82 of 2001<sup>9</sup>. Based on the foregoing explanation, it can be concluded that the quality of Paneki River water is

<sup>9</sup>GR No 82 of 2001 on Water Quality Management and Control of Water Pollution, Class I Standard, which is referred to as raw water suitable for drinking purpose and/or similar usage requiring this standard.



still used as a source of drinking water. The results of the analysis of river water are presented in Table 8.

**Table 7. Water Quality Analytical Results**

No	Parameter	Unit	Sampling locations		Class I standard
			Future intake	Near existing settlement	
<b>A</b>	<b>Physical properties</b>				
1	Temperature	°C	28.82	28.84	Air temperature $\pm$ 3 °C
2	Total dissolved solids	mg/L	134	139	1,000
3	Total suspended solids	mg/L	2.64	3.16	50
4	Conductivity	$\mu$ S/cm	0.18	0.21	-
5	Turbidity	NTU	5.64	5.72	-
6	Salinity	%	0.01	0.01	-
<b>B</b>	<b>Chemical Properties</b>				
1	pH	-	7.56	7.58	6-9
2	Biochemical oxygen demand (BOD <sub>5</sub> )	mg/L	1.06	1.12	2
3	Chemical oxygen demand (COD)	mg/L	5.38	5.53	10
4	Dissolved oxygen (DO)	mg/L	13.4	14.1	6
5	Total phosphor(as P)	mg/L	0.01	0.01	0.2
6	Nitrate (NO <sub>3</sub> -N)	mg/L	1.02	1.06	10
7	Ammonia (NH <sub>3</sub> -N)	mg/L	0.00	0.00	0.5
8	Nitrate (NO <sub>2</sub> -N)	mg/L	0.01	0.01	0.06
9	Iron (Fe)	mg/L	0.00	0.00	0.3
10	Lead (Pb)	mg/L	0.00	0.00	0.03
11	Zinc (Zn)	mg/L	0.00	0.00	0.05
12	Sulphate (SO <sub>4</sub> )	mg/L	3.74	4.38	400

SOURCE: DATA SEKUNDER, UKL/UPL\_LAB. Analisis Sumber Daya Alam dan Lingkungan UNTAD, JUNE 2020

## B. Flora and Fauna (Biodiversity)

58. **Key biodiversity area.** Based on field observations, the location of the Paneki RWSS is outside the Palu or also known as Poboya-Paneki Grand Forest Park (*tamanhutanraya* or *tahura*), is located in Poboya Village and Pombewe Village of Sigi District, and Ngatabaru Village of East Palu District, approximately 10 - 15 km east of Palu City. The grand forest park It is at an altitude of 200 m above sea level with the highest peak of Mount BuluBakente, which reaches an altitude of about 1,039 m above sea level, with varied topographical shapes in the form of wavy, hilly, and mountain. The closest location for the Paneki intake and weir to be constructed is about 40 meters from the boundary of the grand forest park.

59. The Palu Grand Forest Park is one of key biodiversity areas in Central Sulawesi. This grand forest park classified as conservation area according to the Ministry of Forestry decree No. 24/1999 (dated 29 January 1999) and has an area of 7,128 ha, comprising: 6,000 ha of

Paneki protection forest, 1,000 ha of Poboya strict nature reserve, and 128 ha of Kapopo recreational forest (known as the area replanted during the 30<sup>th</sup> national greening week). It is managed by the Poboya Paneki forest management unit of the Central Sulawesi Province based on the Governor Decree No. 05/2009. Accordingly, the grand forest park is intended for flora and fauna conservation, nature recreational purpose, and water resource protection.<sup>10</sup>

60. It was reported in 2015 that approximately 150 – 200 ha of the Palu Grand Forest Park was encroached illegal gold mining activities. Some disturbance to flora habitat and availability of clean water were also reported.<sup>11</sup> Based on this condition, there was a proposal to relocate the grand forest park to areas where the forest condition is considered intact.<sup>12</sup> However, further development of the relocation proposal is unknown to date. Figure 12 shows the condition in parts of the grand forest park in 2018.

**Figure 12. The condition in parts of the grand forest park in 2018**



Source:<https://kabar24.bisnis.com/read/20180508/78/793075/relokasi-taman-hutan-rakyat-poboya-mendapatkan-dukungan>

61. **Flora.** The ecosystem in the Palu Grand Forest Park is dominated by trees and other plants at an altitude of 100 to 1,500 m above sea level, with flat topography, hilly and mountainous location, and a slope of between 8% to 60%. Several research results show that about 159 plant species have been identified in this grand forest park, consisting of 100 types of trees, 13 types of grass, 22 types of lianas, stranglers, epiphytes, saprophytes and parasites, and 5 types of palmae.

62. Vegetation types in the form of tree-level and pole-level in and around the grand forest park are trees that grow naturally and those are cultivated. The trees found were Johar (*Cassia seamea*), Gamal (*Gliricidaemaculata*), Asam (*Tamarindusindica*), Angsana (*Pterocarpusindicus*), Acacia (*Acacia auricauliformis*), Eucalyptus (*Melaleuca leucadendron*), Javan Wood (*Lanneagrandsis*), Candlenut (*Aleuretesmoluccana*), Mangga (*Mangiferaindica*), Jackfruit (*Artocarpusintegra*), Breadfruit (*Artocarpusaltilis*), SengonLaut

<sup>10</sup> <http://rimbawan-resource.blogspot.com/2013/09/selayang-pandang-tahura-sulteng-part-1.html>, 2013.

<sup>11</sup> <https://www.mongabay.co.id/2015/01/31/tahura-poboya-paneki-terusik-tambang-emas-bagaimana-ini>, 2015.

<sup>12</sup> <https://kabar24.bisnis.com/read/20180508/78/793075/relokasi-taman-hutan-rakyat-poboya-mendapatkan-dukungan>, 2018

(*Paraserianthesfalcataria*), Jembolan (*Eugenia jembolana*), Teak (*Tectona grandis*), Acacia (*Acacia auriculiformis*), Mahogany (*Swieteniamacrophylla*), Randu (*Ceibapetandra*), Trembesi (*Albisiaprocera*), JatiPutih (*Gmelina arborea*), Eboni (*Diospyroscelebica*), Sandalwood (*Santalun album*)( species is categorized as protected, rare, endangered, endemic species according to Indonesian regulations), Biti (*Vitexgofassus*), Lamtoro (*Leucaenaglauca*), Karui (*Acacia nilotica*), and others. While the types of bush and shrub vegetation that can be found are: Red distance, Roviga, Cactus, and others. The condition of natural vegetation in the study area can be seen in Figure 13.

63. **Fauna.** The results of fauna identification included: Yellow-crested white cockatoo (*Cacatuasulphlirea*), Tekukur (*Geopeliasp*), Brown Eagle (*Elanushypolenaus sp.*) and Monitor lizard (*Varanus sp.*).

**Figure 13. Vegetation Conditions in the Study Area**



### **C. Socio-economic and Land Use**

64. Employment in the study area is mainly in the agricultural, plantation, forestry, and fishery sectors. In general, the economy in Sigi Regency is strongly influenced by the national economy. The economic fundamentals in the study areas are supported by the existence of traditional markets, kiosks, stalls, and restaurants. The current land use pattern around the subproject site is still dominated by vegetation cover from agricultural activities. The types of crops grown are lowland rice, corn, peanuts, and green beans.

65. The population structure in the study area from the estimated population registration in 2019 shows the percentage of the elderly population (elderly), namely the population aged 65 years or more, in the study area the average is 8.97%, the productive age 20-64 years is 57 , 3% and under five and school age 0-19 years is 33.73%. The table above shows that the dependency ratio of the population in the study area averages is 74.5%. This means that every 100 people of productive age (20-64 years) support around 75 people of non-productive age (aged 0-19 years and 65 years and over).

66. Natural resources in the study area beside the land are forests and rivers. Natural resources that can be controlled and owned by residents individually (private) are land. Residents control and / or own land through various means, namely buying from other people, inheriting from parents, renting, borrowing from other people (including government forest land), giving / sharing from the government, controlling the unused land owned by

country, and clearing forests. Some residents in the study area are control and own land through buying and inheriting from their parents. These lands are generally accompanied by a certificate of ownership from the village and some of them already have ownership certificates.

#### **D. Public Health**

67. Environmental health status in the study area can be seen from the environmental conditions which include houses and sanitation facilities for residents in the study location. The condition of the residents' houses generally has met the health requirements. House wall materials made of cement, wood, or bamboo; house floors made of ceramic or cement plaster; and house roofs made of tile, asbestos, or zinc.

68. The current source of water for residents comes from river water taken from between the rocks in the river, some also come from groundwater. The water is used for bathing, drinking, and cooking. Based on the results of the analysis of the water quality in the study location, it is in accordance with the quality standards set.

69. Based on observations in the field, some people have a high concern for health and the environment. This is shown by most of the people who already have large water disposal facilities. The waste produced from households is generally thrown into the trash, piled up in the garbage pits that are made, burned, and some even made compost.

70. The disease pattern in the study area is relatively the same as the disease pattern suffered by the Indonesian people in general. Where ARI disease is a major health problem and is a typical disease in tropical regions. The ten most common diseases are ARI, gastritis, muscular and tissue system diseases, hypertension, diabetes mellitus, allergies, diarrhea, and disorders of the nervous system, bronchitis, and heart. Disease vectors that are carriers of the disease are mosquitoes, flies, cockroaches, and disease-carrying animals such as rats and dogs.

71. The health facilities in the study area consist of 3 units of supporting Public health center, 8 units of Village Health Posts, and 3 units of Village Polyclinic. The closest referral Public health center is the Public health center of Biromaru, located in Mpanau Village, Sigi Biromaru District.

#### **E. Socio-cultural and Physical Cultural Resources**

72. The communities in the study area have no specific customs or cultures which according to the law must be protected. The culture that is still very thick is the culture of the Kaili people and the culture or customs associated with Islam. The population in the study area is relatively homogeneous in terms of religion, language, and customs. The majority of the population in this area are Kaili, Bugis, Gorontalo, and a few other local ethnics. People generally use the Indonesian language to communicate.

73. The social process or social interaction that occurs in the community leads to the form of cooperation which is manifested in mutual cooperation activities. The strong values of religious customs that almost all local traditions, culture, and arts are colored by Islamic religious values and the Kaili Tribe, where people tend to prioritize the spirit of togetherness to create social harmony. Therefore, people tend to avoid ways of conflict and conflict in solving any problems that occur. From the social life aspect, the function of social institutions and traditional institutions is important because, in addition to being a unifying tool, it can also be used as a means of monitoring and protecting the community.

## VI. ANTICIPATED ENVIRONMENTAL IMPACTS AND MITIGATION MEASURES

74. The potential environmental impacts of subproject activities are any change in the physical, biological, and socio-economic, and cultural resources to the current baseline conditions. The impacts anticipated to occur from the Paneki RWSS are assessed based on its types of impacts (e.g., positive or negative, direct or indirect impact), its duration (e.g., short-, medium- or long-term), and its distribution (e.g., local or regional) and whether the impact has accumulative characteristic. Based on the above assessment, the significance of the subproject's impact on the environmental components is classified as follows:

- **Not significant impact** if there is no adverse consequence.
- **Low impact** if there are short-term recovery due to the impact and can be mitigated using measures typically applied for similar subproject.
- **Moderate impact** if recovery due to the impact close to baseline conditions will occur over time and require specific mitigation measures.
- **High impact** if recovery due to the impact requires significant mitigation measures over a long-term period, and/or for which there is likely to be adverse consequence.

75. Key subproject activities of the Paneki RWSS that are most likely to produce potential environmental impacts are as follow:

- Earthworks required for infrastructure development, for example, excavation, trench filling, and weir construction;
- Logging and clearing of vegetation to remove it by mechanical or manual means, including soil enrichment;
- Temporary use of land next to the subproject site including that used for the accumulation of material, machine parking lots, basecamp, site subproject offices, and toilets;
- Construction of raw water supply infrastructure especially weir with intake and transmission pipeline; it also includes other minor civil works such as water measuring chambers, some buildings for power supply connections; and
- Operation of construction machinery and vehicles at the job site and truck traffic.

### A. Pre-construction Stage

76. **Multiple community perceptions.** Field survey and land acquisition activities could create multiple impressions/assessments, either positive or negative, in the community, particularly by the landowner in Pombewe and Loru Villages towards the subproject if the community finds out that the land in their village will be affected by the subproject and this matter is not well informed to them. The land acquisition of approximately 27,500 m<sup>2</sup> will be required for the intake's weir, raw water transmission pipeline, and access road. The landowners will hand-over their owned land if there is a price agreement between the subproject and the residents. In general, the community wants the construction of Paneki RWSS to be carried out immediately, with the expectations that their area will have adequate supply of clean water and they can work on the subproject to sustain their livelihoods.



**Table 8. Essential Environmental Impacts of Paneki Raw Water Supply Subproject**

	Field survey & Land acquisition	Construction workers recruitment	Basecamp construction & operation	Inspection road construction	Material excavation/transportation & heavy equipment operation	Weir construction	Transmission pipe and bridge construction	Heavy equipment and worker demobilization	Weir operation	Transmission pipeline operation
<b>Pre-construction Phase</b>										
Multiple community perceptions	X	X								
<b>Construction Phase</b>										
Changes in geology structure					X					
Changes in land use & topography			X			X				
Soil and water contamination			X	X						X
Changes in river hydrology & water quality			X	X		X				X
Reduced environmental sanitation			X			X				
Reduced ambient air quality			X		X	X		X		
Increased noise level			X		X	X		X		
Disturbance to flora & fauna/biodiversity			X			X				
Employment & business opportunities		X			X			X		
Socio-cultural resource impact	X	X			X					
Occupational and public health & safety and COVID-19 risks		X	X	X	X	X	X	X		
<b>Operation Phase</b>										
Change water quality										x

77. The impact on land acquisition in terms of compensation will be felt directly by the landowners affected by the subproject. This impact will be of local scale because the landowners are in Pombewe and Loru Villages and of short-term duration during the field survey and land acquisition process. However, the land acquisition required by the subproject will result in the loss of land rights for those affected in the long-term as the land will now be owned by S3RBO. Based on the foregoing, the impact caused by the field survey and land acquisition on land acquisition is considered not significant and therefore, the following mitigation measures are proposed:

- conduct a meaningful public consultation with affected communities prior to commencing the subproject's activities; and
- carry out comprehensive data collection related to the area of land ownership affected by subproject and subsequently pay the compensation in a timely manner according to prevailing laws and regulations as well as ADB's requirements.

## **B. Construction Stage**

78. **Changes in geology structure.** The potential impact on changes in local geology structure is most likely to occur at the quarry due to the demand for construction materials such as stone, sand, and other materials. These materials will be sourced from class C quarry that has valid government permits. This impact will inevitably occur as a result of the procurement of construction materials even though the impact will not occur directly at the subproject location. Based on the work plan, material procurement will only be required when the weir construction will take place under 1 year, so that the duration of the impact is of short duration. The impact due to this material extraction activity will not be reversed because the material needed is used up. This impact is of local scale in nature as it will happen only at the quarry. Based on the foregoing, the impact caused by the demand for construction materials is considered not significant and therefore, the following mitigation measures are proposed:

- optimize the demand for construction materials based on the subproject's actual needs; and
- source the construction materials only from the licensed typed-C quarries.

79. **Changes in land use and topography.** Potential impacts on the land use and topography of the area are likely to occur during the construction stages due to land clearing and levelling. Land clearing work is carried out to clear the land that will be used for weirs and transmission pipelines from trees, obstructions, bushes, and other objects that can interfere with the smooth running of the work. Excavation, stockpiling, and leveling work, this work is carried out by excavating the ground according to the depth or height of the transmission pipe to be installed based on the topographic conditions.

80. The impact on topography will inevitably occur, though localized within the intake and pipeline alignment, due to the construction of this infrastructure and inspection road, requiring some adjustment to the existing topography. Based on the work plan, the construction mentioned earlier will take place under 1 year, so that the duration of the impact is short-term. This type of topographical impact due to the weir construction activity will not be reversed unless excavation for the needs of the transmission pipeline will reverse because stockpiling will be carried out after the completion of the pipe installation. This impact is considered local in nature to the subproject site. Based on the foregoing, the changes in topography caused by the construction of the weir, transmission pipeline and access road is considered low impact and therefore, the following mitigation measures are proposed:

- final shaping and replanting of earthworks in the stockpile will be completed as soon as possible once the pipes are buried in the soil to facilitate stable regeneration of the ground cover; and
- weirs, pipelines, and other works will be replanted to facilitate regeneration and slope stabilization.

81. **Soil and water contamination.** The impacts on land resources are likely related to soil contamination due to accidental spills of oil, fuel and other chemicals from the basecamp operations, on-site maintenance activities of heavy equipment, and construction activities using these substances. Contaminated soil, if not immediately removed and stored properly in dedicated drums, would be washed out and may contaminate the Paneki river and other nearby receiving water bodies. This situation may, in turn, affect flora, fauna, and human health utilizing these water resources. Overall, these impacts can be categorized as certain to occur if mitigation measures are not implemented properly.

82. Based on the work plan, the construction activities will take place under 1 year so that the duration of the impact is short-term, and the impact will only occur on a local scale within the 4.3-km ROW of the raw water transmission pipeline. The impact on soil and water contamination, if any, will be reversible as the accidental spills of those hazardous substances are anticipated to be minimal. Based on the foregoing explanation, the significance of the impact caused by the construction activities are considered as low on soil and water. Therefore, the following mitigation measures are proposed:

- oil, fuel, and chemicals considered hazardous substances will be stored in bonded areas with waterproof floors and weatherproof roofs as well as restricted access;
- re-fueling will be carried out at public gas stations and maintenance, washing and repairs of construction equipment and vehicles will be carried out at public repair/maintenance stations;
- the construction machinery will be maintained in good condition and any leaks will be repaired immediately;
- spill response equipment will be provided at the construction site; and
- soil contaminated by hydrocarbon products and other substances considered hazardous will be cleaned up immediately and then temporarily stored at dedicated drums prior to disposal by licensed transporters to licensed hazardous waste facilities.

83. **Changes in river hydrology and water quality.** Earthworks including soil cut and fill required as well as construction activities can increase soil erosion and some sediment could enter the Paneki River. Accidental landslides can also occur along the embankment of the Paneki River increasing sediment load into the river and other nearby watercourses. The potential for this impact to occur can be categorized as certain. In the construction implementation, there will be a waste of soil and rock that, if not effectively managed, can also lead to sedimentation and surface water pollution in Paneki River as well as create unsightly visual impact.

84. Based on the work plan, the earthworks and construction activities will take place under 1 year so that the duration of the impact is short-term and the impact will only occur on a local scale along the 4.3-km ROW of the raw water transmission pipeline. The changes in river hydrology and reduced water quality due to the construction activities are certain to occur but can be mitigated using the proposed mitigation measures as follow:

- soil clearance will be minimized as far as possible.
- construction works for riverbank protection will be carried out in seasons with small Paneki River discharge;



- topsoil will be separated from the soil layer during excavation, and topsoil will be reused as topsoil;
- Remaining excavated material will be reused if possible, for example for refilling;
- When water pumping is carried out, sediment traps will be installed at the point of extraction and disposal to avoid the entry of sediment into waterways and rivers;
- Implement a suitable stockpile storage management to prevent runoff carrying sediment from entering the watercourse including permitting the establishment of vegetation in exposed soil and providing ditches to accommodate runoff;
- do not place material and waste rock stockpiles within 50 m of any watercourse and in flood-prone areas as well as avoid sensitive locations;
- wastewater associated with mixing and placing of concrete (including washing water) will be collected and treated in settling ponds to prevent surface water contamination;
- drainage will be provided around the construction site and drainage will be directed to settling ponds; and
- basecamp will be properly located and equipped with drainage and wastewater facilities to collect runoff and, if necessary, treat runoff.

**85. Reduced environmental sanitation.** The construction activities and basecamp operations will generate construction wastes such as material debris and household-typed waste. The impact of this waste generation will be a direct one in the form of reduced environmental sanitation within the subproject area. These potential impacts can be classified as local within the project site and will only last during the construction period, under 1 year.

86. Based on the analogy of similar activities, this type of impact will occur due to the behavior of workers who have not been able to implement an effective waste management practice. This situation is expected to return to its original state when subproject activities and basecamp operations end. Based on the foregoing, the significance of this impact is considered low and therefore, the following mitigation measures are proposed:

- Suitable temporary waste storage containers will be provided at the construction site and workers camp; all wastes will be reused or recycled as much as possible;
- waste that cannot be reused or recycled will be transported regularly to the approved landfill location operated by the local government in Palu and/or Sigi;
- the subproject's basecamp will be equipped with an adequate water supply and sanitation facilities and will be maintained in a clean/hygienic condition
- particular care should be taken in dismantling the pipe to avoid the creation of asbestos dust by cutting operations; the pipes must be discharged according to the technical specifications and must be provided with an adequate ground cover;
- burning waste at or near the site is strictly prohibited; and
- The contractor will be responsible for the removal and disposal of significant residual material, waste, and contaminated soil left on site after construction.

**87. Reduced ambient air quality.** Sources potentially causing deterioration in ambient air quality from construction activities include: (a) dust generated from excavating the soil; (b) dust generated from disturbed and uncovered construction areas; (c) dust and emissions generated by the movement of vehicles and heavy equipment on the transport roads; and (d) dust from aggregate preparation and concrete mixing. The results of the measurement of

ambient air quality in the area around the WTP Paneki are still below the threshold values stipulated in the Government of the Republic of Indonesia Regulation No. 41/1999 on Air Pollution Control.

88. A decrease in air quality will only affect the existing settlements near the raw water transmission pipeline and the weir location so that the impact is only local and lasts during the mobilization of heavy equipment and construction materials during the construction period. Based on the analogy of similar subproject, this impact is almost certain to occur, however, the impact will end and will reverse after the construction period, which will last in less than 1 year, ends. Based on the foregoing, the significance of impact caused by the above activities on ambient air quality is considered not significant. Nevertheless, the following measures are proposed to maintain acceptable ambient air quality at the existing settlements near the subproject site:

- the dry ground surface should be watered regularly by paying attention to weather conditions;
- transport vehicle should travel at a low speed (e.g., no more than 20km/hour on construction sites);
- all vehicles delivering dusty construction material to the site or dumping debris must be covered;
- exhaust systems for vehicles, trucks, and machinery must be in good working order, well maintained, and has been in operation for less than 10-years;
- equipment should be located as far as possible from residential areas; and
- prefabricated structures will be used as much as possible.

89. **Increased noise level.** Noise will be generated from the movement of vehicles and trucks, physical works, and transportation of materials. The increase in noise will affect the population at existing settlements near the transmission pipelines and weir locations. Noise level measurements have been carried out in the area around WTP Paneki and around residential areas. The measurement results in residential areas are slightly above the standard of 55 dB(A), namely 56 to 57dB(A). The existence of material mobilization activities will not have a significant effect due to short exposure time i.e., less than 1 year of construction time and the construction activities will only be carried out during the day-time period.

90. Increased noise level will only affect the population near the raw water transmission pipeline and the location of the weir so that the impact is only local and only lasts during the short-term period during mobilization of heavy equipment (value 2). Based on the analogy of similar subproject, this impact is almost certain to occur, however, the impact will end and be reversible after the construction activities end. Based on the foregoing, the significance of impact caused by the mobilization of materials and heavy equipment is not significant. Nevertheless, the following measures are proposed to maintain acceptable noise level at the existing settlements near the subproject site:

- construction activities will only be carried out during the day-time period;
- equipment and activities with elevated noise levels should be located as far as possible from human settlements; and
- conduct socialization to the closest community regarding the schedule and duration of construction work.

91. **Disturbance to flora and fauna/biodiversity.** Land clearing work is carried out to clear the land that will be used for weirs and transmission pipelines from trees, obstructions, bushes, and other objects that can interfere with the smooth running of the work. This activity will potentially remove flora around the weir area and transmission pipelines. Based on field observations, the intake location is located about 40-m outside the Palu Grand Forest Park. Based on the preliminary observations, the types of flora encountered at the subproject site are not considered threatened or endangered species, and therefore no significant impact on flora is anticipated.

92. The potential impact of disturbance on fauna will take place at the construction stage. This potential may come from workers who are likely to hunt fauna around the subproject site which is located close to the Palu Grand Forest Park. Based on the preliminary observations, there are no reports of rare, endangered, or endemic fauna species at the subproject site. The baseline information indicates that part of the grand forest park, comprising protection forest and strict nature reserve, has been encroached by illegal gold miners and other commercial uses, suggesting that flora and fauna habitat herein have been disturbed by man-made activities to some extent.

93. The impact on flora and fauna habitat is anticipated to occur due to the construction of the weir and transmission pipeline will involve land clearing activities and proximity of the subproject site to the Palu Grand Forest Park. Based on the work plan, the construction of weir and transmission pipeline will take place under 1 year so that the duration of the impact is short-term and is local in nature to the subproject site. Based on the foregoing, the significance of this impact is low, nevertheless, the following mitigation measures are proposed:

- a cooperation between the contractor, S3RBO and the management unit of the Palu Grand Forest Park should be established to provide awareness to the contractor and its workers on the importance of flora and fauna conservation as well as disseminate legal sanctions applied for any worker found for collecting flora and/or poaching fauna from this conservation area;
- the cooperation should be extended for the forest management unit to conduct patrol and minimize encroachment to the grand forest park from the subproject site.
- logging of trees that do not need to be felled will be prohibited;
- conduct selective land clearing at areas immediately needed for construction activities; and
- temporary use areas such as construction basecamp sites will be replanted using suitable local species upon completion of the construction works.

94. **Employment and business opportunities.** The subproject is anticipated to provide limited employment and business opportunities for the local community during the construction period. This employment opportunity could be in the form of non-skilled and daily labor. The total number of workers for the subproject is estimated around 100 people and part of this may be supplied from the local community depending upon the subproject need. Further, the subproject could create some business opportunities, although at local scale and for short-term period, such as the community open food and beverage kiosks (*warung*) and sell several types of consumer goods.

95. The socio-economic impacts described earlier is anticipated to improve the community's livelihoods although it will be for short-term period. This impact has a direct effect on the community around the subproject site and is regional in nature. This potential impact will appear during construction activities that last during the construction period. Based on the experience of similar subprojects, it is almost certain that this impact will occur

and of significance for the local community and therefore, should be enhanced through the proposed measures:

- conduct a public consultation not only to disclose the subproject information but also disseminate the business and employment opportunities that may arise;
- the location of the site subproject's basecamp and temporary accommodation will be discussed in consultation with local authorities and/or communities;
- the site subproject's basecamp and/or temporary accommodation will be equipped with an adequate water supply and sanitation facilities and will be maintained in a clean/hygienic condition;
- prioritizing local workers and suppliers to supply labor and material needs for the subproject provided that they meet the opportunity and qualification.

96. **Socio-cultural resource impacts.** These impacts will occur as a result of the interaction between workers and local residents, where if the workers are not from the local population it will automatically bring the culture of their respective areas. This impact has a direct effect on the existing social environment around the subproject site and is regional in nature. This potential impact will appear during construction activities that last for 6 months (value 2). On the other hand, the impact on physical cultural resources at the subproject site cannot be assessed in the light of baseline information on this matter.

97. Based on the foregoing and similar subproject, the overall impacts on socio-cultural resources may be minor and its significance could be low. Nevertheless, mitigation measures to this effect should be conducted using precautionary approach based on those defined for the socio-economic impacts. In addition, the subproject is required to establish a 'chance find procedure' as a tool to document any findings on cultural resources and address any follow-up actions that may be required in a formal/written manner.

98. **Occupational and public health and safety, and COVID-19.** The use of tools, heavy equipment, and powered machinery in the subproject can pose physical hazards to workers, which can be caused by elevated noise, vibration, dust, handling of heavy and hazardous materials and equipment, falling objects, and work on slippery surfaces. This potential impact will be certain and felt directly by the workers but only locally around the subproject site during construction period. On the other hand, public health impacts could be resulted from dust and noise that will be generated by the movement of vehicles and trucks, especially during earthworks and transportation of construction materials. This potential impact will be certain and felt directly by the workers but only within the existing settlements around the subproject site during construction period. Based on the foregoing, the significance of the impact caused by construction activities on occupational and public health and safety is considered low, but proposed mitigation measures as follows should be conducted:

#### *Occupational Health and Safety*

- the contractor is responsible for providing a safe construction site by developing and implementing a construction environmental management plan (CEMP), incorporating health and safety measures to mitigate risk to construction workers and the public, for implementation;
- a trained/certified HSE officer will be appointed by the contractor to supervise implementation of the CEMP;
- workers will receive induction and/or trainings on occupational health and safety during construction, especially in relation to the use of potentially hazardous equipment,

handling, and disposal of hazardous materials including asbestos pipes, and use of personal protective equipment (PPE);

- adequate first aid facilities will be provided on-site;
- appropriate fire extinguishers will be provided on-site;
- all equipment will be maintained under safe operating conditions;
- material piles such as pipes, must be stable and properly secured to avoid collapse and possible injury to site workers;
- appropriate personal protective equipment, including ear protection, hard hats, dust masks, and safety boots will be provided; and
- adequate signage in risk areas will be installed, and access to construction sites will be restricted;

#### *Public Health and Safety*

- Provide information through formal and informal means to the public about the safety risks when approaching the subproject area.
- Adequate signage and clear warning and hazard signs should be installed at subproject areas

99. Due to ongoing COVID-19 global pandemic, the workforce of the subprojects inherently exposed to coronavirus infection risk. Further, this infection could spread to the community living nearby the subproject sites and beyond in the absence of relevant vaccines and implementation of mitigation measures. Therefore, the Coronavirus infection is considered high risk for the subproject that must be mitigated as follow:

- the contractor shall conduct a risk assessment of Coronavirus infection and define relevant mitigation measures for the subproject; the risk assessment can be conducted in parallel when developing the CEMP;
- every worker of the subproject will require to conduct Coronavirus testing using the methodology defined by prevailing laws and regulations applied for the subproject; and the result of this testing must be properly recorded and reported to relevant authorities; and
- provide induction, daily talk, and signage at the subproject site to create awareness of Coronavirus infection and maintain discipline in applying the following norms i.e., social distancing, wearing mask, and washing hand regularly at the subproject site and other public places.

### **C. Operation Phase**

**100. Weir with intake and pipeline Operation and maintenance** .The operation of the intake and the transmission pipeline will inevitably have some impacts on water and soil quality, particularly in connection with maintenance Pipes for raw water transmission will be above ground. Maintenance activities include: Inspection of the internal condition of pipes, Detection of Leaks, Handling of leaks and Handling of corrosion. The potential impact that occurs will have an impact on surface water and soil because of the use of Installed "sacrificial anode" every 12 m and replaced every 6 months, also Primary coating by zinc, Secondary coating by epoxy, Polyuritan coating. These potential impacts are directly exposed to water and soil. These potential impacts are anticipated to be local impacts in the long-term operational period. Based on the experience of similar activities, it is almost certain that this impact can occur, based on the foregoing, this impact is considered insignificant, however mitigation measures to ensure that corrosion management activities must be carried out as needed.

- To check, maintain and clean regularly the silt trap at the Paneki Intake.
- Sediment / silt from the silt trap is brought out from the site by a 3rd party which working together for further management.
- Check the pipes for corrosion conditions and make repairs to the pipes with Installed “sacrificial anode” in every 12 m and replaced every 6 months.

## VII. ANALYSIS OF SUBPROJECT'S ALTERNATIVES

101. In the feasibility study and detailed engineering design (DED) phase, the proposed construction of the Paneki Raw Water Supply System considers three alternatives for the placement of the raw water intake as follow:

- Alternative 1 - The elevation of the intake is about 100 meters from the elevation of 238-m above sea level (asl), and this site is located inside the Palu Grand Forest Park. With this alternative, the amount of raw water discharge is more than 25 liters per second and the water can flow gravitationally to the WTP at Pombewe permanent residence (at an elevation of 200-m above sea level).
- Alternative 2 - The elevation of the intake is below the elevation of 238 m asl. With this alternative, the location of the intake is far from the grand forest park, but by gravity system it will be difficult to flow the water because the difference in elevation height from the WTP location (level 200 m asl) is relatively small.
- Alternative 3 - The location of the intake is at the level of 238-m asl. With this alternative, the intake location is about 40-m outside the boundary of the grand forest park and the land status is declared as non-forest use. At this site, the difference in elevation between the intake and WTP is adequate to flow the raw water by gravity at a planned water discharge of 25 liters per second.

102. Based on a number of considerations, the subproject has adopted Alternative 3 for the DED of Paneki RWSS (as described in Section 3 of this IEE).

## VIII. INFORMATION DISCLOSURE, CONSULTATION AND PARTICIPATION

103. As integral part of the IEE preparation, ADB requires that a meaningful public consultation on the Paneki RWSS subproject is conducted. This event is intended to provide clear subproject information and potential impacts that may occur in each stage of the subproject to the affected community and some stakeholders. Proposed measures to mitigate these potential impacts are also described at this event. The public consultation process began with coordination activities carried out with elements of the S3RBO as the Subproject Implementation Unit up to relevant agencies at Sigi District and village levels. Coordination is carried out in order to determine the elements of the participants who will attend the implementation time and the place of implementation. Furthermore, an invitation to carry out activities is made.

104. The public consultation activities of the subproject were held on March 2, 2020 at the Gumbasa Irrigation Observer Office (participants 33 people) and March 12, 2020 at the Mandala Paneki Scout Building (participants 50 people). On both events, the S3RBO explained the background of the Paneki RWSS subproject. After that, the experts provided an explanation regarding the subproject activities to be implemented. The explanation began with the area of land that will be affected by the subproject starting from the weir area, the transmission pipeline to the WTP. The explanation included an overview of the potential impacts that will occur at each stage of the activity. The public consultation activity was continued with a question and answer session. Related minutes of meeting was then signed. The participants who attended this public consultation included the representatives of S3RBO, sub-district heads, village heads, community leaders, youth leaders, religious leader

105. The community supported the construction of the Paneki RWSS, and they suggested the consultant have to hold public consultation once again and provides the information of water distribution to make clearer so that the community would have better understanding. Documentation of the implementation of the public consultation is presented in Figure 14.

**Figure 14. Implementation of Public Consultation at Pombewe Village**





## IX. GRIEVANCE REDRESS MECHANISM

106. The Grievance Redress Mechanism (GRM) will allow to prevent and address community concerns, reduce risks, and assist the EARR to maximize environmental and social benefits. In addition to serving as a platform to resolve grievances, the GRM should help achieve the following objectives: (i) open channels for effective communication, including the identification of new environmental issues of concern arising from the EARR; (ii) demonstrate concerns about community members and their environmental well-being; and (iii) prevent and mitigate any adverse environmental impacts on communities caused by EARR implementation and operations. The GRM must be accessible to diverse members of the community, including more vulnerable groups such as women and youth. Opportunities for confidentiality and privacy for complainants are to be honored where this is seen as important.

107. Each IA <sup>13</sup>will assign a Public Complaints Officer (PCO) to the PIU coordinate the GRM and deal with complaints from affected people throughout implementation of subprojects under its purview. Prior to construction, the PCO will finalize the GRM and issue notices to inform the public within the EARR area of the GRM. The PCO's or PIU's phone number, address, email address will be disseminated to the people through displays at the respective offices and at construction sites.

108. According to EARR's Environmental Assessment and Review Framework (May 2019), the GRM involves the following stages:

- **Stage 1:** Submission of Complaint & Informal Resolution. When a problem occurs during project implementation, the community will complain to the project implementation contractor. The project implementing contractor will solve the problem if it is felt capable of resolving the problem. If the problem cannot be resolved by the contractor, he will report to the project supervisor or to the PIU (the S3RBO)). To solve the problem reported to the PIU, the contractor together with the PIU will coordinate with the subdistrict or village where the problem originated. A resolution during construction can be handled by the contractors' representatives at the construction site and other parties. At this first level, the grievance should be resolved within maximum 2 days. If the complaint is not resolved at this level, they may elevate his grievances to the second level GRM.
- **Stage 2:** Formal Submission of Complaint. In the event of environmental problems related to the implementation of reconstruction and rehabilitation subprojects, the affected people or the community through its representatives can submit oral or written complaints to the City or Provincial Environment Agency (*DLH* or *Dinas Lingkungan Hidup*), bringing required evidences. The PCO must make documentation records. For each complaint, the PCO must investigate the complaint, assess its eligibility and identify an appropriate solution. It will provide a clear reply within five (5) working days to the complainant and the contractor. The PCO will, as necessary, through the PIU, instruct the contractor to take corrective actions. The PCO will review the contractor's response and undertake additional monitoring. During the complaint investigation, the PCO will work in close consultation with the contractors and consultants. Contractors during construction should implement the redress solution and convey the outcome to the PCO within seven (7) working days.
- **Stage 3:** Multi-stakeholder Meeting. At the village level, where a construction activity is implemented, an ad-hoc committee will be established. At this stage through mediation by the District or Provincial Environmental Office, an "environmental communication forum"

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<sup>13</sup> The Directorate General of Water Resources in the case of the subproject.

will be formed, which will accommodate community complaints related to problems arising from IAIN subproject activities and other related projects. Through this forum, ways of solving environmental problems that arise will be sought. The forum also involves the IA, the implementing contractor, community leaders, representatives of NGOs and local governments.

- **Stage 4: ADB Special Mission.** If the multi-stakeholder hearing process is not successful, the PCO will inform ADB accordingly, and the ADB EARR team may decide to organize a special mission to address the problem and identify a solution.
- **Stage 5: Judicial Proceedings.** If the affected person is not satisfied with the reply in Stage 4, he or she can go through local judicial proceedings.
- **Stage 6: Reporting.** The PCO will record all complaints, investigations, and subsequent actions and report monthly to the PIU and the IA. A summary report on PCO operations and complaint logs will be included in semi-annual environmental monitoring reports to the EA (MPWH), and in the EA's consolidated monitoring reports to ADB.

## X. ENVIRONMENTAL MANAGEMENT PLAN

### A. Institutional Arrangements and Responsibilities

109. **Steering Committee.** At the national level, a steering committee comprising the Ministry of Finance, BAPPENAS, MPWH, Ministry of Transportation and Ministry of Religious Affairs will be formed to guide the implementation of the EARR. At the provincial level, a steering committee will be formed comprising the Governor, the Heads of District/City, and related sectoral agencies. The steering committee at the central and provincial level will coordinate with other relevant ministries, and development partners as well as communications with wider stakeholders.

110. **Executing Agency (EA).** The MPWH (through its Directorate General for Water Resources) is the executing agency (EA) with two implementing agencies, i.e the Directorate General of Water Resources (DGWR) and the Directorate of Human Settlements (DGHS). The EA established a Central Project Management Unit (CPMU) with two Project Management Unit (PMUs), each representing an IA. The CPMU consolidates all subproject activities and reporting from the implementing agencies through their respective PMUs. There will be an environmental safeguards focal person (person-in-charge, PIC) in each PMU. MPWH and ADB will conduct regular coordination meetings involving all IAs and relevant stakeholders including provincial and district environmental agency and other sectoral agencies. A Project Management Consultant (PMC) will support the CPMU and consolidate the environmental monitoring reports to the steering committees and ADB.

111. **Project Implementing Unit (PIU).** The Sulawesi III River Basin Organization (S3RBO) under DGWR is the PIU for the construction of Paneki RWSS. The Project Management and Construction Supervision Consultant will be appointed to assist S3RBO in the monitoring of environmental safeguard compliance under this subproject, and in the reporting to the CPMU. At the post-construction stage, the S3RBO will be responsible for operation and maintenance of the subproject including implementation of the EMP.

112. The contractor to be appointed will report on EMP implementation (both mitigation and monitoring) including its compliance with the requirements of the EMP at pre-construction and construction phase of the Paneki RWSS. The report should be completed with supporting documents (e.g., photo, inspection checklist, minutes of meeting, etc., as relevant) and submitted on semi-annual basis for review by the IA and subsequent endorsement by the EA prior to submission and clearance by ADB for disclosure at ADB's website.

### B. Capacity Building and Training

113. The contractor, through its certified/competent HSE officer, will supervise implementation of the subproject's construction environmental management plan (CEMP). The CEMP will need to be site- and project specific commensurate with the Paneki RWSS and developed based on the environmental management plan (EMP) defined in Tables 9 and 10. The HSE officer will conduct inductions on the CEMP to the worker and public.

114. Supported by related medical practitioners and government authorities, the contractor is responsible for mitigating the infection risk due to global COVID-19 pandemic. The contractor will also communicate and disseminate information to the community in the closest settlement to the work location regarding the schedule and duration of activities, especially activities that have potential safety risks to the public.

### **C. Environmental Mitigation Measures**

115. Table 9 presents the proposed environmental mitigation measures to be implemented by the contractor and other related parties during the subproject implementation based on the impact and risk of the Paneki RWSS assessed in Section 6 of this IEE.

**Table 9. Environmental Mitigation Measures**

Source of Impact	Anticipated Impact	Mitigation Measures	Location	Responsibility
<b>Pre-construction Phase</b>				
Field survey & Land acquisition	Multiple community perception	<ul style="list-style-type: none"> <li>Carry out data collection related to the area of land affected by subproject activities.</li> <li>Ensure that land acquisition activities are carried out based on applicable regulations.</li> </ul>	Pombeweand Loru Villages, Sigi District	S3RBO
<b>Construction Phase</b>				
Material excavation/ transportation and heavy equipment operation	Changes in geological structure (due to excavation from the quarry and at subproject site)	<ul style="list-style-type: none"> <li>Optimize the demand for construction materials based on the subproject's actual needs.</li> <li>Source the construction materials only from the licensed typed-C quarries.</li> </ul>	Quarry and subproject areas	Contractor
Basecamp and weir construction	Changes in land use and topography	<ul style="list-style-type: none"> <li>Conduct final shaping and replanting for ground/slope stabilization at areas where the earthworks and construction have been completed.</li> </ul>	Basecamp and subproject areas	Contractor
Accidental spills of oil, fuel and other chemicals from basecamp operation, onsite maintenance and construction activities	Soil and water contamination	<ul style="list-style-type: none"> <li>Store oil, fuel, and chemicals considered hazardous substance in bonded areas with waterproof floors, weatherproof roofs, and restricted access</li> <li>Carry out re-fueling, maintenance, washing and repair of construction equipment and vehicles at public gas station and workshops.</li> <li>Maintain the construction of machinery in good operating conditions and any leaks will be repaired immediately.</li> <li>Provide adequate spill response equipment.</li> <li>Conduct immediate clean-up for soils contaminated by oil, fuel and other hazardous substances, and then temporarily store this soil at dedicated drums prior to disposal by licensed contractors.</li> </ul>	Basecamp and subproject areas	Contractor
Earthwork and construction activities	Soil erosion and changes in river water quality	<ul style="list-style-type: none"> <li>Minimize land clearing as far as possible.</li> <li>Conduct construction works for the riverbank protection in seasons while</li> </ul>	Subproject areas	Contractor

Source of Impact	Anticipated Impact	Mitigation Measures	Location	Responsibility
		<p>the Paneki river is in low-flow conditions.</p> <ul style="list-style-type: none"> <li>• Separate topsoil from other subsoil horizons for future reuse in replanting the disturbed areas.</li> <li>• Reuse the remaining excavated materials for refilling.</li> <li>• Install sediment traps at the inlet and outlet locations to prevent sediment from entering waterways and rivers.</li> <li>• Develop a dedicated material stockpile to prevent runoff carrying this material from entering Paneki river.</li> <li>• Do not place material and waste rock stockpiles within 50 m of any watercourses, in flood-prone areas, and other ecologically sensitive locations.</li> <li>• Collect and treat wastewater associated with mixing and placing of concrete (including washing water) at settling ponds.</li> <li>• Create a drainage channel at the construction site connected to settling ponds</li> <li>• Develop the basecamp area in a safe location equipped with drainage and wastewater treatment facilities.</li> </ul>		
Generation of construction debris and household-typed wastes	Reduced environmental sanitation	<ul style="list-style-type: none"> <li>• Provide suitable temporary waste storage containers.</li> <li>• Implement waste reuse or recycle as much as possible.</li> <li>• Dispose the waste that cannot be reused or recycled to approved landfill location operated by the Sigi and/or Palu governments.</li> <li>• It is prohibited to burn waste at or near the site</li> <li>• Apply special treatment must be taken to demolish/dismantle the pipe to avoid the generation of asbestos dust; adequate ground cover should be provided.</li> <li>• Remove/dispose significant residual material and waste upon completion of the construction activity.</li> <li>• Provide the subproject basecamp with adequate water supply and sanitation facilities, and maintain it in good sanitation standard.</li> </ul>	Basecamp and subprojectareas	Contractor
Mobilization of heavy equipment and	Reduced ambient air quality	<ul style="list-style-type: none"> <li>• Conduct watering activities on a dry ground surface on regular basis.</li> <li>• Impose speed restriction of 20 km/h for the subproject's vehicles travelling</li> </ul>	Basecamp and subprojectareas	Contractor

Source of Impact	Anticipated Impact	Mitigation Measures	Location	Responsibility
<p>construction vehicles/materials</p> <p>Operation of rock crusher and concrete mixer</p>		<p>within the subproject areas.</p> <ul style="list-style-type: none"> <li>• Provide adequate cover for the subproject's vehicles transporting materials.</li> <li>• Operate trucks and engine exhaust systems in good operating conditions (e.g., those less than 10-years old).</li> <li>• Put construction equipment as far as possible from residential areas.</li> <li>• Use prefabricated structures as much as possible.</li> </ul>		
<p>Mobilization of heavy equipment and construction vehicles/materials</p> <p>Operation of rock crusher and concrete mixer</p>	Increased noise level	<ul style="list-style-type: none"> <li>• Conduct construction activities during day-time period only.</li> <li>• Place and operate equipment and construction activities generating elevated noise levels as far as possible from human settlements.</li> <li>• Conduct dissemination on the subproject schedule to the closest community to the subproject area.</li> </ul>	Basecamp and subprojectareas	Contractor
<p>Earthwork/land clearing activities</p> <p>Accidental tree felling</p> <p>Animal poaching</p>	Disturbance to flora and fauna/ biodiversity	<ul style="list-style-type: none"> <li>• Establish a co-operation between S3RBO and the management unit (<i>Unit Pelaksana Teknis Daerah or UPTD</i>) of Palu Grand Forest Park under the Government of Central Sulawesi Province to provide: <ul style="list-style-type: none"> <li>– induction/awareness session on flora and fauna conservation as well as precautions that must be complied by the contractor including its construction workforce when working near the Palu Grand Forest Park; and</li> <li>– forest ranger patrol to minimize encroachment, illegal logging, and poaching of fauna at the grand forest park.</li> </ul> </li> <li>• Prohibit logging of trees that do not need to be felled.</li> <li>• Prohibit workers from hunting fauna, and penalty will be imposed on workers who hunt fauna at or near the subproject site.</li> <li>• Conduct selective land clearing at subproject areas immediately needed for construction activities.</li> <li>• Conduct revegetation of the subproject's basecamp area if no longer use using local species.</li> </ul>	Basecamp and subprojectareas	S3RBO UPTD of Palu Grand Forest Park Contractor

Source of Impact	Anticipated Impact	Mitigation Measures	Location	Responsibility
Recruitment of construction workers  Construction activities	Employment and business opportunities	<ul style="list-style-type: none"> <li>Conduct public consultation to disclose the subproject's information and disseminate the business and employment opportunities that may arise.</li> <li>Select the location of subproject's basecamp acceptable by the local community</li> <li>Prioritizing local workers and suppliers to supply labor and material needs provided that they meet the subproject's specification.</li> </ul>	Basecamp and subproject areas	Contractor
Interaction between local and non-local workers	Socio-cultural resource impacts	<ul style="list-style-type: none"> <li>Select the location of subproject's basecamp acceptable by the local community.</li> <li>Prioritizing local workers to supply labor needs provided that they meet the subproject's specification.</li> <li>Conduct regular engagement and communication with the local community.</li> </ul>	Basecamp and subproject areas	Contractor
The use of machines, tools, and heavy equipment in the construction activities.	Occupational and public health and safety risks that may have the potential for injuries and fatalities	<p><i>Occupational Health and Safety</i></p> <ul style="list-style-type: none"> <li>Establish a safe working environment at the subproject area through development and implementation a construction environmental management plan (CEMP), incorporating health and safety measures to mitigate risk to workers and the public.</li> <li>Appoint a trained/certified HSE officer to supervise implementation of the CEMP.</li> <li>Provide workers with induction and/or trainings on occupational health and safety during construction, especially in relation to the use of potentially hazardous equipment, handling, and disposal of hazardous materials including asbestos pipes, and use of personal protective equipment (PPE).</li> <li>Provide appropriate PPE, including ear protection, hard hats, dust masks, and safety boots.</li> <li>Provide adequate first aid facilities.</li> <li>Provide appropriate fire extinguishers.</li> <li>Maintain all equipment under safe operating conditions.</li> <li>Properly secure loose material piles such as pipes.</li> <li>Restrict access to certain subproject sites such as material and fuel storage.</li> </ul>	Basecamp and subproject areas  Existing settlements within the proximity of subproject area	Contractor



Source of Impact	Anticipated Impact	Mitigation Measures	Location	Responsibility
		<ul style="list-style-type: none"> <li>Installadequate signage and clear warning and hazard signs at subproject areas</li> </ul> <p><i>Public Health and Safety</i></p> <ul style="list-style-type: none"> <li>Provide information through formal and informal means to the public about the risks when approaching the subproject area.</li> <li>Installadequate signage and clear warning and hazard signs at subproject areas</li> </ul>		
Global COVID-19/Coronavirus pandemic	COVID-19/ Coronavirus infection risks	<p><i>COVID-19 mitigation</i></p> <ul style="list-style-type: none"> <li>Conduct induction, daily talk, and post clear signage at the subproject site to create awareness of Coronavirus infection and maintain discipline in applying the following norms i.e., social distancing, wearing mask, and washing hand regularly at the subproject site and other public places.</li> <li>conduct a risk assessment of Coronavirus infection and define relevant mitigation measures for the subproject; the risk assessment can be conducted in parallel when developing the CEMP;</li> <li>conduct Coronavirus testing using the methodology defined by prevailing laws and regulations applied for the subproject; and the result of this testing must be properly recorded and reported to relevant authorities.</li> </ul>	Basecamp and subproject areas Existing settlements within the proximity of subproject area	Contractor
<b>Operation and Maintenance Phase</b>				
Weir and pipeline Operation and maintenance	Changes in water surface quality	<ul style="list-style-type: none"> <li>To check, maintain and clean regularly the silt trap at the Paneki Intake.</li> <li>Sediment / silt from the silt trap is brought out from the site by a 3rd party which working together for further management.</li> <li>Check the pipes for corrosion conditions and make repairs to the pipes with Installed “sacrificial anode” in every 12 m and replaced in every 6 months</li> </ul>	Weir and Pipeline of Paneki	S3RBO UPTD

#### **D. Monitoring Requirements**

116. Table 10 presents the proposed environmental monitoring to be conducted by the contractor and other related parties during the subproject implementation based on the impact and risk, and mitigation measures of the Paneki RWSS presented in Sections 6 and 7 of this IEE. Environmental monitoring should be conducted to assess the effectiveness of mitigation measures implemented during the subproject implementation. The environmental monitoring includes analysis/measurement of ambient air quality, noise, and surface water quality samples will be carried out using the laboratory accredited by the Indonesian Accreditation Committee (*Komisi Akreditasi iNasional*).

**Table 10. Environmental Monitoring Requirements**

Source of Impact	Anticipated Impact	Monitoring Plan	Monitoring Frequency	Monitoring Location	Responsibility
<b>Pre-construction Phase</b>					
Field survey & Land acquisition/ compensation	Multiple community perception	Report the progress of LARP implementation including land acquisition/compensation.	Monthly	Pombeweand Loru Villages, Sigi District	S3RBO Government of Sigi Regency
<b>Construction Phase</b>					
Material excavation/ transportation and heavy equipment operation	Changes in geological structure (due to excavation from the quarry and at project site)	Obtain the valid copy of the license of the quarry and other permits as required by the government.	Prior to purchasing materials from the quarry	Quarry and subproject area	Contractor
Basecamp and weir construction	Changes in land use and topography	Report the progress of final shaping and replanting in subproject areas using form, checklist, photo, and clear criteria (as relevant).	Weekly	Basecamp and subproject area	Contractor
Accidental spills of oil, fuel and other chemicals from basecamp operation, and onsite maintenance and construction activities	Soil and water contamination	<p>Conduct scheduled inspection and report the corresponding results using form, checklist, photo, and clear criteria (as relevant) for the following activities:</p> <ul style="list-style-type: none"> <li>• Storage of oil, fuel, and chemicals considered hazardous substance in bonded areas with waterproof floors, weatherproof roofs, and restricted access</li> <li>• Re-fueling, maintenance, washing and repair of construction equipment and vehicles at public gas station and workshops.</li> <li>• Maintenance of construction of machinery in good operating conditions and any leaks will be</li> </ul>	Weekly	Basecamp and subproject area	Contractor

Source of Impact	Anticipated Impact	Monitoring Plan	Monitoring Frequency	Monitoring Location	Responsibility
		<p>repaired immediately.</p> <ul style="list-style-type: none"> <li>Condition of spill response equipment.</li> <li>Clean-up activities conducted for soils contaminated by oil, fuel and other hazardous substances, and their storage and disposal.</li> </ul>			
Earthwork and construction activities	Soil erosion and changes in river water quality	<p>Conduct scheduled inspection and report the corresponding results using form, checklist, photo, and clear criteria (as relevant) for the following activities:</p> <ul style="list-style-type: none"> <li>Minimization of land clearing as far as possible.</li> <li>Conduct construction works for the riverbank protection in seasons while the Paneki river is in low-flow conditions.</li> <li>Separation of topsoil from other subsoil horizons.</li> <li>Reuse of the remaining excavated materials for refilling.</li> <li>Installation of sediment traps at the inlet and outlet of waterways.</li> <li>A dedicated material stockpile location.</li> <li>Material and waste rock stockpiles within 50 m of any watercourses and away from ecologically sensitive locations.</li> <li>Collection and treatment of wastewater associated with concrete mixing.</li> <li>Existence of drainage channel and settling ponds at the subproject area.</li> <li>Develop the basecamp area in a safe location equipped with drainage and wastewater treatment facilities.</li> </ul> <p>Conduct regular sampling of Paneki river water and analyze the samples for the parameters and</p>	<p>Daily for activities related to construction</p> <p>Water sampling and analysis:</p> <ul style="list-style-type: none"> <li>once prior to construction</li> <li>quarterly during construction</li> </ul> <p>once during commissioning/operation</p>	<p>Subproject area</p> <p>Water sampling is conducted at:</p> <ul style="list-style-type: none"> <li>upstream of the intake location</li> <li>downstream of the intake near the existing settlements</li> </ul> <p>one location within the pipeline alignment</p>	Contractor

Source of Impact	Anticipated Impact	Monitoring Plan	Monitoring Frequency	Monitoring Location	Responsibility
		standards required by GR No. 82/2001: <ul style="list-style-type: none"> <li>Physical parameters: pH, temperature, TDS, TSS, conductivity, and turbidity</li> <li>Chemical parameters: pH, BOD, COD, DO, total phosphor, nitrate, ammonia, nitrate, iron, lead, zinc, sulphate.</li> </ul>			
Generation of construction debris and household-typed wastes	Reduced environmental sanitation	Conduct scheduled inspection and report the corresponding results using form, checklist, photo, and clear criteria (as relevant) for the following activities: <ul style="list-style-type: none"> <li>Provision of suitable temporary waste storage containers.</li> <li>Waste reuse or recycle</li> <li>Regular disposal of wastes that cannot be reused or recycled to approved landfill location operated by the Sigi and/or Palu governments.</li> <li>Prohibition on waste burning</li> <li>Special treatment to demolish/dismantle the pipe to avoid the generation of asbestos dust; adequate ground cover should be provided.</li> <li>Removal and disposal of significant residual of construction materials and wastes</li> </ul> Provision of adequate water supply and sanitation facilities, and maintenance of the basecamp.	Weekly	Basecamp and subproject areas	Contractor
Mobilization of heavy equipment and construction vehicles/materials  Operation of rock crusher and concrete	Reduced ambient air quality	Conduct scheduled inspection and report the corresponding results using form, checklist, photo, and clear criteria (as relevant) for the following activities: <ul style="list-style-type: none"> <li>Regular watering activities during dusty conditions</li> <li>Implementation of speed restriction of 20 km/h for</li> </ul>	Weekly for activities related to construction  Ambient air quality monitoring:	Ambient air quality monitoring is conducted at: subproject area (Paneki Weir and Paneki WTP), inspection road,	Contractor

Source of Impact	Anticipated Impact	Monitoring Plan	Monitoring Frequency	Monitoring Location	Responsibility
mixer		<p>the project's vehicles travelling within the subproject areas.</p> <ul style="list-style-type: none"> <li>• Provision of adequate cover for the project's vehicles transporting materials.</li> <li>• Maintenance record for truck and construction vehicle engines(e.g., the truck and construction vehicles are less than 10-years old).</li> <li>• Location of construction equipment from residential areas.</li> <li>• Use of prefabricated structures.</li> </ul> <p>Conduct regular sampling of ambient air quality and analyze the samples for the parameters (i.e., SO<sub>2</sub>, NO<sub>2</sub>, CO, HC, TSP) and standards required by GR No. 41/1999:</p> <ul style="list-style-type: none"> <li>• Physical parameters: pH, temperature, TDS, TSS, conductivity, and turbidity.</li> <li>• Chemical parameters: pH, BOD, COD, DO, total phosphor, nitrate, ammonia, nitrate, iron, lead, zinc, sulphate.</li> </ul>	<ul style="list-style-type: none"> <li>• Once prior to construction</li> <li>• Quarterly during construction</li> <li>• Once during commissioning/operation</li> </ul>	and Existing settlements within the proximity of subproject area	
<p>Mobilization of heavy equipment and construction vehicles/materials</p> <p>Operation of rock crusher and concrete mixer</p>	Increased noise level	<p>Conduct scheduled inspection and report the corresponding results using form, checklist, photo, and clear criteria (as relevant) for the following activities:</p> <ul style="list-style-type: none"> <li>• Compliance with the schedule of construction activities during day-time period only.</li> <li>• Equipment and construction activities generating elevated noise levels is located as far as possible from human settlements.</li> <li>• Dissemination on the subproject schedule to the closest community is conducted.</li> </ul>	<p>Weekly for activities related to construction</p> <p>Monitoring of noise level:</p> <ul style="list-style-type: none"> <li>• Once prior to construction</li> <li>• Quarterly during construction</li> <li>• Once during commissioning/o</li> </ul>	Monitoring of noise level is conducted at: subproject area (Paneki Weir and Paneki WTP), inspection road, and Existing settlements within the proximity of subproject area	Contractor

Source of Impact	Anticipated Impact	Monitoring Plan	Monitoring Frequency	Monitoring Location	Responsibility
			peration		
<p>Earthwork/land clearing activities</p> <p>Accidental tree felling</p> <p>Animal poaching</p>	Disturbance to flora and fauna/ biodiversity	<p>Conduct scheduled inspection and document the inspection results using form, checklist, and clear criteria (as relevant) for the following activities:</p> <ul style="list-style-type: none"> <li>• Establishment of a co-operation between S3RBO and the management unit (<i>Unit Pelaksana Teknis Daerah or UPTD</i>) of Palu Grand Forest Park under the Government of Central Sulawesi Province to provide: <ul style="list-style-type: none"> <li>– induction/awareness session on flora and fauna conservation as well as precautions that must be complied by the contractor including its construction workforce when working near the Palu Grand Forest Park; and</li> <li>– forest ranger patrol to minimize encroachment, illegal logging, and poaching of fauna at the grand forest park.</li> </ul> </li> <li>• Prohibition of tree logging, fauna hunting and poaching is enforced.</li> <li>• Penalty/sanction is imposed on workers conducting fauna hunting and poaching.</li> <li>• Selective land clearing is conducted</li> <li>• Revegetation of the subproject's basecamp area if conducted.</li> </ul>	Monthly	Basecamp and subproject areas near the Grand Forest Park	<p>S3RBO</p> <p>UPTD Poboya-Paneki/Palu Grand Forest Park</p> <p>Contractor</p>
<p>Recruitment of construction workers</p> <p>Construction activities</p>	Employment and business opportunities	<ul style="list-style-type: none"> <li>• Report on the public consultation conducted by the subproject during pre- and construction phases.</li> <li>• Report on the local workers and suppliers selected to supply labor and material needs.</li> </ul>	Monthly	Basecamp and subproject areas	Contractor
Interaction between local and non-local	Socio-cultural resource impacts	<ul style="list-style-type: none"> <li>• Selection process of the location of subproject's basecamp acceptable by the local community is</li> </ul>	Monthly	Basecamp and subproject areas	Contractor

Source of Impact	Anticipated Impact	Monitoring Plan	Monitoring Frequency	Monitoring Location	Responsibility
workers		<p>documented</p> <ul style="list-style-type: none"> <li>• Report on local workers recruited.</li> <li>• Minutes of meeting on regular engagement and communication with the local community.</li> </ul>			
The use of machines, tools, and heavy equipment in the construction activities.	Occupational and public health and safety risks that may have the potential for injuries and fatalities	<p><i>Occupational Health and Safety</i></p> <p>Ensure that a construction environmental management plan (CEMP) is developed and consistently implemented.</p> <p>Report implementation of the CEMP including relevant EHS indicators and the following:</p> <ul style="list-style-type: none"> <li>• Appointment of a trained/certified HSE officer of the contractor is reported.</li> <li>• Provision of CEMP induction and/or trainings in relation to the use of potentially hazardous equipment, handling, and disposal of hazardous materials including asbestos pipes, and use of personal protective equipment (PPE).</li> <li>• Provision and use of appropriate PPE.</li> <li>• Provision of adequate first aid facilities.</li> <li>• Provision of appropriate fire extinguishers.</li> <li>• Maintenance of all equipment under safe operating conditions.</li> <li>• Secured storage of loose material piles such as pipes.</li> <li>• Implementation of restricted access to certain subproject sites such as material and fuel storage.</li> <li>• Installation of adequate signage and clear warning and hazard signs</li> </ul>	Monthly	<p>Basecamp and subproject areas</p> <p>Existing settlements within the proximity of subproject area</p>	Contractor



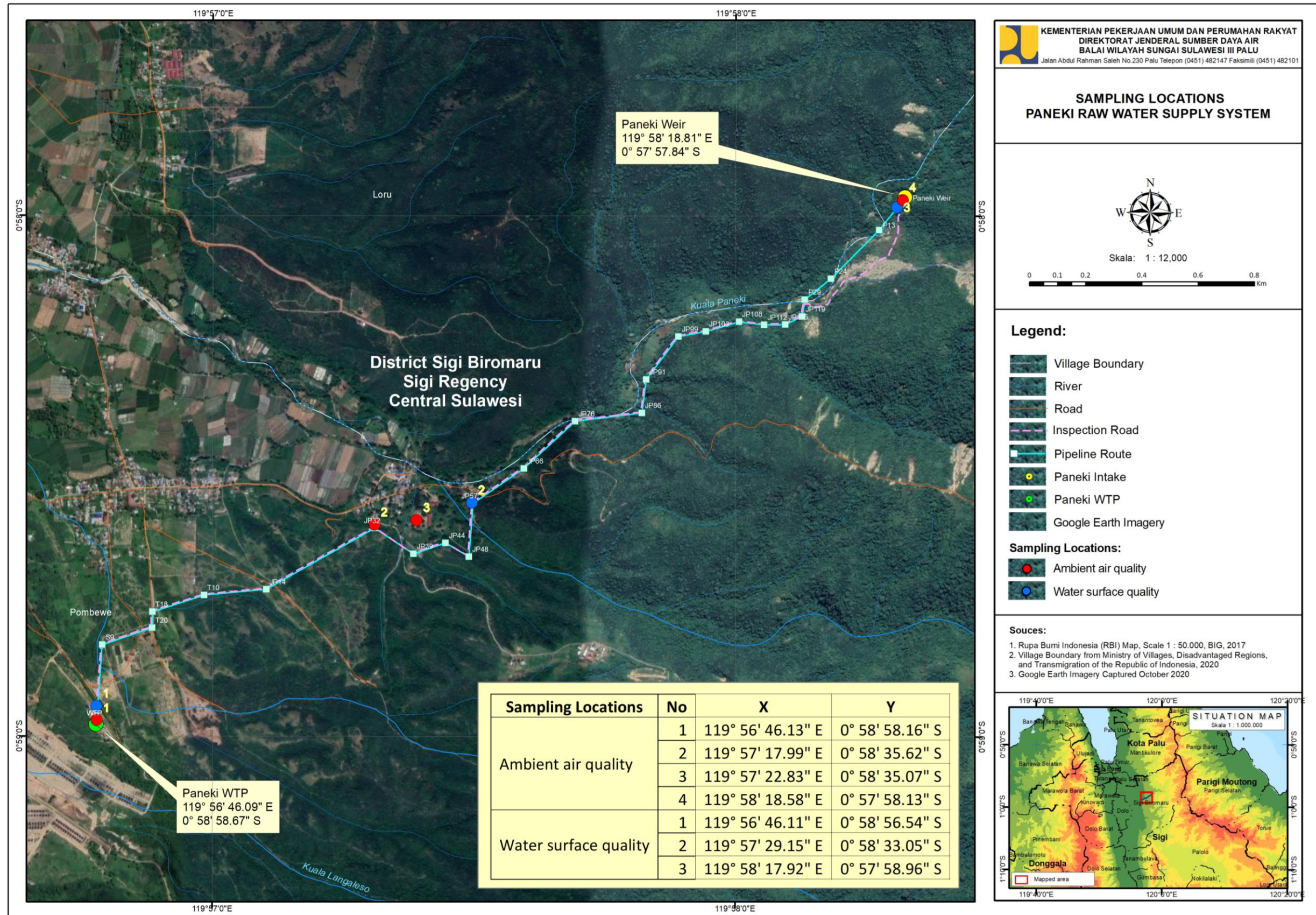
Source of Impact	Anticipated Impact	Monitoring Plan	Monitoring Frequency	Monitoring Location	Responsibility
		<p><i>Public Health and Safety</i></p> <ul style="list-style-type: none"> <li>Dissemination of information through formal and informal means to the public about the risk of construction activities.</li> <li>Installation of adequate signage and clear warning and hazard signs.</li> </ul>			
Global COVID-19/ Coronavirus pandemic	Coronavirus infection risks	<p>Monitor implementation of COVID-19 mitigation protocol, including:</p> <ul style="list-style-type: none"> <li>Provision of induction, daily talk, and post clear signage at the subproject site to create awareness of Coronavirus infection and maintain social distancing, wearing mask, and washing hand regularly at the subproject site and other public places.</li> <li>Existence of risk assessment results of Coronavirus infection and relevant mitigation measures defined for the subproject.</li> <li>Requirement to conduct Coronavirus testing for construction workers and suppliers using the methodology defined by prevailing laws and regulations applied for the subproject; and the result of this testing must be properly recorded and reported to relevant authorities.</li> </ul>	Monthly	<p>Basecamp and subproject areas</p> <p>Existing settlements within the proximity of subproject area</p>	Contractor The Health Agency of Sigi District
Operation and Monitoring Phase					
weir and pipeline operation and maintenance	change in surface water quality	<p>Conduct regular sampling of Paneki river water and analyze the samples for the parameters and standards required by GR No. 82/2001:</p> <ul style="list-style-type: none"> <li>Physical parameters: pH, temperature, TDS, TSS, conductivity, and turbidity</li> <li>Chemical parameters: pH, BOD, COD, DO, total phosphor, nitrate, ammonia, nitrate,</li> </ul>	6 month	<p>Weir Paneki</p> <p>Water sampling is conducted at:</p> <ul style="list-style-type: none"> <li>upstream of the intake location</li> <li>downstream of</li> </ul>	S3RBO

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Source of Impact	Anticipated Impact	Monitoring Plan	Monitoring Frequency	Monitoring Location	Responsibility
		iron, lead, zinc, sulphate		the intake • conducted at the pipeline alignment	



Figure 15. Location Map for Environment Monitoring Plan





## E. Emergency Response and Preparedness

117. Emergency response - In the event of a disaster causing major damage to the pipeline, an emergency response team with equipment will be required so that the water supply can be restored within two days. The likely composition of the team and required equipment/material are shown below.

- a. Personnel: 1 welder Level II or III certified, 1 driver, 1 crane operator.
- b. Equipment: 1 unit mobile crane, 1 unit welding equipment, 1 unit manual crane.
- c. Material such as, but not limited to, replacement pipes, length depending on the damaged section.

118. S3RBO could establish a shortlist/ registration of local contractors having the required personnel and equipment to be deployed on short notice following established emergency procedures. In addition, S3RBO could establish an emergency stock of, among others, GIPpipes (200 m minimum) and welding material. In addition S3RBO could also procure welding equipment as a back-up in case local contractors do not have the required welding equipment at the time a major disaster occurs.

## F. Reporting

119. The contractor to be appointed for the Paneki RWSS will report on EMP implementation (both mitigation and monitoring) including its compliance at pre-construction and construction stages. The monitoring report should be completed with supporting documents (e.g., photo, inspection checklist, minutes of meeting, etc., as relevant) and submitted on semi-annual basis (i.e., January to June and July to December periods) for review by the IA and subsequent endorsement by the EA. The monitoring report will be then submitted to ADB for clearance and disclosure at ADB's website.

## G. Estimated Cost for EMP Implementation

120. The implementation cost of the EMP is the cost for monitoring requirements periodically during the pre-construction, construction and operational stages. The main costs related to the implementation of the EMP that must be covered are costs for measuring air quality, noise, surface water quality and coronavirus testing which carried out before construction activities begin, during construction activities and after construction activities. Monitoring reports are prepared in every 6 months / 1 semesters to be submitted to ADB.

**Table 11. Estimated Costs for Environmental Monitoring**

No	Description	Unit	Quantity	time	Rate (Rp)	Total Amount (Rp)
1	Personnel					
	Environmental Specialist (team leader)	person	1	1	10.000.000	10.000.000
	Environmental Assistant	person	6	1	8.000.000	48.000.000
2	Sampling					
	Air Quality and Noise Quality	Sample	4	3	950.000	11.400.000
	Water Quality	Sample	4	3	850.000	10.200.000
	Coronavirus testing/PPE	set	100	2	900.000	183.600.000
3	Reporting					
	Report preparation					5.000.000
	Subtotal					268.200.000

## XI. CONCLUSIONS AND RECOMMENDATIONS

121. **Conclusions.** The described process in this document has assessed the environmental impact of all elements of the water supply sub-project improvement in the Paneki area. All potential impacts have been identified at the pre-construction, construction and operation stages. Activities that cause impact are based on the results of the Paneki Clean Water Supply System DED study 2020.

122. Although there are no activity components in the Paneki community forest, however, the implementation of construction work and the presence of workers and vehicles have the potential to disturb the Paneki community forest ecosystem. Mitigation of emerging impacts has been recommended to prevent negative impacts that occur.

123. During the construction stage, mainly impacts that occur are changes in geology structure, changes in land use & topography, soil and water contamination, changes in river hydrology & water quality, reduced environmental sanitation, reduced ambient air quality, Increased noise level, disturbance to flora & fauna / biodiversity, employment & business opportunities, socio-cultural resource impact, occupational and public health & safety and COVID-19 risks. Preventive measures to minimize impact have been recommended while at the operation stage the possible impact is changes of water surface quality due to weir and pipeline operation and maintenance.

124. Public consultation activities carried out during the subproject design to ensure that stakeholders are involved during IEE preparation. The steps for reporting the information are planned in order to ensure that the affected communities are facilitated by all inputs during all stages of subproject implementation.

125. The grievance redress mechanism of this subproject will provide a platform for communities to submit their grievances, and explain both informal and formal submission mechanisms, period of implementation, and mechanisms for resolving complaints about environmental performance.

126. The EMP will assist the contractor in reducing the impact of environmental risks, and guide the contractor in implementing the proposed project in an environmentally sound manner.

127. A copy of the approved EMP must be kept at the project site during the construction period. The EMP must bind all contractors, and will form part of the contract clause. Non-compliance with, or any deviation from, the requirements set forth in this document constitutes as failure to comply with environmental performance.

128. This project will benefit the general public by contributing to the long-term improvement of the clean water supply system and community livelihoods in the Pombewe resettlement area the adjacent Pombewe and Loru villages, Central Sulawesi.

129. Therefore, under ADB's SPS, the project is classified as environmental category B and does not require further environmental impact assessment.

130. **Recommendations.** This IEE should be updated during the construction phase by the contractor to reflect any changes, amendments and will be reviewed and approved by the PMU.

**APPENDIX A :**

**The ADB's environmental screening and categorization for environment**

**Palu EARR - Subproject Environmental Screening**  
**Subproject Name: Paneki Raw Water Supply System (“Paneki RWSS”)**

The following form and checklist should be completed with the required information to support the environmental screening and categorization of subprojects.

<b>Location:</b>	XX Sub-district in Sigi Regency, Central Sulawesi
<b>Name of person/organization preparing this environmental screening:</b>	Sulawesi III River Basin Organization (S3RBO) in Palu (assisted by the ADB’s consultant)
<b>Job title:</b>	-
<b>Date:</b>	1 October 2020

**Summary of Project Description**

The S3RBO in Palu proposes the construction of Paneki RWSS, as a subproject of the EARR to supply raw water from Paneki river to a water treatment plant (WTP) in Pombewe permanent resident (known as Huntap Pombewe). The construction will consist of weir and intake that has a width of 12 m and height of 1.5 m, and a single 4.4-km galvanized iron pipe of 250-mm diameter. The intake and pipeline are designed to supply a raw water flow of 25 liters per second using gravitational system. The construction of the WTP, ground reservoir, and clean water distribution systems at Huntap Pombewe are not funded by ADB.

The Paneki RWSS is in the proximity of Poboya-Paneki Grand Forest Park (also known as Tahura Palu), Sigi Regency, approximately 10 - 15 km east of Palu City. This grand forest park is classified as flora and fauna conservation as well as recreational area according to the Ministry of Forestry Decree No. 24/1999 (dated 29 January 1999). It is managed by a forest management unit of the Central Sulawesi Province based on the Governor Decree No. 05/2009. Further, the grand forest park is part of the Tokalekaju montane forest recognized key biodiversity area in Central Sulawesi according to the Integrated Biodiversity Assessment Tool (2020). It was reported in 2015 that approximately 150 – 200 ha of the Palu Grand Forest Park was encroached illegal gold mining activities. Some disturbance to flora habitat and availability of clean water were also reported.

Key environmental impacts during the construction phase of the Paneki RWSS are likely to be interim increases in air pollutants, noise level, and suspended solids in Paneki river; encroachment and fauna hunting due to improved access to the Poboya-Paneki grand forest park; limited, local business employment and opportunities; and health risk due to COVID-19 pandemic. These environmental impacts are anticipated to be limited within the project’s footprint and short-term during the 6-month construction period of the subproject, expected to start in January 2021. These impacts can be mitigated using mitigation measures and applying monitoring requirements typically applied for common construction activities that will be defined in the EMP. Of particular importance to the implementation of EMP is the collaboration between the contractor, S3RBO, and the management unit of Poboya-Paneki Grand Forest Park to mitigate biodiversity impacts on this conservation area that may be directly or indirectly resulted from the construction and operation of Paneki RWSS.

Considering this project description, the Paneki RWSS is considered as Category B subproject for environment and therefore, an IEE/EMP will need to be prepared by S3RBO and submitted for clearance and meeting the requirement of ADB’s no objection letter.

**Part 1:** The subproject environmental screening is to be conducted according to the Indonesian Environmental Law No. 32/2009 on Environmental Protection and Management and its implementing regulations.

Check (√) the appropriate type of the environmental document required for the subproject.

	AMDAL (Indonesian version of EIA)
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√	UKL-UPL (Indonesian environmental management and monitoring plan) prepared and Environmental Permit No. 09/DPM-PTSP-SIGI/2020 (dated 27 August 2020) has granted by the Government of Sigi Regency.
	SPPL (Commitment letter to conduct environmental management and monitoring)

Is the subproject screening confirmed by the provincial or district environmental agency (DLH)?

No	(Indicate likely date of the subproject screening to be completed by DLH)
<b>Yes</b>	Based on the advisory letter No. 660/971/Bid.I/DISLH (dated 8 July 2019) issued by the Environmental Agency of Central Sulawesi Province.

**Part 2:** The subproject environmental screening is determined based on the information presented in the rapid environmental assessment (REA) checklist (see Table 1). In addition, the preliminary Climate Risk Screening form should be completed (see Table 2).

Check (√) the appropriate type of ADB's environmental categorization and environmental document required for the subproject.

	Category A subproject	Environmental Impact Assessment (EIA)
√	Category B subproject	IEE/EMP based on the information provided in Tables 1 and 2.
	Category C subproject	Due Diligence Report or Environmental Management System

**Table 1: Rapid Environment Assessment Checklist – Paneki RWSS**

Screening Questions	Yes	No	Remarks
<b>A. Project Siting</b>			
Is the project area adjacent to or within any of the following areas?			
▪ Densely populated?		√	The Paneki RWSS (the subproject) is in a rural agricultural area which is sparsely populated.
▪ Heavy with development activities?		√	No heavy development was observed in the subproject area dominated by agricultural land and forest/conservation area
▪ Adjacent to or within any environmentally sensitive, protected areas?	√		The subproject area is within the proximity of Poboya-Paneki grand forest park (Tahura Palu) which is part of Tokalekaju montane forest, recognized as key biodiversity area. This grand forest park is also intended for recreational purposes.
▪ Buffer zone of protected area?	√		The closest distance between the subproject site, i.e., Paneki raw water intake with the boundary of the grand forest park is roughly 40 meters.
▪ Special area for protecting biodiversity?	√		The subproject site is bordering with the Poboya-Paneki Grand Forest Park.
▪ Wetland		√	There are no wetlands recognized as ecologically important within the subproject site.



Screening Questions	Yes	No	Remarks
▪ Mangrove		√	The subproject site is located within the upper reach of the Paneki river system, and therefore no mangrove ecosystem is known in the area
▪ Bay or estuarine area?		√	The subproject site is located within the upper reach of the Paneki river system, and therefore far from the Palu bay.
▪ Cultural heritage sites?		√	There are no cultural heritage sites known or reported in the subproject area to date.
<b>B. Potential Environmental Impacts</b>			
Will the subproject cause the following?			
▪ pollution of raw water supply from upstream wastewater discharge from communities, industries, agriculture, and soil erosion runoff		√	The upstream part of the Paneki's raw water intake is the Poboya-Paneki grand forest park. Therefore, the water quality of this river is reported as meeting the standard stipulated in Government Regulation No. 82/2001.
▪ impairment of historical/cultural monuments/ areas and loss/damage to these sites?		√	There are no cultural heritage sites known or reported in the subproject area to date. Therefore, impairment of historical, cultural sites is unlikely.
▪ hazard of land subsidence caused by excessive ground water pumping?		√	There is no groundwater pumping required as part of the subproject.
▪ social conflicts arising from displacement of communities?		√	No displacement of communities is required as part of the subproject and therefore, social conflicts are not anticipated.
▪ conflicts in abstraction of raw water for water supply with other beneficial water uses for surface and ground waters?		√	The Paneki river is used for irrigation and to be used for raw water supply. The FS indicates that the water flow required for the subproject is unlikely to reduce the water flow required for irrigation. If low water flow condition is encountered, the raw water supply system will be ceased for the interim period.
▪ unsatisfactory raw water supply (e.g. excessive pathogens or mineral constituents)?		√	The upstream part of the Paneki's raw water intake is the Poboya-Paneki grand forest park. Therefore, the water quality of this river is reported as meeting the standard stipulated in Government Regulation No. 82/2001.
▪ delivery of unsafe water to distribution system?		√	The raw water supplied will be treated at a water treatment plant (to be constructed) at the Huntap Pombewe.
▪ inadequate protection of intake works or wells, leading to pollution of water supply?		√	The upstream part of the Paneki's raw water intake is the Poboya-Paneki grand forest park. Therefore, the water quality of this river is reported as meeting the standard stipulated in Government Regulation No. 82/2001.
▪ over pumping of ground water, leading to salinization and ground subsidence?		√	No groundwater pumping is required as part of the Paneki RWSS and therefore, this question is irrelevant.
▪ excessive algal growth in storage reservoir?		√	The subproject will not include the construction of water storage reservoir and therefore, this question is irrelevant.
▪ increase in production of sewage beyond capabilities of community facilities?		√	This question is irrelevant with the subproject.
▪ inadequate disposal of sludge from water treatment plants		√	The subproject will not include the construction of WTP and therefore, this question is irrelevant.
▪ inadequate buffer zone around pumping and treatment plants to alleviate noise and		√	The subproject will not include the construction of WTP and pumping, and therefore, this question is irrelevant.

Screening Questions	Yes	No	Remarks
other possible nuisances and protect facilities?			
<ul style="list-style-type: none"> <li>impairments associated with transmission lines and access roads?</li> </ul>		√	As part of construction of the subproject, access road will be improved and constructed. Therefore, no impairment is expected.
<ul style="list-style-type: none"> <li>health hazards arising from inadequate design of facilities for receiving, storing, and handling of chlorine and other hazardous chemicals?</li> </ul>	√		The subproject will use hydrocarbon materials and some chemicals and therefore, associated health hazards exist.
<ul style="list-style-type: none"> <li>health &amp; safety hazards to workers from handling and management of chlorine used for disinfection, other contaminants, and biological and physical hazards during project construction and operation?</li> </ul>	√		The subproject will use hydrocarbon materials and some chemicals and therefore, associated health hazards exist.
<ul style="list-style-type: none"> <li>noise and dust from construction activities?</li> </ul>	√		Increases in noise and dust level is anticipated from the construction activities, but this will be remote and not intense.
<ul style="list-style-type: none"> <li>disproportionate impacts on the poor, women and children, Indigenous People or other vulnerable groups?</li> </ul>		√	The subproject will not require displacement of physical and non-physical assets and therefore, is not anticipated to cause disproportionate impacts to the project's stakeholder.
<ul style="list-style-type: none"> <li>increased road traffic due to interference of construction activities?</li> </ul>		√	The subproject will increase road traffic, particularly during the construction period.
<ul style="list-style-type: none"> <li>dislocation or involuntary resettlement of people?</li> </ul>		√	The subproject will not require displacement of physical and non-physical assets and therefore, is not anticipated to cause disproportionate impacts to the project's stakeholder.
<ul style="list-style-type: none"> <li>continuing soil erosion/silt runoff from construction &amp; operations?</li> </ul>	√		The construction of the subproject is anticipated to cause some level of erosion.
<ul style="list-style-type: none"> <li>delivery of unsafe water due to poor Operation &amp; Maintenance treatment processes (especially mud accumulations in filters) and inadequate chlorination due to lack of adequate monitoring of chlorine residuals in distribution systems?</li> </ul>	√		This issue is anticipated in the operation and maintenance.
<ul style="list-style-type: none"> <li>delivery of water to distribution system, which is corrosive due to inadequate attention to feeding of corrective chemicals?</li> </ul>		√	The Paneki RWSS does not include chemical treatment and therefore, this question is irrelevant.
<ul style="list-style-type: none"> <li>accidental leakage of chlorine gas?</li> </ul>		√	No chlorine gas will be used in the subproject as it related to construction of the raw water supply system.
<ul style="list-style-type: none"> <li>excessive abstraction of water affecting downstream water users?</li> </ul>		√	The Paneki river is used for irrigation and to be used for raw water supply. The FS indicates that the water flow required for the subproject is unlikely to reduce the water flow required for irrigation. If low water flow condition is encountered, the raw water supply system will be ceased for the interim period.
<ul style="list-style-type: none"> <li>competing uses of water?</li> </ul>		√	The Paneki river is used for irrigation and to be used for raw water supply. The FS indicates that the water flow required for the subproject is unlikely to reduce the water flow required for irrigation. If low water flow condition is encountered, the raw water supply system will be ceased for the interim period.
<ul style="list-style-type: none"> <li>increased sewage flow due to increased water supply</li> </ul>		√	The subproject relates to raw water supply from the intake to the water treatment plant only, and no water supply directly to the community.

Screening Questions	Yes	No	Remarks
<ul style="list-style-type: none"> <li>▪ increased volume of sullage (wastewater from cooking and washing) and sludge from wastewater treatment plant</li> </ul>		√	The subproject is not expected to cause waterborne diseases as the source of the water for the subproject is from the upper reach of the Paneki River within the proximity of the Poboya-Paneki Grand Forest Park, where the population density is low.
<ul style="list-style-type: none"> <li>▪ large population influx during project construction and operation that causes increased burden on social infrastructure and services (such as water supply and sanitation systems)?</li> </ul>		√	The subproject is not expected to cause large population influx as the total number of workforce required may be around 100 people, and majority of this may be primarily from within the subproject area of Paneki, Sigi and/or Donggala.
<ul style="list-style-type: none"> <li>▪ social conflicts if workers from other regions or countries are hired?</li> </ul>		√	The workforce will be mobilized primarily from within the area of the irrigation system (to be rehabilitated), and therefore the subproject is not anticipated to cause social conflicts.
<ul style="list-style-type: none"> <li>▪ risks to community health and safety due to the transport, storage, and use and/or disposal of materials such as explosives, fuel and other chemicals during construction and operation?</li> </ul>		√	Refueling of gasoline for light vehicles and equipment used to support the subproject activities will be conducted at the fuel station to minimize risk to community health and safety.
<ul style="list-style-type: none"> <li>▪ community safety risks due to both accidental and natural hazards, especially where the structural elements or components of the project (e.g., irrigation dams) are accessible to members of the affected community or where their failure could result in injury to the community throughout project construction, operation and decommissioning?</li> </ul>	√		The subproject is in disaster prone area experiencing devastated natural disasters in September 2018 and therefore, inherently expose community safety risk.

**Table 2: Preliminary Climate Risk Screening – Paneki RWSS**

Screening Questions		Score	Remarks
<b>Location and design of project</b>	Is siting and/or routing of the project (or its components) likely to be affected by climate conditions including extreme weather-related events such as floods, droughts, storms, landslides?	1	The siting of Paneki RWSS (the subproject) including raw water intake and pipeline is likely to be affected by flood, drought, and landslides.
	Would the project design (e.g. the clearance for bridges) need to consider any hydro-meteorological parameters (e.g., sea-level, peak river flow, reliable water level, peak wind speed etc.)?	2	The subproject will consider water abstraction from Paneki river to maintain the hydrological balance required for other water users and the overall river system.
<b>Materials and maintenance</b>	Would weather, current and likely future climate conditions (e.g. prevailing humidity level, temperature contrast between hot summer days and cold winter days, exposure to wind and humidity hydro-meteorological parameters likely affect the selection of project inputs over the life of project outputs (e.g. construction material)?	2	The subproject will consider water abstraction from Paneki river to maintain the hydrological balance required for other water users and the overall river system between dry and rainy period.
	Would weather, current and likely future climate conditions, and related extreme events likely affect the maintenance (scheduling and cost) of project output(s)?	1	Current weather conditions and likely future climate conditions will affect maintenance cost of the subproject.
<b>Performance of project outputs</b>	Would weather/climate conditions and related extreme events likely affect the performance (e.g. annual power production) of project output(s) (e.g. hydro-power generation facilities) throughout their design lifetime?	1	During the operations, weather/ climate conditions will affect the project performance in term of raw water supply availability.
<b>Total score</b>		<b>7</b>	

Options for answers and corresponding score are provided below:

Response	Score
Not Likely	0
Likely	1
Very Likely	2

Responses when added that provide a score of 0 will be considered low risk project. If adding all responses will result to a score of 1 - 4 and that no score of 2 was given to any single response, the project will be assigned a medium risk category. A total score of 5 or more (which include providing a score of 1 in all responses) or a 2 in any single response will be categorized as high-risk project.

Result of screening (Low, Medium, High): **High-risk project.**

Other comments: None.

APPENDIX B

Environmental Permit



**PEMERINTAH KABUPATEN SIGI  
DINAS PENANAMAN MODAL DAN PELAYANAN  
TERPADU SATU PINTU**

*Jl. Trans Palu-Palolo Kompleks Perkantoran Desa Bora Kecamatan Sigi Biromaru  
E - Mail : dpmptsp@sigikab.go.id*

**KEPUTUSAN BUPATI SIGI**

**Nomor : 09/ DPM- P TSP - 616/2020**

**TENTANG**

**IZIN LINGKUNGAN RENCANA KEGIATAN PEMBANGUNAN INTAKE DAN  
JARINGAN PIPA TRANSMISI AIR BAKU PANEKI KABUPATEN SIGI**

**BUPATI SIGI,**

- Menimbang : a. bahwa berdasarkan Pasal 2 Peraturan Pemerintah Nomor 27 Tahun 2012 tentang Izin Lingkungan, setiap usaha dan/atau kegiatan yang wajib memiliki Amdal atau UKL-UPL wajib memiliki Izin Lingkungan;
- b. bahwa Rencana Kegiatan Pembangunan Intake dan Jaringan Pipa Transmisi Air Baku Paneki Di Kabupaten Sigi merupakan kegiatan yang wajib memiliki Izin Lingkungan;
- c. bahwa berdasarkan pertimbangan sebagaimana dimaksud dalam huruf a dan huruf b, perlu menetapkan Keputusan Bupati Sigi tentang Izin Lingkungan Rencana Kegiatan Pembangunan Intake dan Jaringan Pipa Transmisi Air baku Paneki Di Kabupaten Sigi.
- Mengingat : 1. Undang-Undang Nomor 27 Tahun 2008 tentang Pembentukan Kabupaten Sigi di Provinsi Sulawesi Tengah (Lembaran Negara Republik Indonesia Tahun 2008 Nomor 100, Tambahan Lembaran Negara Republik Indonesia Nomor 4873);
2. Undang-Undang Nomor 32 Tahun 2009 tentang Perlindungan dan Pengelolaan Lingkungan Hidup (Lembaran Negara Republik Indonesia Tahun 2009 Nomor 140, Tambahan Lembaran Negara Republik Indonesia Nomor 5059);
3. Undang-Undang Nomor 23 Tahun 2014 tentang Pemerintahan Daerah (Lembaran Negara Republik Indonesia Tahun 2014 Nomor 244, Tambahan Lembaran Negara Republik Indonesia Nomor 5587) sebagaimana telah diubah dengan Undang-Undang Nomor 9 Tahun 2015 tentang Perubahan Kedua atas Undang-Undang Nomor 23 Tahun 2014 tentang Pemerintahan Daerah (Lembaran Negara Republik Indonesia Tahun 2015 Nomor 58, Tambahan Lembaran Negara Republik Indonesia Nomor 5679);
4. Peraturan Pemerintah Nomor 27 Tahun 2012 tentang Izin Lingkungan (Lembaran Negara Republik Indonesia Tahun 2012 Nomor 48, Tambahan Lembaran Negara Republik Indonesia Nomor 5285);
5. Peraturan Menteri Lingkungan Hidup Nomor 16 Tahun



- 2012 tentang Pedoman penyusunan dokumen lingkungan hidup
6. Peraturan Menteri Lingkungan Hidup Nomor 8 Tahun 2013 tentang Tata Laksana Penilaian dan Pemeriksaan Dokumen Lingkungan Hidup serta Penerbitan Izin Lingkungan;
  7. Peraturan Menteri Lingkungan Hidup dan Kehutanan Nomor P.38/MENLHK/SETJEN/KUM.1/7/2019 Tahun 2019 tentang Jenis rencana usaha dan/atau kegiatan yang wajib memiliki analisis mengenai dampak lingkungan hidup.
  8. Peraturan Daerah Kabupaten Sigi Nomor 3 Tahun 2010 tentang Urusan Pemerintahan Kabupaten Sigi (Lembaran Daerah Kabupaten Sigi Tahun 2010 Nomor 3, Tambahan Lembaran Daerah Kabupaten Sigi Nomor 3);
  9. Peraturan Daerah Kabupaten Sigi Nomor 17 Tahun 2014 tentang Perlindungan dan Pengelolaan Lingkungan Hidup Kabupaten Sigi (Lembaran Daerah Kabupaten Sigi Tahun 2014 Nomor 17, Tambahan Lembaran Daerah Kabupaten Sigi Nomor 85);
  10. Peraturan Bupati Sigi Nomor 12 Tahun 2018 tentang Perubahan Atas Peraturan Bupati Nomor 6 Tahun 2017 tentang Pendelegasian Kewenangan Bupati Kepada Dinas yang Menyelenggarakan Urusan Bidang Perizinan dan Non Perizinan.

- Memperhatikan :
1. Surat Dinas Pekerjaan Umum Dan Perumahan Kabupaten Sigi Nomor 600/06.197/DPUP/2020 Tanggal 24 Juni 2020 Perihal Pertimbangan Teknis Kesesuaian Tata Ruang.
  2. Surat Dinas Lingkungan Hidup Kabupaten Sigi Nomor 431.660/667/PPLH/DLH Tanggal 12 Agustus 2020 Perihal Pertimbangan teknis.
  3. Berita Acara Verifikasi Dokumen UKL – UPL Dinas lingkungan Hidup Kabupaten Sigi nomor 800.807/1619/PPLH/DLH Tanggal 15 Juli 2020.

**MEMUTUSKAN :**

Menetapkan : **KEPUTUSAN BUPATI SIGI TENTANG IZIN LINGKUNGAN RENCANA KEGIATAN PEMBANGUNAN INTAKE DAN JARINGAN PIPA TRANSMISI AIR BAKU PANEKI KABUPATEN SIGI**

KESATU : Memberikan Izin Lingkungan Rencana Kegiatan Pembangunan Intake dan Jaringan Pipa Transmisi Air Baku Paneki Di Kabupaten Sigi Kepada :

- a. Nama Instansi : Balai Wilayah Sungai Sulawesi III.
- b. Bidang Usaha : Pemerintahan
- c. Penanggungjawab : Feriyanto Pawenrusi, ST.,MT  
Kegiatan
- d. Jabatan : Kepala Balai Wilayah Sungai Sulawesi III.

- e. Alamat : Jl. A.R Saleh No. 230 Palu.
- f. Lokasi Kegiatan : Desa Pombewe, Desa Mpanau, Desa Lolu dan Desa Loru.
- g. Deskripsi Kegiatan : Rencana Kegiatan Pembangunan Intake dan Jaringan Pipa Transmisi Air Baku Paneki.

- KEDUA : Ruang lingkup Kegiatan dalam Izin Lingkungan ini mencakup kegiatan yang tercantum dalam Dokumen Upaya Pengelolaan Lingkungan Hidup dan Upaya Pemantauan Lingkungan Hidup (UKL-UPL) Rencana Kegiatan Pembangunan Intake dan Jaringan Pipa Transmisi Air Baku Paneki Kabupaten Sigi Provinsi Sulawesi Tengah;
- KETIGA : Penanggungjawab Kegiatan dalam melaksanakan kegiatannya harus memenuhi persyaratan dan wajib memiliki izin usaha dan/atau izin lainnya yang terkait dengan izinnya;
- KEEMPAT : Penanggungjawab, dalam melaksanakan kegiatannya harus memenuhi kewajiban Upaya Pengelolaan Lingkungan Hidup dan Upaya Pemantauan Lingkungan Hidup sebagaimana tercantum dalam Lampiran yang merupakan bagian tidak terpisahkan dari Keputusan Bupati sigi ini;
- KELIMA : Selain kewajiban sebagaimana dimaksud pada Diktum KEEMPAT, Penanggungjawab, dalam melaksanakan kegiatannya juga harus memenuhi hal sebagai berikut :
  - a. melakukan sosialisasi kegiatan kepada Pemerintah Daerah dan tokoh masyarakat setempat sebelum kegiatan dilakukan;
  - b. mendokumentasikan seluruh kegiatan pengelolaan lingkungan yang dilakukan terkait dengan kegiatan tersebut;
  - c. menyampaikan hasil pelaksanaan ketentuan dalam izin lingkungan setelah selesainya pelaksanaan kegiatan ini, terhitung sejak tanggal ditetapkannya Keputusan ini, kepada Dinas Penanaman Modal dan Pelayanan Terpadu Satu Pintu Kabupaten Sigi u.p Kepala Dinas Lingkungan Hidup Kabupaten Sigi.
- KEENAM : Penerbitan izin sebagaimana dimaksud dalam Diktum KETIGA wajib mencantumkan segala persyaratan dan kewajiban yang tercantum dalam Diktum KELIMA;
- KETUJUH : Penanggungjawab usaha dan/atau kegiatan wajib mengajukan permohonan perubahan izin lingkungan apabila terjadi perubahan atas rencana usaha dan/atau kegiatannya sesuai dengan kriteria perubahan yang tercantum dalam Pasal 50 Peraturan Pemerintah Nomor 27 Tahun 2012 tentang Izin Lingkungan;



- KEDELAPAN : Menyampaikan laporan pelaksanaan persyaratan dan kewajiban sebagaimana dimaksud dalam Diktum KEEMPAT dan Diktum KELIMA, setiap 6 (enam) bulan sekali sejak Keputusan ini ditetapkan Bupati Sigi u.p Kepala Dinas Lingkungan Hidup Kabupaten Sigi;
- KESEMBILAN : Apabila dalam penetapan keputusan ini terdapat kekeliruan dan kesalahan, akan dilakukan perbaikan sebagaimana mestinya;
- KESEPULUH : Keputusan Bupati ini mulai berlaku pada tanggal ditetapkan.

DITETAPKAN DI : SIGI BIROMARU  
PADA TANGGAL : 27 Agustus 2020

a.n **BUPATI SIGI**  
**KEPALA DINAS PENANAMAN MODAL DAN**  
**PELAYANAN TERPADU SATU PINTU**  
**KABUPATEN SIGI**



**HERU MURTANTO, S. Pd**  
NIP. 19671211 199103 1 010

Tembusan disampaikan Kepada Yth:

- Bupati Sigi (sebagai laporan) di Dolo;
- Dinas Lingkungan Hidup Kabupaten Sigi di Bora;
- Dinas Pekerjaan Umum dan Perumahan Kabupaten Sigi di Kalukubula;
- Camat Sigi Biromaru.

**Tabel 3. 1** Matriks Upaya Pengelolaan dan Pemantauan Lingkungan Hidup

SUMBER DAMPAK	JENIS DAMPAK	BESARAN DAMPAK	UPAYA PENGELOLAAN LINGKUNGAN HIDUP			UPAYA PEMANTAUAN LINGKUNGAN HIDUP			INSTITUSI PENGELOLA DAN PEMANTAUAN LINGKUNGAN HIDUP
			BENTUK UPAYA PENGELOLAAN LINGKUNGAN HIDUP	LOKASI PENGELOLAAN LINGKUNGAN HIDUP	PERIODE PENGELOLAAN LINGKUNGAN HIDUP	BENTUK UPAYA PEMANTAUAN LINGKUNGAN HIDUP	LOKASI PEMANTAUAN LINGKUNGAN HIDUP	PERIODE PEMANTAUAN LINGKUNGAN HIDUP	
<b>TAHAP PRA KONSTRUKSI</b>									
Survei lapangan	Persepsi negatif masyarakat terhadap rencana kegiatan	Dampak timbulnya persepsi negatif masyarakat merupakan dampak dari kurangnya informasi atau kejelasan tentang lokasi atau posisi pembangunan Intake dan Jaringan Pipa Transmisi Air Baku Paneki Kabupaten Sigi	<ul style="list-style-type: none"> <li>Melakukan kegiatan sosialisasi dan konsultasi publik untuk menjangkau aspirasi warga dan menyampaikan informasi tentang kegiatan kepada masyarakat terkena dampak sebelum melakukan survei lapangan</li> <li>Memberikan informasi yang jelas kepada masyarakat, tokoh masyarakat, pemuka agama dan masyarakat lainnya tentang rencana kegiatan pembangunan Intake dan Jaringan Pipa Transmisi Air Baku Paneki Kabupaten Sigi</li> <li>Menyelesaikan konflik secara musyawarah dengan melibatkan para tokoh agama, tokoh masyarakat, kepala desa,</li> </ul>	Desa Pombewe, Desa Mpanau, Desa Lolu, Desa Loru	Pengelolaan lingkungan dilakukan selama kegiatan survei dan penetapan lokasi pembangunan system pasokan air baku paneki	<b>Metode Pengumpulan dan Analisis Data :</b> <ul style="list-style-type: none"> <li>Memantau terjadinya keresahan masyarakat, konflik sosial dan gangguan keamanan dan ketertiban</li> <li>Melakukan <i>Focus Group Discussion</i> (FGD) pada masing-masing desa yang berpotensi konflik dan dilanjutkan dengan analisis deskriptif</li> </ul>	Desa Pombewe, Desa Mpanau, Desa Lolu, Desa Loru	Pemantauan lingkungan dilakukan selama kegiatan survei dan penetapan lokasi pembangunan system pasokan air baku paneki	<b>Pengelola :</b> Kementerian Pekerjaan Umum (Balai Wilayah Sungai Sulawesi III)  <b>Pengawas :</b> <ul style="list-style-type: none"> <li>Dinas Lingkungan Hidup Kabupaten Sigi</li> <li>Camat Sigi Biromaru</li> <li>Desa Pombewe</li> <li>Desa Mpanau</li> <li>Desa Lolu</li> <li>Desa Loru</li> </ul> <b>Pelaporan :</b> Dinas Lingkungan

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			kelurahan serta kecamatan.						Hidup Kabupaten Sigi
Pengadaan lahan	Kecemburuan sosial untuk mendapatkan bantuan pembangunan infrastruktur air bersih	<ul style="list-style-type: none"> <li>Tidak adanya keluhan dan protes yang dilakukan oleh masyarakat</li> <li>Masyarakat menerima ganti rugi sesuai dengan kesepakatan</li> </ul>	<ul style="list-style-type: none"> <li>Mempercepat proses studi LARAP (<i>Land Acquisition and Resettlement Action Plan</i>) untuk mengetahui secara pasti pemilik dan luasan lahan yang akan dibangun intake dan jaringan pipa air baku</li> <li>Jika terjadi konflik akan diselesaikan secara musyawarah dengan melibatkan para tokoh agama, tokoh masyarakat, kepala desa, kelurahan serta kecamatan.</li> </ul>	Desa Pombewe, Desa Mpanau, Desa Lolu, Desa Loru	Pengelolaan lingkungan dilakukan selama kegiatan pengadaan lahan pembangunan system pasokan air baku paneki	<p><b>Metode Pengumpulan dan Analisis Data :</b></p> <ul style="list-style-type: none"> <li>Memantau terjadinya keresahan masyarakat, konflik sosial dan gangguan keamanan dan ketertiban</li> </ul> <p>Melakukan <i>Focus Group Discussion</i> (FGD) pada masing-masing desa yang berpotensi konflik dan dilanjutkan dengan analisis deskriptif</p>	Desa Pombewe, Desa Mpanau, Desa Lolu, Desa Loru	Pemantauan lingkungan dilakukan selama kegiatan survei dan penetapan lokasi pembangunan system pasokan air baku paneki	<p><b>Pengelola :</b> Kementerian Pekerjaan Umum (Balai Wilayah Sungai Sulawesi III)</p> <p><b>Pengawas :</b></p> <ul style="list-style-type: none"> <li>Badan Pertanahan Nasional</li> <li>Dinas Lingkungan Hidup Kabupaten Sigi</li> <li>Camat Sigi Biromaru</li> <li>Desa Pombewe</li> <li>Desa Mpanau</li> <li>Desa Lolu</li> <li>Desa Loru</li> </ul> <p><b>Pelaporan :</b> Dinas Lingkungan</p>

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									Hidup Kabupaten Sigi
Perekrutan tenaga kerja konstruksi	Terbukanya kesempatan kerja	<ul style="list-style-type: none"> <li>Perbandingan jumlah tenaga kerja lokal yang diserap lebih banyak dibandingkan tenaga kerja dari luar dan berkurangnya persentase tingkat pengangguran</li> </ul>	<ul style="list-style-type: none"> <li>Sebelum perekrutan tenaga kerja dilakukan pengumuman melalui media masa</li> <li>Berkoordinasi dengan aparat setempat dalam rangka proses rekrutmen tenaga kerja</li> </ul>	Desa Pombewe, Desa Mpanau, Desa Lolu, Desa Loru	Selama kegiatan rekrutment tenaga kerja	Melakukan pendataan jumlah tenaga kerja dan membandingkan jumlah tenaga kerja lokal yang terserap dibandingkan dengan tenaga kerja dari luar daerah. Data yang didapat selanjutnya dianalisa secara deskriptif kualitatif	Desa Pombewe, Desa Mpanau, Desa Lolu, Desa Loru	Selama kegiatan rekrutment tenaga kerja	<p><b>Pengelola :</b> Kementerian Pekerjaan Umum (Balai Wilayah Sungai Sulawesi III)</p> <p><b>Pengawas :</b></p> <ul style="list-style-type: none"> <li>Dinas Tenaga Kerja dan Transmigrasi Kabupaten Sigi</li> <li>Dinas Lingkungan Hidup Kabupaten Sigi</li> <li>Camat Sigi Biromaru</li> <li>Desa Pombewe</li> <li>Desa Mpanau</li> <li>Desa Lolu</li> <li>Desa Loru</li> </ul> <p><b>Pelaporan :</b></p>

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	Peningkatan pendapatan masyarakat	Peningkatan pendapatan masyarakat	<ul style="list-style-type: none"> <li>Membayarkan upah sesuai dengan jadwal yang telah disepakati</li> <li>Membayarkan nilai upah kepada para tenaga kerja sesuai dengan nilai yang telah disepakati</li> <li>Berkoordinasi dengan aparat desa setempat dalam rangka proses rekrutment tenaga kerja</li> </ul>	Desa Pombewe, Desa Mpanau, Desa Lolu, Desa Loru	Selama kegiatan rekrutment tenaga kerja	Data dikumpulkan dengan cara <ul style="list-style-type: none"> <li>Observasi</li> <li>Wawancara dengan kuisioner</li> <li>Wawancara mendalam (<i>indept interview</i>)</li> </ul> Data yang didapat selanjutnya dianalisa secara deskriptif kualitatif	Desa Pombewe, Desa Mpanau, Desa Lolu, Desa Loru	Selama kegiatan rekrutment tenaga kerja	Dinas Lingkungan Hidup Kabupaten Sigi  <b>Pengelola :</b> Kementrian Pekerjaan Umum (Balai Wilayah Sungai Sulawesi III)  <b>Pengawas :</b> <ul style="list-style-type: none"> <li>Dinas Tenaga Kerja dan Transmigrasi Kabupaten Sigi</li> <li>Dinas Lingkungan Hidup Kabupaten Sigi</li> <li>Camat Sigi Biromaru</li> <li>Desa Pombewe</li> <li>Desa Mpanau</li> <li>Desa Lolu</li> <li>Desa Loru</li> </ul>

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									<b>Pelaporan :</b> Dinas Lingkungan Hidup Kabupaten Sigi
<b>TAHAP KONSTRUKSI</b>									
Pembangunan dan pengoperasian basecamp dan bengkel kerja	Penurunan kualitas udara	<p><b>Rona Awal :</b> <b>Rencana WTP</b> CO 53,11 µg/Nm<sup>3</sup> NO<sub>2</sub> 23,36 µg/Nm<sup>3</sup> SO<sub>2</sub> 42,58 µg/Nm<sup>3</sup> Pb 0,00 µg/Nm<sup>3</sup> Debu 10,93 µg/Nm<sup>3</sup></p> <p><b>Sekitar Pemukiman</b> CO 44,66 µg/Nm<sup>3</sup> NO<sub>2</sub> 18,35 µg/Nm<sup>3</sup> SO<sub>2</sub> 26,94 µg/Nm<sup>3</sup> Pb 0,00 µg/Nm<sup>3</sup> Debu 10,93 µg/Nm<sup>3</sup></p> <p>Kondisi kualitas udara tidak melebihi baku mutu kualitas udara berdasarkan PP No. 41 Tahun 1999. Parameter yang diacu baku mutunya adalah CO, NO<sub>2</sub>, SO<sub>2</sub>, Pb dan TSP (debu)</p>	<ul style="list-style-type: none"> <li>Semua kendaraan maupun peralatan yang digunakan dalam pembangunan dan pengoperasian basecamp dan bengkel kerja wajib menggunakan filter emisi</li> <li>Melakukan perawatan peralatan secara periodik agar tidak menghasilkan gas buang yang dapat menurunkan kualitas udara</li> <li>Membasahi jalan yang dilalui kendaraan mobilisasi alat dan material</li> </ul>	Pengelolaan lingkungan dilokasi pembangunan dan pengoperasian basecamp dan bengkel kerja	Pengelolaan lingkungan dilakukan selama kegiatan pembangunan dan pengoperasian basecamp dan bengkel kerja	Metode Pengumpulan dan Analisis Data <ul style="list-style-type: none"> <li>Mengetahui kondisi kualitas udara ambient</li> </ul> Metode Pemantauan Dilakukan dengan cara pengambilan sampel dilapangan menggunakan gas sampler kemudian dianalisa dilaboratorium	Pemantauan lingkungan dilokasi pembangunan dan pengoperasian basecamp dan bengkel kerja	Pemantauan lingkungan dilakukan 6 bulan sekali selama kegiatan pembangunan dan pengoperasian basecamp dan bengkel kerja	<p><b>Pengelola :</b> Kementerian Pekerjaan Umum (Balai Wilayah Sungai Sulawesi III)</p> <p><b>Pengawas :</b></p> <ul style="list-style-type: none"> <li>Dinas Lingkungan Hidup Kabupaten Sigi</li> <li>Dinas Kesehatan Kabupaten Sigi</li> <li>Camat Sigi Biromaru</li> <li>Desa Pombewe</li> <li>Desa Mpanau</li> <li>Desa Lolu</li> <li>Desa Loru</li> </ul>

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									<p><b>Pelaporan :</b> Dinas Lingkungan Hidup Kabupaten Sigi</p>
	Peningkatan kebisingan dan terjadinya kecelakaan kerja	<p><b>Rona Awal :</b> Pengukuran Tingkat kebisingan yang dilakukan di lokasi WTP dan sekitar pemukiman penduduk sebesar 46,3 – 54,2 dBA dan 56,7 – 57,2 dBA</p> <p>Kebisingan yang di ditimbulkan tidak melewati Baku Mutu kebisingan yang di atur pada KepMen LH No 48 Thn 1996</p>	<ul style="list-style-type: none"> <li>Tenaga kerja yang berhubung langsung dengan sumber bising menggunakan earplug</li> <li>Pengaturan jam kerja, yaitu pada jam 08.00 s/d 16.00 WITA</li> <li>Menerapkan sistem Kesehatan dan Keselamatan kerja bagi para pekerja</li> </ul>	Pengelolaan lingkungan dilokasi pembangunan dan pengoperasian basecamp dan bengkel kerja	Pengelolaan lingkungan dilakukan selama kegiatan pembangunan dan pengoperasian basecamp dan bengkel kerja	<ul style="list-style-type: none"> <li>Pengamatan dan pencatatan untuk mengetahui dan memastikan tenaga kerja yang berhubung langsung dengan sumber bising menggunakan earplug</li> <li>Pengamatan dan pencatatan untuk memastikan tenaga kerja bekerja sesuai jadwal yang ditentukan</li> <li>Pengukuran langsung tingkat kebisingan menggunakan alat <i>Sound Level Meter</i></li> </ul>	Pemantauan lingkungan dilokasi pembangunan dan pengoperasian basecamp dan bengkel kerja	Pemantauan lingkungan dilakukan 6 bulan sekali selama kegiatan pembangunan dan pengoperasian basecamp dan bengkel kerja	<p><b>Pengelola :</b> Kementrian Pekerjaan Umum (Balai Wilayah Sungai Sulawesi III)</p> <p><b>Pengawas :</b></p> <ul style="list-style-type: none"> <li>Dinas Lingkungan Hidup Kabupaten Sigi</li> <li>Dinas Kesehatan Kabupaten Sigi</li> <li>Camat Sigi Biromaru</li> <li>Desa Pombewe</li> <li>Desa Mpanau</li> <li>Desa Lolu</li> </ul>

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									<ul style="list-style-type: none"> <li>Desa Loru</li> </ul> <p><b>Pelaporan :</b> Dinas Lingkungan Hidup Kabupaten Sigi</p>
	Timbulan sampah	Tidak terdapat timbulan sampah yang berserakan disekitar lokasi kegiatan maupun yang terbuang ke badan sungai	Menyediakan 3 titik tempat pembuangan sampah yang nantinya akan diangkut kemudian dibuang ke tempat pembuangan akhir dan tidak membuang sampah sembarangan	Pengelolaan lingkungan dilokasi pembangunan dan pengoperasian basecamp dan bengkel kerja	Pengelolaan lingkungan dilakukan selama kegiatan pembangunan dan pengoperasian basecamp dan bengkel kerja	Pengamatan langsung terhadap timbulan sampah	Pemantauan lingkungan ketersedianya tempat sampah pembangunan dan pengoperasian basecamp dan bengkel kerja	Pemantauan lingkungan dilakukan 6 bulan sekali selama kegiatan pembangunan dan pengoperasian basecamp dan bengkel kerja	<p><b>Pengelola :</b> Kementerian Pekerjaan Umum (Balai Wilayah Sungai Sulawesi III)</p> <p><b>Pengawas :</b></p> <ul style="list-style-type: none"> <li>Dinas Lingkungan Hidup Kabupaten Sigi</li> <li>Camat Sigi Biromaru</li> <li>Desa Pombewe</li> <li>Desa Mpanau</li> <li>Desa Lolu</li> <li>Desa Loru</li> </ul> <p><b>Pelaporan :</b></p>



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									Dinas Lingkungan Hidup Kabupaten Sigi
	Penurunan kualitas air	<p>Rona awal untuk kualitas air dapat dilihat pada lampiran rona awal</p> <p>Kondisi kualitas air tidak melebihi baku mutu air yang digunakan berdasarkan PP RI No. 82 Tahun 2001 Kelas II</p>	<ul style="list-style-type: none"> <li>Menyediakan tempat pengolahan limbah cair sementara bagi tenaga kerja dilokasi kegiatan</li> <li>Menyediakan tempat penampungan sementara LB3</li> <li>Bekerja sama dengan transporter LB3 untuk pengambilan LB3 dari lokasi kegiatan</li> </ul>	Pengelolaan lingkungan dilokasi pembangunan dan pengoperasian basecamp dan bengkel kerja	Pengelolaan lingkungan dilakukan selama kegiatan pembangunan dan pengoperasian basecamp dan bengkel kerja	<ul style="list-style-type: none"> <li>Melakukan pengambilan sampel air pada badan air di sungai dengan menggunakan botol sampel dan selanjutnya dianalisa di laboratorium</li> <li>Menganalisa parameter air sesuai dengan Peraturan Pemerintah RI Nomor 82 Tahun 2001, tentang baku dan kriteria kerusakan lingkungan hidup, Lampiran I Bagian A Kriteria Mutu Air Berdasarkan Kelas Air</li> <li>Memantau ketersediaan tempat pengelolaan limbah domestik dan tempat</li> </ul>	Pemantauan lingkungan dilokasi pembangunan dan pengoperasian basecamp dan bengkel kerja	Pemantauan lingkungan dilakukan 6 bulan sekali selama kegiatan pembangunan dan pengoperasian basecamp dan bengkel kerja	<p><b>Pengelola :</b> Kementerian Pekerjaan Umum (Balai Wilayah Sungai Sulawesi III)</p> <p><b>Pengawas :</b></p> <ul style="list-style-type: none"> <li>Dinas Lingkungan Hidup Kabupaten Sigi</li> <li>Dinas Kesehatan Kabupaten Sigi</li> <li>Camat Sigi Biromaru</li> <li>Desa Pombewe</li> <li>Desa Mpanau</li> <li>Desa Lolu</li> <li>Desa Loru</li> </ul>

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			BENTUK UPAYA PENGELOLAAN LINGKUNGAN HIDUP	LOKASI PENGELOLAAN LINGKUNGAN HIDUP	PERIODE PENGELOLAAN LINGKUNGAN HIDUP	BENTUK UPAYA PEMANTAUAN LINGKUNGAN HIDUP	LOKASI PEMANTAUAN LINGKUNGAN HIDUP	PERIODE PEMANTAUAN LINGKUNGAN HIDUP	
						penyimpanan sementara LB3			<b>Pelaporan :</b> Dinas Lingkungan Hidup Kabupaten Sigi
Mobilisasi dan demobilisasi alat dan material	Gangguan Lalulintas dan Kesehatan Keselamatan Kerja	Kegiatan mobilisasi - demobilisasi peralatan dan material prakiraan besaran volume lalu lintas jalan di lokasi studi. Pada studi ini, diasumsikan akan terjadi peningkatan volume arus lalu lintas sebesar 30% dari kondisi tanpa adanya pembangunan jalan.	Berbagai upaya pengelolaan dampak kemacetan lalu lintas pada saat mobilisasi - demobilisasi peralatan dan material yang bersifat rekayasa prasarana jalan adalah sebagai berikut : <ul style="list-style-type: none"> <li>• Mengurangi pemanfaatan badan jalan dan bahu jalan untuk aktivitas non-transportasi</li> <li>• Menempatkan 2 orang petugas untuk mengatur Lalulintas pada jalan keluar masuk permukiman warga.</li> <li>• Melakukan koordinasi dengan instansi terkait</li> <li>• Memasang rambu rambu tanda bahaya pada kendaraan mobilisasi</li> <li>• Menutup bak pengangkut bahan dan</li> </ul>	Pengelolaan lingkungan di sepanjang ruas Jalan yang dilalui kendaraan mobilisasi dan demobilisasi alat dan material	Pengelolaan lingkungan dilakukan selama kegiatan mobilisasi - demobilisasi peralatan dan material	Pengamatan langsung system pengaturan lalulintas dan mengetahui tingkat gangguan transportasi	Pemantauan lingkungan di sepanjang ruas Jalan yang dilalui kendaraan mobilisasi dan demobilisasi alat dan material	Pemantauan lingkungan dilakukan 6 bulan sekali selama kegiatan mobilisasi - demobilisasi peralatan dan material	<b>Pengelola :</b> Kementrian Pekerjaan Umum (Balai Wilayah Sungai Sulawesi III)  <b>Pengawas :</b> <ul style="list-style-type: none"> <li>• Dinas Perhubungan Kabupaten Sigi</li> <li>• Dinas Lingkungan Hidup Kabupaten Sigi</li> <li>• Camat Sigi Biromaru</li> <li>• Desa Pombewe</li> <li>• Desa Mpanau</li> <li>• Desa Lolu</li> <li>• Desa Loru</li> </ul>

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			material menggunakan terpal <ul style="list-style-type: none"> <li>Menerapkan sistem Kesehatan dan Keselamatan kerja bagi para pekerja</li> </ul>						<b>Pelaporan :</b> Dinas Lingkungan Hidup Kabupaten Sigi
	Penurunan kualitas udara	<b>Rona Awal :</b> <b>Rencana WTP</b> CO 53,11 µg/Nm <sup>3</sup> NO <sub>2</sub> 23,36 µg/Nm <sup>3</sup> SO <sub>2</sub> 42,58 µg/Nm <sup>3</sup> Pb 0,00 µg/Nm <sup>3</sup> Debu 10,93 µg/Nm <sup>3</sup> <b>Sekitar Pemukiman</b> CO 44,66 µg/Nm <sup>3</sup> NO <sub>2</sub> 18,35 µg/Nm <sup>3</sup> SO <sub>2</sub> 26,94 µg/Nm <sup>3</sup> Pb 0,00 µg/Nm <sup>3</sup> Debu 10,93 µg/Nm <sup>3</sup>  Kondisi kualitas udara tidak melebihi baku mutu kualitas udara berdasarkan PP No. 41 Tahun 1999. Parameter yang diacu baku mutunya adalah CO, NO <sub>2</sub> , SO <sub>2</sub> , Pb dan TSP (debu)	<ul style="list-style-type: none"> <li>Semua kendaraan yang digunakan wajib menggunakan filter emisi</li> <li>Melakukan perawatan peralatan secara periodik agar tidak menghasilkan gas buang yang dapat menurunkan kualitas udara</li> <li>Kendaraan yang digunakan harus membatasi kecepatan kendaraan</li> <li>Membersihkan bak dan roda kendaraan angkutan bahan dan material, utamanya pada saat keluar dari lokasi tapak proyek</li> <li>Menyiram air untuk mengurangi timbulnya debu pada jalan yang dilalui kendaraan terutama di daerah</li> </ul>	Pengelolaan lingkungan di sepanjang ruas Jalan yang dilalui kendaraan mobilisasi dan demobilisasi alat dan material	Pengelolaan lingkungan dilakukan selama kegiatan mobilisasi - demobilisasi peralatan dan material	Metode Pengumpulan dan Analisis Data <ul style="list-style-type: none"> <li>Mengetahui kondisi kualitas udara ambient</li> </ul> Metode Pemantauan Dilakukan dengan cara pengambilan sampel dilapangan menggunakan gas sampler kemudian dianalisa dilaboratorium	Pemantauan lingkungan di sepanjang ruas Jalan yang dilalui kendaraan mobilisasi dan demobilisasi alat dan material	Pemantauan lingkungan dilakukan 6 bulan sekali selama kegiatan mobilisasi - demobilisasi peralatan dan material	<b>Pengelola :</b> Kementerian Pekerjaan Umum (Balai Wilayah Sungai Sulawesi III)  <b>Pengawas :</b> <ul style="list-style-type: none"> <li>Dinas Perhubungan Kabupaten Sigi</li> <li>Dinas Kesehatan Kabupaten Sigi</li> <li>Dinas Lingkungan Hidup Kabupaten Sigi</li> <li>Camat Sigi Biromaru</li> <li>Desa Pombewe</li> </ul>

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			sekitar pemukiman penduduk <ul style="list-style-type: none"> <li>• Menutup bak kendaraan pengangkut material dengan terpal</li> <li>• Memasang rambu rambu tanda bahaya pada kendaraan pengangkut</li> </ul>						<ul style="list-style-type: none"> <li>• Desa Mpanau</li> <li>• Desa Lolu</li> <li>• Desa Loru</li> </ul> <b>Pelaporan :</b> Dinas Lingkungan Hidup Kabupaten Sigi
	Peningkatan kebisingan	<b>Rona Awal :</b> Pengukuran Tingkat kebisingan yang dilakukan di lokasi WTP dan sekitar pemukiman penduduk sebesar 46,3 – 54,2 dBA dan 56,7 – 57,2 dBA Besaran Dampak : Terjadi peningkatan kebisingan sebesar dari unit peralatan yang digunakan	<ul style="list-style-type: none"> <li>• Kendaraan bermotor secara rutin dilakukan perawatan</li> <li>• Tenaga kerja yang berhubung langsung dengan sumber bising menggunakan earplug</li> <li>• Pengaturan jam kerja, yaitu pada jam 08.00 s/d 16.00 WITA</li> </ul>	Pengelolaan lingkungan di sepanjang ruas Jalan yang dilalui kendaraan mobilisasi dan demobilisasi alat dan material	Pengelolaan lingkungan dilakukan selama kegiatan mobilisasi - demobilisasi peralatan dan material	<ul style="list-style-type: none"> <li>• Melakukan pengecekan data perawatan kendaraan bermotor</li> <li>• Pengamatan dan pencatatan untuk mengetahui dan memastikan tenaga kerja yang berhubung langsung dengan sumber bising menggunakan earplug</li> <li>• Pengamatan dan pencatatan untuk memastikan tenaga kerja bekerja sesuai jadwal yang ditentukan</li> </ul>	Pemantauan lingkungan di sepanjang ruas Jalan yang dilalui kendaraan mobilisasi dan demobilisasi alat dan material	Pemantauan lingkungan dilakukan 6 bulan sekali selama kegiatan mobilisasi - demobilisasi peralatan dan material	<b>Pengelola :</b> Kementerian Pekerjaan Umum (Balai Wilayah Sungai Sulawesi III)  <b>Pengawas :</b> <ul style="list-style-type: none"> <li>• Dinas Lingkungan Hidup Kabupaten Sigi</li> <li>• Dinas Kesehatan Kabupaten Sigi</li> <li>• Camat Sigi Biromaru</li> <li>• Desa Pombewe</li> </ul>

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						<ul style="list-style-type: none"> <li>Pengukuran langsung tingkat kebisingan menggunakan alat <i>Sound Level Meter</i></li> </ul>			<ul style="list-style-type: none"> <li>Desa Mpanau</li> <li>Desa Lolu</li> <li>Desa Loru</li> </ul> <p><b>Pelaporan :</b> Dinas Lingkungan Hidup Kabupaten Sigi</p>
Pembangunan bendung dan intake	Penurunan kualitas udara	<p><b>Rona Awal :</b> <b>Rencana WTP</b> CO 53,11 µg/Nm<sup>3</sup> NO<sub>2</sub> 23,36 µg/Nm<sup>3</sup> SO<sub>2</sub> 42,58 µg/Nm<sup>3</sup> Pb 0,00 µg/Nm<sup>3</sup> Debu 10,93 µg/Nm<sup>3</sup></p> <p><b>Sekitar Pemukiman</b> CO 44,66 µg/Nm<sup>3</sup> NO<sub>2</sub> 18,35 µg/Nm<sup>3</sup> SO<sub>2</sub> 26,94 µg/Nm<sup>3</sup> Pb 0,00 µg/Nm<sup>3</sup> Debu 10,93 µg/Nm<sup>3</sup></p> <p>Kondisi kualitas udara tidak melebihi baku mutu kualitas udara berdasarkan PP No. 41 Tahun 1999. Parameter yang diacu baku</p>	<ul style="list-style-type: none"> <li>Menyiram air untuk mengurangi timbulnya debu pada jalan yang dilalui kendaraan terutama di daerah sekitar pemukiman penduduk</li> <li>Mengoptimalkan tumbuhan yang ada disekitar bangunan bendung (intake) sebagai buffer zone untuk menyerap debu dan gas emisi</li> </ul>	Disekitar lokasi pembangunan bendung dan intake	Pengelolaan lingkungan dilakukan selama tahap pembangunan bendung dan intake	<p>Metode Pengumpulan dan Analisis Data</p> <ul style="list-style-type: none"> <li>Mengetahui kondisi kualitas udara ambient</li> </ul> <p>Metode Pemantauan Dilakukan dengan cara pengambilan sampel dilapangan menggunakan gas sampler kemudian dianalisa dilaboratorium</p>	Disekitar lokasi pembangunan bendung dan intake	6 bulan sekali selama tahap kegiatan pembangunan bendung dan intake	<p><b>Pengelola :</b> Kementerian Pekerjaan Umum (Balai Wilayah Sungai Sulawesi III)</p> <p><b>Pengawas :</b></p> <ul style="list-style-type: none"> <li>Dinas Lingkungan Hidup Kabupaten Sigi</li> <li>Dinas Kesehatan Kabupaten Sigi</li> <li>Camat Sigi Biromaru</li> <li>Desa Pombewe</li> </ul>

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		mutunya adalah CO, NO <sub>2</sub> , SO <sub>2</sub> , Pb dan TSP (debu)							<ul style="list-style-type: none"> <li>Desa Mpanau</li> <li>Desa Lolu</li> <li>Desa Loru</li> </ul> <p><b>Pelaporan :</b> Dinas Lingkungan Hidup Kabupaten Sigi</p>
	Penurunan kualitas air	<p>Rona awal untuk kualitas air dapat dilihat pada lampiran rona awal</p> <p>Kondisi kualitas air tidak melebihi baku mutu air yang digunakan berdasarkan PP RI No. 82 Tahun 2001 Kelas II</p>	<ul style="list-style-type: none"> <li>Mengurangi intensitas pekerjaan Ketika puncak musim hujan</li> <li>Setiap kegiatan konstruksi diikuti dengan pembangunan saluran drainase untuk menampung dan mengalirkan limpasan air permukaan ke lokasi sedimen trap</li> <li>Mengendalikan erosi dan sedimentasi seminimal mungkin TSL dengan berbagai teknik konservasi tanah dan air</li> </ul>	Disekitar lokasi pembangunan bendung dan intake	Pengelolaan lingkungan dilakukan selama tahap pembangunan bendung dan intake	<ul style="list-style-type: none"> <li>Melakukan pengambilan sampel air pada badan air di sungai dengan menggunakan botol sampel dan selanjutnya dianalisa di laboratorium</li> <li>Menganalisa parameter air sesuai dengan Peraturan Pemerintah RI Nomor 82 Tahun 2001, tentang baku dan kriteria kerusakan lingkungan hidup, Lampiran I Bagian A Kriteria Mutu Air Berdasarkan Kelas Air</li> </ul>	Disekitar lokasi pembangunan bendung dan intake	6 bulan sekali selama tahap kegiatan pembangunan bendung dan intake	<p><b>Pengelola :</b> Kementerian Pekerjaan Umum (Balai Wilayah Sungai Sulawesi III)</p> <p><b>Pengawas :</b></p> <ul style="list-style-type: none"> <li>Dinas Lingkungan Hidup Kabupaten Sigi</li> <li>Dinas Kesehatan Kabupaten Sigi</li> <li>Camat Sigi Biromaru</li> <li>Desa Pombewe</li> </ul>



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									<ul style="list-style-type: none"> <li>Desa Mpanau</li> <li>Desa Lolu</li> <li>Desa Loru</li> </ul> <p><b>Pelaporan :</b> Dinas Lingkungan Hidup Kabupaten Sigi</p>
	Peningkatan kebisingan dan Kesehatan keselamatan kerja	<p><b>Rona Awal :</b> Pengukuran Tingkat kebisingan yang dilakukan di lokasi WTP dan sekitar pemukiman penduduk sebesar 46,3 – 54,2 dBA dan 56,7 – 57,2 dBA Besaran Dampak : Terjadi peningkatan kebisingan dari aktivitas pembangunan bendung dan intake</p>	<ul style="list-style-type: none"> <li>Pengaturan jam kerja, yaitu pada jam 08.00 s/d 16.00 WITA</li> <li>Mengoptimalkan tanaman disekitar lokasi konstruksi bendung (intake) sebagai buffer zone untuk mereduksi dampak gas emisi dan kebisingan yang ditimbulkan dari kegiatan konstruksi</li> <li>Tenaga kerja yang berhubung langsung dengan sumber bising menggunakan earplug</li> <li>Menerapkan sistem Kesehatan dan Keselamatan kerja bagi para pekerja</li> </ul>	Disekitar lokasi pembangunan bendung dan intake	Pengelolaan lingkungan dilakukan selama tahap pembangunan bendung dan intake	<ul style="list-style-type: none"> <li>Pengamatan dan pencatatan untuk mengetahui dan memastikan tenaga kerja yang berhubungan langsung dengan sumber bising menggunakan earplug</li> <li>Pengamatan dan pencatatan untuk memastikan tenaga kerja bekerja sesuai jadwal yang ditentukan</li> <li>Pengukuran langsung tingkat kebisingan menggunakan alat <i>Sound Level Meter</i></li> </ul>	Disekitar lokasi pembangunan bendung dan intake	6 bulan sekali selama tahap kegiatan pembangunan bendung dan intake	<p><b>Pengelola :</b> Kementerian Pekerjaan Umum (Balai Wilayah Sungai Sulawesi III)</p> <p><b>Pengawas :</b></p> <ul style="list-style-type: none"> <li>Dinas Lingkungan Hidup Kabupaten Sigi</li> <li>Dinas Kesehatan Kabupaten Sigi</li> <li>Camat Sigi Biromaru</li> <li>Desa Pombewe</li> </ul>

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									<ul style="list-style-type: none"> <li>Desa Mpanau</li> <li>Desa Lolu</li> <li>Desa Loru</li> </ul> <p><b>Pelaporan :</b> Dinas Lingkungan Hidup Kabupaten Sigi</p>
Pemasangan pipa transmisi dan jembatan pipa	Penurunan kualitas udara	<p><b>Rona Awal :</b> <b>Rencana WTP</b> CO 53,11 µg/Nm<sup>3</sup> NO<sub>2</sub> 23,36 µg/Nm<sup>3</sup> SO<sub>2</sub> 42,58 µg/Nm<sup>3</sup> Pb 0,00 µg/Nm<sup>3</sup> Debu 10,93 µg/Nm<sup>3</sup></p> <p><b>Sekitar Pemukiman</b> CO 44,66 µg/Nm<sup>3</sup> NO<sub>2</sub> 18,35 µg/Nm<sup>3</sup> SO<sub>2</sub> 26,94 µg/Nm<sup>3</sup> Pb 0,00 µg/Nm<sup>3</sup> Debu 10,93 µg/Nm<sup>3</sup></p> <p>Kondisi kualitas udara tidak melebihi baku mutu kualitas udara berdasarkan PP No. 41 Tahun 1999. Parameter yang diacu baku</p>	<ul style="list-style-type: none"> <li>Mengoptimalkan tumbuhan yang ada disekitar lokasi pemasangan pipa transmisi dan jembatan pipa sebagai buffer zone untuk menyerap debu dan gas emisi</li> </ul>	Disekitar lokasi pemasangan pipa transmisi dan jembatan pipa	Pengelolaan lingkungan dilakukan selama tahap pemasangan pipa transmisi dan jembatan pipa	<p>Metode Pengumpulan dan Analisis Data</p> <ul style="list-style-type: none"> <li>Mengetahui kondisi kualitas udara ambient</li> </ul> <p>Metode Pemantauan</p> <ul style="list-style-type: none"> <li>Dilakukan dengan cara pengambilan sampel dilapangan menggunakan gas sampler kemudian dianalisa dilaboratorium</li> </ul>	Disekitar lokasi pemasangan pipa transmisi dan jembatan pipa	6 bulan sekali selama tahap kegiatan pemasangan pipa transmisi dan jembatan pipa	<p><b>Pengelola :</b> Kementerian Pekerjaan Umum (Balai Wilayah Sungai Sulawesi III)</p> <p><b>Pengawas :</b></p> <ul style="list-style-type: none"> <li>Dinas Lingkungan Hidup Kabupaten Sigi</li> <li>Dinas Kesehatan Kabupaten Sigi</li> <li>Camat Sigi Biromaru</li> <li>Desa Pombewe</li> </ul>

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			BENTUK UPAYA PENGELOLAAN LINGKUNGAN HIDUP	LOKASI PENGELOLAAN LINGKUNGAN HIDUP	PERIODE PENGELOLAAN LINGKUNGAN HIDUP	BENTUK UPAYA PEMANTAUAN LINGKUNGAN HIDUP	LOKASI PEMANTAUAN LINGKUNGAN HIDUP	PERIODE PEMANTAUAN LINGKUNGAN HIDUP	
		mutunya adalah CO, NO2, SO2, Pb dan TSP (debu)							<ul style="list-style-type: none"> <li>Desa Mpanau</li> <li>Desa Lolu</li> <li>Desa Loru</li> </ul> <p><b>Pelaporan :</b> Dinas Lingkungan Hidup Kabupaten Sigi</p>
	Penurunan kualitas air	<p>Rona awal untuk kualitas air dapat dilihat pada lampiran rona awal</p> <p>Kondisi kualitas air tidak melebihi baku mutu air yang digunakan berdasarkan PP RI No. 82 Tahun 2001 Kkelas II</p>	<ul style="list-style-type: none"> <li>Mengurangi intensitas pekerjaan Ketika puncak musim hujan</li> <li>Setiap kegiatan konstruksi diikuti dengan pembangunan saluran drainase untuk menampung dan mengalirkan limpasan air permukaan ke lokasi sedimen trap</li> <li>Mengendalikan erosi dan sedimentasi seminimal mungkin TSL dengan berbagai teknik konservasi tanah dan air</li> </ul>	Disekitar lokasi pemasangan pipa transmisi dan jembatan pipa	Pengelolaan lingkungan dilakukan selama tahap pemasangan pipa transmisi dan jembatan pipa	<ul style="list-style-type: none"> <li>Melakukan pengambilan sampel air pada badan air di sungai dengan menggunakan botol sampel dan selanjutnya dianalisa di laboratorium</li> <li>Menganalisa parameter air sesuai dengan Peraturan Pemerintah RI Nomor 82 Tahun 2001, tentang baku dan kriteria kerusakan lingkungan hidup, Lampiran I Bagian A Kriteria Mutu Air Berdasarkan Kelas Air</li> </ul>	Disekitar lokasi pemasangan pipa transmisi dan jembatan pipa	6 bulan sekali selama tahap kegiatan pemasangan pipa transmisi dan jembatan pipa	<p><b>Pengelola :</b> Kementerian Pekerjaan Umum (Balai Wilayah Sungai Sulawesi III)</p> <p><b>Pengawas :</b></p> <ul style="list-style-type: none"> <li>Dinas Lingkungan Hidup Kabupaten Sigi</li> <li>Dinas Kesehatan Kabupaten Sigi</li> <li>Camat Sigi Biromaru</li> </ul>

Formulir Upaya Pengelolaan Lingkungan dan Upaya Pemantauan Lingkungan  
Rencana Kegiatan Pembangunan Intake dan Jaringan Pipa Transmisi Air Baku Paneki  
Kabupaten Sigi Tahun 2020

SUMBER DAMPAK	JENIS DAMPAK	BESARAN DAMPAK	UPAYA PENGELOLAAN LINGKUNGAN HIDUP			UPAYA PEMANTAUAN LINGKUNGAN HIDUP			INSTITUSI PENGELOLA DAN PEMANTAUAN LINGKUNGAN HIDUP
			BENTUK UPAYA PENGELOLAAN LINGKUNGAN HIDUP	LOKASI PENGELOLAAN LINGKUNGAN HIDUP	PERIODE PENGELOLAAN LINGKUNGAN HIDUP	BENTUK UPAYA PEMANTAUAN LINGKUNGAN HIDUP	LOKASI PEMANTAUAN LINGKUNGAN HIDUP	PERIODE PEMANTAUAN LINGKUNGAN HIDUP	
									<ul style="list-style-type: none"> <li>• Desa Pombewe</li> <li>• Desa Mpanau</li> <li>• Desa Lolu</li> <li>• Desa Loru</li> </ul> <p><b>Pelaporan :</b> Dinas Lingkungan Hidup Kabupaten Sigi</p>
Pemutusan hubungan kerja	Hilangnya kesempatan kerja	Tidak adanya keluhan dan protes yang dilakukan oleh masyarakat	<ul style="list-style-type: none"> <li>• Melakukan pemberitahuan dan pengumuman minimal 1 bulan sebelum dilakukan PHK</li> <li>• Membayarkan upah/pesangon sesuai dengan kesepakatan</li> </ul>	Desa Pombewe, Desa Mpanau, Desa Lolu, Desa Loru	Pada tahap pemutusan hubungan kerja	Pengumpulan data dilakukan secara langsung dengan melakukan pengamatan di lapangan dan wawancara terhadap mantan tenaga kerja konstruksi Data yang diperoleh selanjutnya dianalisa secara deskriptif kualitatif	Desa Pombewe, Desa Mpanau, Desa Lolu, Desa Loru	Pada tahap pemutusan hubungan kerja	<p><b>Pengelola :</b> Kementerian Pekerjaan Umum (Balai Wilayah Sungai Sulawesi III)</p> <p><b>Pengawas :</b></p> <ul style="list-style-type: none"> <li>• Dinas Tenaga Kerja dan Transmigrasi Kabupaten Sigi</li> <li>• Dinas Lingkungan Hidup Kabupaten Sigi</li> </ul>

Formulir Upaya Pengelolaan Lingkungan dan Upaya Pemantauan Lingkungan  
Rencana Kegiatan Pembangunan Intake dan Jaringan Pipa Transmisi Air Baku Paneki  
Kabupaten Sigi Tahun 2020

SUMBER DAMPAK	JENIS DAMPAK	BESARAN DAMPAK	UPAYA PENGELOLAAN LINGKUNGAN HIDUP			UPAYA PEMANTAUAN LINGKUNGAN HIDUP			INSTITUSI PENGELOLA DAN PEMANTAUAN LINGKUNGAN HIDUP
			BENTUK UPAYA PENGELOLAAN LINGKUNGAN HIDUP	LOKASI PENGELOLAAN LINGKUNGAN HIDUP	PERIODE PENGELOLAAN LINGKUNGAN HIDUP	BENTUK UPAYA PEMANTAUAN LINGKUNGAN HIDUP	LOKASI PEMANTAUAN LINGKUNGAN HIDUP	PERIODE PEMANTAUAN LINGKUNGAN HIDUP	
									<ul style="list-style-type: none"> <li>• Camat Sigi Biromaru</li> <li>• Desa Pombewe</li> <li>• Desa Mpanau</li> <li>• Desa Lolu</li> <li>• Desa Loru</li> </ul> <p><b>Pelaporan :</b> Dinas Lingkungan Hidup Kabupaten Sigi</p>
<b>TAHAP OPERASI</b>									
Operasi bendung, intake dan pipa transmisi	Penurunan debit air	Rencana debit air yang akan diambil sebesar 25 l/dtk, sebagai perbandingan hasil pengukuran pada bulan kering debit air Sungai Paneki sebesar 480 l/dtk	<ul style="list-style-type: none"> <li>• Jumlah air baku yang disadap tidak boleh melebihi izin pengambilan air baku yang direncanakan</li> <li>• Apabila kapasitas sumber berkurang dari kapasitas yang dibutuhkan, maka air yang disadap harus dikurangi sedemikian rupa sehingga masih ada sisa untuk pemeliharaan lingkungan di hilir sungai</li> </ul>	Intake Sungai Paneki	Pengelolaan lingkungan hidup dilakukan selama kegiatan Operasi bendung, intake dan pipa transmisi	Melakukan pengamatan langsung dilapangan dan pengukuran debit Sungai Paneki serta memantau adanya penanaman pohon yang sudah dilakukan oleh pemrakarsa	Intake Sungai Paneki	pemantauan lingkungan hidup dilakukan selama kegiatan Operasi bendung, intake dan pipa transmisi	<p><b>Pengelola :</b> Kementrian Pekerjaan Umum (Balai Wilayah Sungai Sulawesi III)</p> <p><b>Pengawas :</b></p> <ul style="list-style-type: none"> <li>• Dinas Lingkungan Hidup Kabupaten Sigi</li> <li>• Camat Sigi Biromaru</li> </ul>

Formulir Upaya Pengelolaan Lingkungan dan Upaya Pemantauan Lingkungan  
Rencana Kegiatan Pembangunan Intake dan Jaringan Pipa Transmisi Air Baku Paneki  
Kabupaten Sigi Tahun 2020

SUMBER DAMPAK	JENIS DAMPAK	BESARAN DAMPAK	UPAYA PENGELOLAAN LINGKUNGAN HIDUP			UPAYA PEMANTAUAN LINGKUNGAN HIDUP			INSTITUSI PENGELOLA DAN PEMANTAUAN LINGKUNGAN HIDUP
			BENTUK UPAYA PENGELOLAAN LINGKUNGAN HIDUP	LOKASI PENGELOLAAN LINGKUNGAN HIDUP	PERIODE PENGELOLAAN LINGKUNGAN HIDUP	BENTUK UPAYA PEMANTAUAN LINGKUNGAN HIDUP	LOKASI PEMANTAUAN LINGKUNGAN HIDUP	PERIODE PEMANTAUAN LINGKUNGAN HIDUP	
			<ul style="list-style-type: none"> <li>Dilakukan penanaman pohon disekitar lokasi bendung</li> <li>Melakukan pemeliharaan disekitar sumber air/sungai untuk menjaga ketersediaan debit air</li> </ul>						<ul style="list-style-type: none"> <li>Desa Pombewe</li> <li>Desa Mpanau</li> <li>Desa Lolu</li> <li>Desa Loru</li> </ul> <p><b>Pelaporan :</b> Dinas Lingkungan Hidup Kabupaten Sigi</p>
	Dampak Terhadap terjadinya Kebocoran atau rembesan	Sebagaimana biasanya untuk menjamin bahwa rembesan pada daerah hilir dapat dengan mudah diteliti dan diukur, maka areal sejauh tiga kali dari tinggi maksimum elevasi muka air intake harus bebas dari semua tanaman dan aktifitas pertanian.	<ul style="list-style-type: none"> <li>Memperbaiki bagian-bagian yang rusak dan berusaha mencari penyebab utama terjadinya kerusakan tersebut, untuk selanjutnya ditentukan jalan pemecahannya</li> <li>Adanya kerusakan harus cepat diidentifikasi melalui inspeksi harian sebelum sempat membesar</li> <li>Perbaikan harus segera berlangsung cepat dan dilaksanakan secara darurat dimana bangunan dapat</li> </ul>	Sepanjang lokasi pipa transmisi dan jembatan pipa	Pengelolaan lingkungan hidup dilakukan selama kegiatan Operasi bendung, intake dan pipa transmisi	Melakukan pengamatan langsung dilapangan	Sepanjang lokasi pipa transmisi dan jembatan pipa	pemantauan lingkungan hidup dilakukan selama kegiatan Operasi bendung, intake dan pipa transmisi	<p><b>Pengelola :</b> Kementerian Pekerjaan Umum (Balai Wilayah Sungai Sulawesi III)</p> <p><b>Pengawas :</b></p> <ul style="list-style-type: none"> <li>Dinas Lingkungan Hidup Kabupaten Sigi</li> <li>Camat Sigi Biromaru</li> <li>Desa Pombewe</li> <li>Desa Mpanau</li> </ul>



Formulir Upaya Pengelolaan Lingkungan dan Upaya Pemantauan Lingkungan  
Rencana Kegiatan Pembangunan Intake dan Jaringan Pipa Transmisi Air Baku Paneki  
Kabupaten Sigi Tahun 2020

SUMBER DAMPAK	JENIS DAMPAK	BESARAN DAMPAK	UPAYA PENGELOLAAN LINGKUNGAN HIDUP			UPAYA PEMANTAUAN LINGKUNGAN HIDUP			INSTITUSI PENGELOLA DAN PEMANTAUAN LINGKUNGAN HIDUP
			BENTUK UPAYA PENGELOLAAN LINGKUNGAN HIDUP	LOKASI PENGELOLAAN LINGKUNGAN HIDUP	PERIODE PENGELOLAAN LINGKUNGAN HIDUP	BENTUK UPAYA PEMANTAUAN LINGKUNGAN HIDUP	LOKASI PEMANTAUAN LINGKUNGAN HIDUP	PERIODE PEMANTAUAN LINGKUNGAN HIDUP	
			terselamatkan dan berfungsi dengan baik Pemeliharaan darurat dapat dilaksanakan oleh instansi yang berwenang mengingat besar kecilnya kerusakan, dilakukan dengan menggunakan tenaga terampil yang keahliannya disesuaikan dengan kebutuhan, regu pemeliharaan ini dengan atau tanpa bantuan buruh lokal						<ul style="list-style-type: none"> <li>• Desa Lolu</li> <li>• Desa Loru</li> </ul> <p><b>Pelaporan :</b> Dinas Lingkungan Hidup Kabupaten Sigi</p>

**Kepala Dinas Penanaman Modal  
Dan Pelayanan Terpadu Satu Pintu  
Kabupaten Sigi**



**Heru Murtanto, S.Pd**  
Pembina Utama Muda,  
NIP. 19671211 199103 1 010

## APPENDIX C

Spatial recommendations



**PEMERINTAH KABUPATEN SIGI**  
**DINAS PEKERJAAN UMUM DAN PERUMAHAN**

Alamat : Jl. Karanja Lembah BTN Kelapa Gading Blok Anggur Desa Kalukubula  
Kecamatan Sigi Biromaru Provinsi Sulawesi Tengah

Sigi Biromaru, 24 Juni 2020

Nomor : 600/06-197/DRUP/ 2020  
Sifat : Biasa  
Lampiran :  
Perihal : Pertimbangan Teknis  
Kesesuaian Tata Ruang

Kepada  
Yth. Kepala Balai Wilayah Sulawesi III  
Palu  
Di -  
Palu

Berkenaan dengan surat Saudara nomor SA0404/Bws13/276 tanggal 19 Juni 2020 perihal Permintaan Permohonan Keterangan Rencana Kabupaten untuk kegiatan pembangunan Intake dan Jaringan Pipa Air Baku Paneki di Desa Pombewe, Desa Mpanau, Desa Lolu dan Desa Loru Kecamatan Sigi Biromaru, maka terkait hal tersebut kami sampaikan Pertimbangan sebagai berikut:

1. Bahwa sesuai Peraturan Daerah Kabupaten Sigi Nomor 21 Tahun 2011 tentang Rencana Tata Ruang Wilayah Kabupaten Sigi (RTRW) Tahun 2010-2030 lampiran VI Rencana Pola Ruang Wilayah Lindung Dan Budidaya, lokasi Intake berdasarkan koordinat GPS termasuk dalam Kawasan Hutan Rakyat dan lokasi WTP termasuk dalam Kawasan Pertanian lahan Kering/Hortikultura.
2. Kesesuaian kegiatan sebagaimana yang dimohonkan terkait pola ruang tersebut adalah:
  - a. Pada kawasan Taman Hutan Rakyat, diperkenankan aktivitas ruang yang tidak berpotensi merusak ekosistem dan keanekaragaman hayati di kawasan hutan wisata.
  - b. Pada kawasan pertanian lahan kering/hortikultura, kegiatan yang sifatnya mengkonversi lahan dapat dilaksanakan sepanjang menjadi fungsi permukiman termasuk penyediaan fasilitas dasar permukiman.
3. Pertimbangan teknis lainnya berdasarkan rancangan RTRW Kabupaten Sigi Tahun 2020-2040, pola ruang pada kawasan tersebut telah diselaraskan dengan perkembangan kebutuhan ruang pasca bencana dan penguasaan

kawasan hutan sehingga lokasi rencana Intake berubah menjadi kawasan APL dengan fungsi peruntukkan perkebunan, demikian pula dengan rencana WTP telah disesuaikan menjadi kawasan permukiman perkotaan.

4. Berdasarkan rancangan RTRW Kabupaten Sigi terkait pola ruang masing-masing lokasi rencana sebagaimana permohonan, bahwa kegiatan tersebut dapat dilaksanakan dan mempertimbangkan kajian lingkungan.
5. Sesuai Peta Zonasi Ruang Rawan Bencana (ZRB) tahun 2018, rencana pembangunan Intake maupun rencana WTP termasuk dalam ZRB 2G (zona rawan gerakan tanah menengah) dimana kegiatan konstruksi bangunan agar memperhatikan standar perencanaan ketahanan gempa untuk struktur bangunan gedung dan non gedung SNI-1726-2012.

Demikian kami sampaikan, atas perhatiannya diucapkan terima kasih.

Plt. KEPALA DINAS PEKERJAAN UMUM DAN PERUMAHAN  
KABUPATEN SIGI



**HENRI KUSUMA ROMBE**  
Pembina Tk.I/IVb  
NIP. 19681015 199703 1 005

Tembusan disampaikan kepada Yth:

1. Bupati Sigi di, Dolo
2. Sekretaris Daerah Kabupaten Sigi di, Dolo
3. Kepala Dinas PMPTSP Kabupaten Sigi di, Bora

**APPENDIX D**

**Public Consultation**

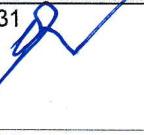




# DAFTAR HADIR PESERTA PKM

Hari/Tanggal : Senin, 02 Maret 2020  
 Waktu : 08:00 s/d Selesai  
 Tempat : Kantor Pengamat Irigasi Gumbasa  
 Agenda : Pertemuan Konsultasi Masyarakat (PKM)

No	Nama	L/P	Instansi	No. HP	Tanda Tangan	
1	ATIS	P	P3A LORU	08234698725	1	2
2	RIDWAN	L	BUBUNSA	085298920021		
3	IKRAM	L	BABINSA	081277062317	3	4
4	ASMAO	L	GAPOKTA	082190309382		
5	JUANIS	L	P3A	082347103251	5	6
6	ALI Abdullah	L	Kemult. TMC-6	08128422796		1
7	SITI SUSANTI	P	BPP BIROMARU	082188553544	7	8
8	TATUR WIJAKSONO	L	BPP BIROMARU	08522970709		
9	PRININATI	P	BPD BUKOMARU	085740239728	9	10
10	Djaja Mulya	L	UPT SPAN	50128373913		
11	SENJA SEFTI RAJJI	L	DINAS CIKASDA	082192243815	11	12
12	SATYA WICANA	L	DINAS CIKASDA	08114536566		
13	SUBARLIN	L	DINAS CIKASDA	085299869913	13	14
14	ASFAR	L	KOSPOMBENE			
15	Djohasa	L	P3A	085242166470	15	16
16	Amudin		ADAT POMBENE			
17	HENRY B	L	POLRI		17	18
18	SYAMARU M.	L	KADER LORU	085241149331		
19	AZIE	L	POLMAS LORU	081241675116	19	20
20	MAY MILIAN		D.I Gumbasa			
21	ASBUDI	L	POLRI	08229331085	21	22
22	IDRIS		PTAF	085395242872		
23	IDRUS	L	KETUA - BPD	081245366228	23	24
24	MURDHI	L	SEKRES POMBENE	08227020		
25	Dama	L	Dinas PUP	0545 08114500068	25	26
26	Tigani	L	kep. UPTD Gumbasa			
27	EDISON	L	BWSSA		27	28
28	FUKI	P	BWSSA			
29	HURI R	L	Dinas PUP		29	30
30	WIMBO H	L	Dinas PUP	08354218170		



No	Nama	L/P	Instansi	No. HP	Tanda Tangan	
31	<del>Amara NONGTJI</del>	L	PELIDA SIBI	081391000111	31 	32 
32	Sonok Firan	P	BWS - Sull III			
33	Nidya Febriant	P	BWS - Sull III		33 	34
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## DAFTAR HADIR PESERTA PKM

Hari/Tanggal

: Kamis, 12 Maret 2020

Waktu

: 09 : 00 s/d Selesai

Tempat

: Gedung Pramuka Mandala Paneki

Agenda

: Pertemuan Konsultasi Masyarakat (PKM)

No	Nama	L/P	Instansi	No. HP	Tanda Tangan
1.	Hi Djokasa	L	P3A	085242186470	1.
2.	H. C. Amudin L		Lembaga Adat		2.
3.	MURDIN		SEKDES POM.		3.
4.	ASPAR		KADES POMBENGE		4.
5.	ERICK		Staf Desa Pombenge		5.
6.	HERDIN		P,3A		6.
7.	MUJA		P,3A		7.
8.	ATIS		P.3A		8.
9.	I S W A N		LEMBAGA ADAT		9.
10.	MASMUD		Buru Tani		10.
11.	SIMON		Buru Tani		11.
12.	ARNIK		" - " -		12.
13.	SUNIDAR		BPD		13.
14.	IKSAN		PETANI		14.
15.	SATIR		BURU TANI		15.
16.	RINO		TAPI		16.
17.	RUSLAN		ULU-ULU		17.
18.	HELMI. m. s.		Bpm		18.
19.	Rival		PH. Sek. Des		19.
20.	Sofan S.		KASI PEM		20.
21.	SYAHIDAN		Gapoktan	085223960498	21.
22.	Sulain		P3A	082347103251	22.
23.	Guoman.		Petani		23.
24.	Siwani		K9 kelompok tani		24.
25.	Anri		Petani		25.



26.	FIFIAN.				26.	Frie
27.	ZAIMUDIN		UPJA	DRS3 9798750	27.	<del>Zaimudin</del>
28.	Ahmar		KASI PEMERINTAHAN	08229671220	28.	<del>Ahmar</del>
29.	ANZAR		PETANI	-	29.	<del>Anzar</del>
30.	Jmanda		PGW	-	30.	<del>Jmanda</del>
31.	BAMA		PETANI	-	31.	<del>Bama</del>
32.	ANHUR		PETANI	-	32.	<del>Anhur</del>
33.	RAZAK		PGW	-	33.	<del>Razak</del>
34.	Al. Halim		- " -	-	34.	<del>Al. Halim</del>
35.	HASBA		PETANI	-	35.	<del>Hasba</del>
36.	SARIF. Sos		KADES MPAMAU		36.	<del>Sarif. Sos</del>
37.	ANDI RAHMAN, SH.i		SEKDES MPAMAU		37.	<del>Andi Rahman, SH.i</del>
38.	YAYAN HIDAYAT		KASI KESPA "		38.	<del>Yayan Hidayat</del>
39.	Tri Utomo		Kaur Perencanaan "		39.	<del>Tri Utomo</del>
40.	<del>DANKAS AMPEN.</del>		<del>BABERDA SIS.</del>		40.	<del>Dankas Ampen.</del>
41.	RIDWANI		PETANI		41.	<del>Ridwan</del>
42.	ASMAN		GAPORTAN		42.	<del>Asman</del>
43.	SYAHRINI. Ningsih		KABG. LORU.		43.	<del>Syahrini. Ningsih</del>
44.	AEIS		POLMAS LORU		44.	<del>Aeis</del>
45.	Moh. Hafid				45.	<del>Moh. Hafid</del>
46.	Ikra. B		BABINSA		46.	<del>Ikra. B</del>
47.	RIDWAN		BABINSA		47.	<del>Ridwan</del>
48.	SEMJA SEPTI F.		DINAS CIVASDA		48.	<del>Semja Septi F.</del>
49.	Moh. NOFRI S		BHABINKAMTIMAS		49.	<del>Moh. Nofri S</del>
50.	Fadri		ATAS		50.	<del>Fadri</del>

## NOTULEN

Waktu Pelaksanaan : Senin, 02 Maret 2020

Tempat Pelaksanaan : Kantor Pengamat Irigasi Gumbasa  
Jalan Karaja Lembah Desa Sigi

Pengarah / Moderator : Asistensi II Bidang Ekonomi dan Pembangunan SEKAB SIGI  
Bpk. Iskandar Nongci ST., MSi

Hasil pertemuan dari Sesi Diskusi dan Tanya Jawab

No	Penanya	Penjawab
1.	<ul style="list-style-type: none"><li>• Kades Pombewe</li></ul> Mohon penjelasan berkaitan Perencanaan Air Baku untuk Huntap Pombewe	<ul style="list-style-type: none"><li>• Nara sumber Bapak Ir. Hadi Santoso untuk Air Baku keperluan masyarakat Pombewe dan Loru hanya memerlukan 25 ltr/dtk</li></ul>
2.	<ul style="list-style-type: none"><li>• Petugas P3A</li></ul> Selama ini Irigasi Paneki masih kekurangan air	<ul style="list-style-type: none"><li>• Nara sumber Bpk Ir. Hadi Santoso dari hasil pengukuran langsung debit sungai Paneki antara 400 s/d 500 ltr/dtk cukup untuk keperluan Irigasi.</li></ul>
3.	<ul style="list-style-type: none"><li>• Sekretaris Desa Pombewe</li></ul> Dengan adanya rencana jaringan air baku untuk huntap jangan sampai ada masyarakat yang hidup dimatikan dengan yang mati dihidupkan	<ul style="list-style-type: none"><li>• Nara sumber Bpk Asisten II pemerintah memikirkan keperluan semua masyarakat termasuk masyarakat yang kena dampak likuifaksi Desa Jono Oge.</li></ul>
4.	<ul style="list-style-type: none"><li>• Tokoh masyarakat Desa Loru</li></ul> untuk keperluan Huntap pemerintah diharapkan membuat sumber baru dengan cara bor	<ul style="list-style-type: none"><li>• Nara sumber Bpk Asisten II sumber air sudah diupayakan oleh pemerintah dengan melakukan pengeboran tetapi hasilnya panas dan habis.</li></ul>
5.	<ul style="list-style-type: none"><li>• Juru pengairan D.I Paneki memberi info</li></ul> Luas D.I Paneki potensial 500 Ha Luas fungsional ± 262 Ha Mohon perbaikan saluran dengan pasangan	<ul style="list-style-type: none"><li>• Nara sumber Bpk. Ir. Hadi Santoso informasinya diucapkan terima kasih, sedang untuk perbaikan saluran Irigasi Paneki menjadi tanggungan Pemerintah Daerah.</li></ul>
6.	<ul style="list-style-type: none"><li>• Kades Loru</li></ul> Untuk mendapatkan penjelasan lebih rinci masyarakat mohon untuk diadakan pertemuan kembali	<ul style="list-style-type: none"><li>• Nara sumber Bpk. Asisten II sepakat untuk dijadwal konsultasi pertemuan kembali</li></ul>

<b>No</b>	<b>Penanya</b>	<b>Penjawab</b>



# DOKUMENTASI





## NOTULEN

Waktu Pelaksanaan : Kamis, 12 Maret 2020

Tempat Pelaksanaan : Gedung Pramuka Mandala Paneki

Pengarah / Moderator : Bapak Henry Rombe, S.T. (Kepala Dinas PU Sigi)

Hasil pertemuan dari Sesi Diskusi dan Tanya Jawab

No	Penanya	Penjawab
1.	<p>Bapak Kades Mpanau :</p> <ul style="list-style-type: none"><li>- Bagaimana Masyarakat ke 5 desa yaitu Pombewe, Loru, Lolu, Mpanau, dan Petobo agar kebutuhan air yang mengairi sawah sudah cukup?</li><li>- Masyarakat mpanau hanya sedikit kebagian air dari pombewe</li></ul>	<p>Bapak Ir. Hadi Santoso</p> <p>Air akan tetap untuk 5 desa, pembagian air bisa diatur diprioritaskan yang mana yang dibutuhkan antara air baku maupun air irigasi untuk petani.</p>
2.	<p>Sekretaris BPD Pombewe</p> <ul style="list-style-type: none"><li>- Bagaimana kalau wakil rakyat dihadirkan, agar tidak ada kesepakatan sepihak saja.</li><li>- Masalah air kenapa harus ambil dari pombewe, bukan dari wuno atau yang lain, bagaimana pendistribusinya ?</li></ul>	<p>Bapak Ir. Hadi Santoso</p> <p>Semua nya sudah menjadi pertimbangan, untuk pertanyaan kenapa harus diambil Pombewe karna air bakunya hanya khusus untuk desa Pombewe dan sekitarnya</p>
3.	<p>Sadlan (Poktan Desa Pombewe)</p> <ul style="list-style-type: none"><li>- Bagaimana kebutuhan masyarakat untuk air minum secara detail harus diperjelas</li></ul>	<p>Bapak Henry Rombe, S.T.</p> <p>Disampaikan pendistribusian airnya agar lebih jelas</p>
4.	<p>Poktan Desa Loru</p> <ul style="list-style-type: none"><li>- Melihat jangka Panjang, apakah kebutuhannya cukup untuk kelima desa? Alternatif lainnya bagaimana jika defisit?</li></ul>	<p>Pak camat</p> <p>Air bisa diatur atau pengaturannya ada dan tidak merugikan masyarakat</p>

No	Penanya	Penjawab
5.	Kepala Desa Mpanau - Bagaimana alternatif lainnya ?	Bapak kuwato : Luas potensial 500 ha irigasi yang bisa di airi, 242 ha sawah, Kurangnya air di sungai tersebut tidak sepanjang tahun hanya pada waktu tertentu saja ini sudah di survei, sekarang sistem pengambilan air di masyarakat yaitu pengambilan bebas masyarakat Pombewe dan Loru, nantinya diberikan bendung tapi tidak mengurangi air untuk irigasi, debit minimum yaitu 390 ltr/dtk. Sungai Paneki termasuk sungai yang kontinyu air yang mengalir terus sepanjang tahun. 25 ltr/dtk = kira kira 21 ribu/hari, sedangkan kebutuhan di masyarakat sekitar masih dibawah 21 ribu/hari, jadi tidak perlu khawatir nantinya akan kekurangan

### Usulan dan saran

1. warga desa Loru :

Kalau bisa dari pihak konsultan desain awal atau perencanaan awal ditampilkan

2. Poktan Desa Loru

Saran masukan semua punggawa harus dihadirkan diundang

3. Pak asisten II /Iskandar nontji

- Tujuan awal untuk meminta izin kepada masyarakat desa terlebih dahulu
- Desain awal untuk diperlihatkan ke warga masyarakat agar lebih paham

4. Sekdes Pombewe

- Menghadirkan tim-tim khusus (irigasi, teknis air baku dan lain-lain)
- Diadakan sosialisasi perdesa
- Perlihatkan skema sederhana dari intake
- Kalau bisa pemaparan disediakan infokus dan dibuatkan power point

5. Kesimpulan dari pak asisten II :

Sebagian masyarakat sudah setuju, saran untuk konsultan diadakan Sosialisasi lagi sekali dengan catatan pemaparan pendistribusian air lebih diperjelas agar masyarakat lebih paham.

6. Ketua P3A sudah setuju

**Kesimpulan sosialisasi:**

Diadakan sosialisasi sekali lagi untuk pemaparan pendistribusian air nya atau jalur pipa transmisi

## Dokumentasi



**BERITA ACARA**  
**PEMBAHASAN RENCANA PEMBANGUNAN**  
**JARINGAN AIR BERSIH DESA POMBEWE, DESA LORU DAN SEKITARNYA**

Pada hari ini, Kamis tanggal Dua Puluh Tiga bulan April tahun Dua Ribu Dua Puluh, bertempat di Kantor Bupati Sigi di Kecamatan Dolo, telah dilaksanakan pembahasan rencana pembangunan jaringan air bersih Desa Pombewe, Desa Loru dan sekitarnya dengan hasil sebagai berikut :

1. Pada prinsipnya pembangunan jaringan air bersih tersebut, yang sumber airnya dari Sungai Paneki, disetujui karena lebih menjamin ketersediaan kuantitas dan kualitas air bersih bagi masyarakat.
2. Pembangunan jaringan air bersih dimaksud juga mencakup penyediaan air bersih untuk kawasan Hunian Tetap (Huntap) Pombewe di Kecamatan Sigi Biromaru, yang proses pembangunannya diharapkan senantiasa berkoordinasi dengan pemerintah Kabupaten Sigi melalui Camat Sigi Biromaru dan Organisasi Perangkat Daerah (OPD) teknis terkait.

Demikian Berita Acara ini dibuat untuk dipergunakan sebagaimana mestinya.

Palu, 23 April 2020

  
**Kepala Desa Pombewe**  
*[Signature]*  
**Agus Abbas**  
  
**Kepala Desa Mpanau**  
*[Signature]*  
**Syarif S.Sos**  
**Kepala Desa Loru**  
  
**Kurniadin Latjedd**  
**Kepala Desa Loru**  
*[Signature]*  
**Syahrin Maradiati**  
**Camat Sigi Biromaru**  
  
**Ruslan, S.IP, M.Pd**  
**Nip. 19651120 198603 1 010**  
**Ptt. Kepala Dinas PUP**  
**Kabupaten Sigi**  
  
**Henri Kusuma Rombe**  
**Nip. 19681015 199703 1 005**

Mengetahui,

**Asisten II**  
**Bidang Ekonomi dan Pembangunan**  
**Sekretariat Daerah Kabupaten Sigi**

*[Signature]*  
**H. Iskandar Nongti**  
**NIP. 19650606 199603 1 004**

  
**Bupati Sigi**  
**Mohamad Irwan, S.Sos, Msi**



Kementerian Pekerjaan Umum dan Perumahan Rakyat  
Direktorat Jenderal Sumber Daya Air



PERTEMUAN KONSULTASI MASYARAKAT  
(PKM)  
BENDUNG WUNO





- PERTEMUAN KONSULTASI MASYARAKAT  
PEMANFATAN SUNGAI WUNO

1. INFORMASI KPD MASYAKAT DLM PEMBANGUNAN
2. PERAN SERTA MASYARAKAT DALAM PEMBANGUNAN

# DASAR HUKUM PKM



## **A. TAHAPAN PEMBANGUNAN**

**Pembangunan bendungan meliputi tahapan:**

- a. persiapan pembangunan;**
- b. perencanaan pembangunan;**
- c. pelaksanaan konstruksi; dan**
- d. pengisian awal waduk.**

## **B. PERENCANAAN PEMBANGUNAN meliputi:**

- a. studi kelayakan;**
- b. penyusunan desain; dan**
- c. studi pengadaan tanah.**


**(3) Dalam perencanaan pembangunan bendungan harus dilakukan pertemuan konsultasi publik dengan mengikutsertakan instansi dan masyarakat terkait.**





**Dengan demikian**

- (1) Masyarakat mempunyai kesempatan yang sama untuk berperan dalam proses pembangunan bendungan.**
- (2) Peran masyarakat sebagaimana dimaksud dapat dilakukan dengan cara:**
  - a. memberikan masukan dan saran dalam pembangunan bendungan dan pengelolaan bendungan beserta waduknya;**
  - b. mengikuti program pemberdayaan masyarakat; dan/atau**
  - c. mengikuti pertemuan konsultasi publik dan sosialisasi.**

- 
- Sungai Wuno juga dimanfaatkan untuk mengairi DI. Wuno (700 Ha), melalui bendung Wuno.
  - Selain itu di S. Konju terdapat juga pengambilan air untuk tanaman Bawang (500 Ha) dan air baku untuk masyarakat.
  - Pada musim kemarau terjadi konflik air karena suplai air dari S. Wuno mengecil.
  - Kondisi jaringan irigasi DI. Wuno mengalami penurunan yang menyebabkan kehilangan air di jaringan ?.



# MAKSUD DAN TUJUAN PKM

**01**

Maksud:

**Memberikan informasi mengenai rencana pembangunan Bendungan.**

**02**

Tujuan:

**Masyarakat mengerti mengenai rencana pembangunan Bendungan dan Pemerintah mendapatkan informasi balik dan masukan dari masyarakat.**





# Pipa Transmisi Air Baku PASIGALA

Kementerian Pekerjaan Umum dan Perumahan Rakyat  
Direktorat Jenderal Sumber Daya Air



## SKEMA PEMBANGUNAN PIPA TRANSMISI AIR BAKU PASIGALA







## Hasil Inventarisasi



Balai Wilayah Sungai Sulawesi III

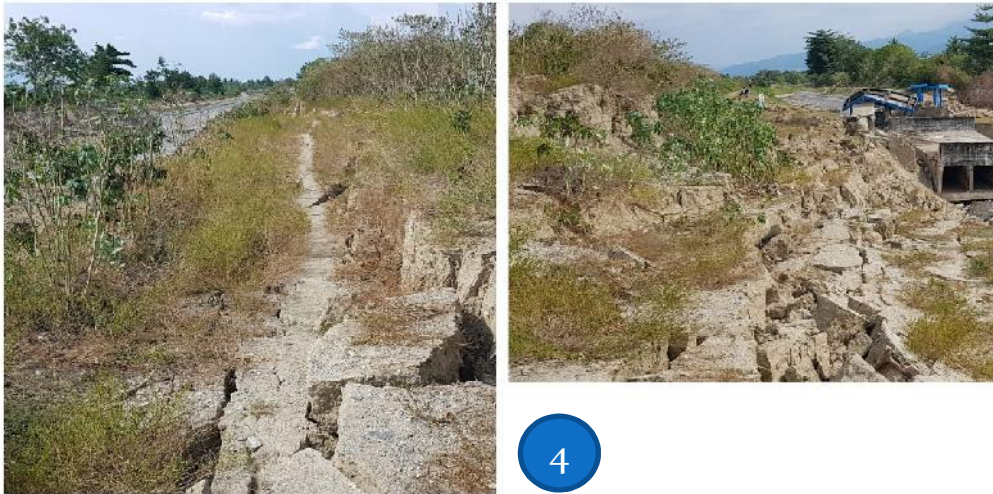
Satuan Kerja Pelaksanaan Jaringan Pemanfaatan Air WS. Palu-Lariang, WS. Parigi-Poso, WS. Kaluku-Karama Prov. Sulawesi Tengah

PPK Air Tanah dan Air Baku [airbakuairtanah@yahoo.co.id](mailto:airbakuairtanah@yahoo.co.id)



# Hasil Inventarisasi

Km 20  
Desa Sibalaya, Kec. Tanambulava  
Longsor di jalur pipa +/- 1 km



4

Sebelum




Setelah gempa



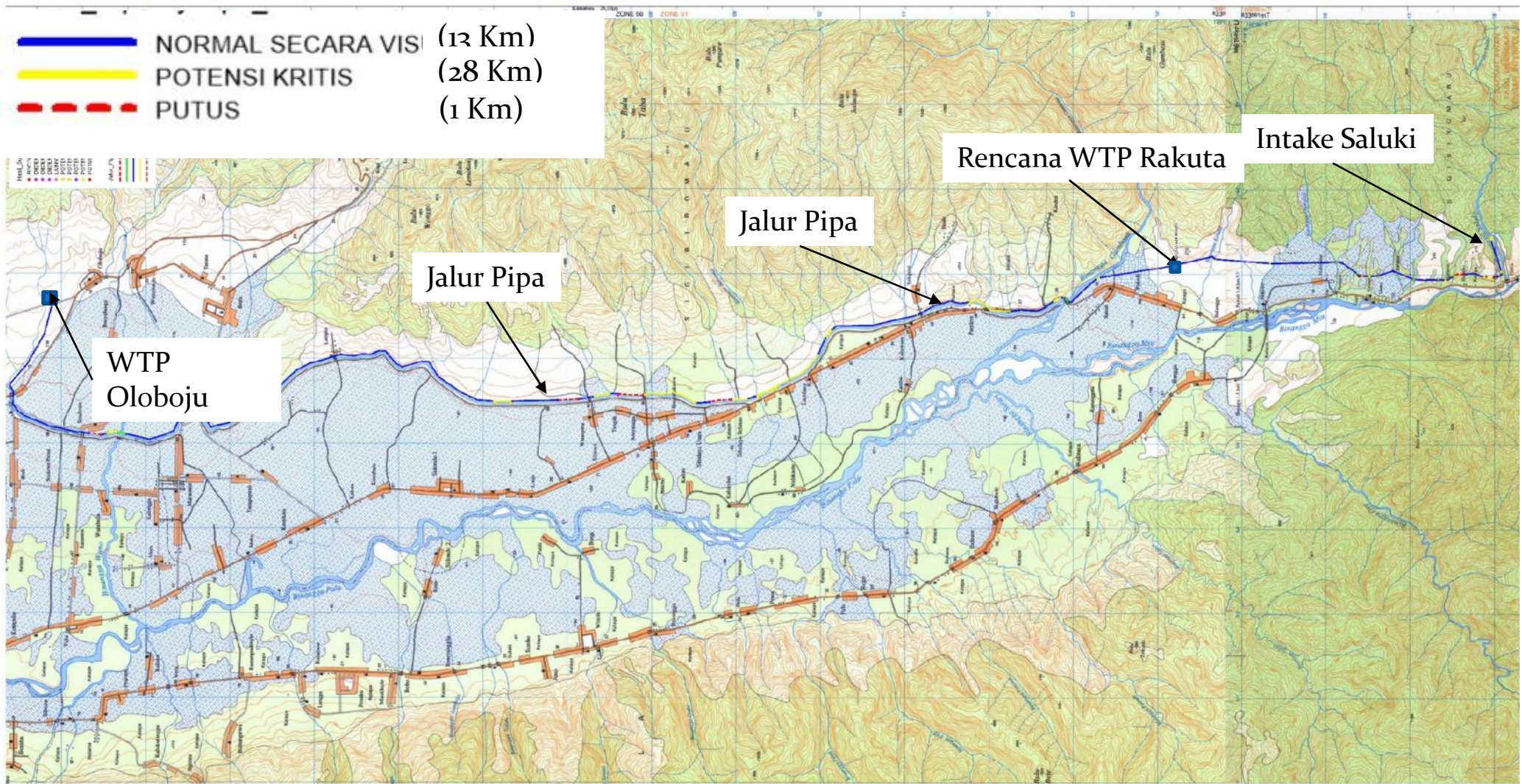
Km 35  
Trust Block sisi Selatan Wuno  
rusak akibat gempa 28 Sept '18

5



- 
- Terjadinya gempa yang berkekuatan 7,4 skala richter telah mengakibatkan banyak terjadi kerusakan di beberapa tempat di sepanjang jaringan transmisi. Jaringan air baku pasigala sepanjang 42.000 m, dan di jaringan pipa transmisi terjadi kerusakan baik di pipa GIP maupun HDPE, sehingga sistem tidak berfungsi.
  - Kekuatan pipa transmisi mengalami penurunan akibat adanya tarikan-tarikan saat terjadi gempa sehingga saat pemanfaatannya nanti perlu diperhatikan, terutama pada jaringan pipa HDPE yang cukup panjang mencapai sekitar 35.600 m.
  - Penurunan kualitas air baku dari Sungai Saluki yang cukup drastis, sehingga jika terjadi hujan di hulu intake maka sedimen yang masuk ke intake saluki sangat tinggi.
  - Diperlukan alternatif-alternatif lain untuk memanfaatkan bangunan eksisting yang ada, baik mulai dari air baku, jaringan pipa transmisi dan fasilitas lainnya.
  - Terdapat sumber air baku lain yang bisa digunakan yaitu dari Sumber Air Baku Sungai Wuno.





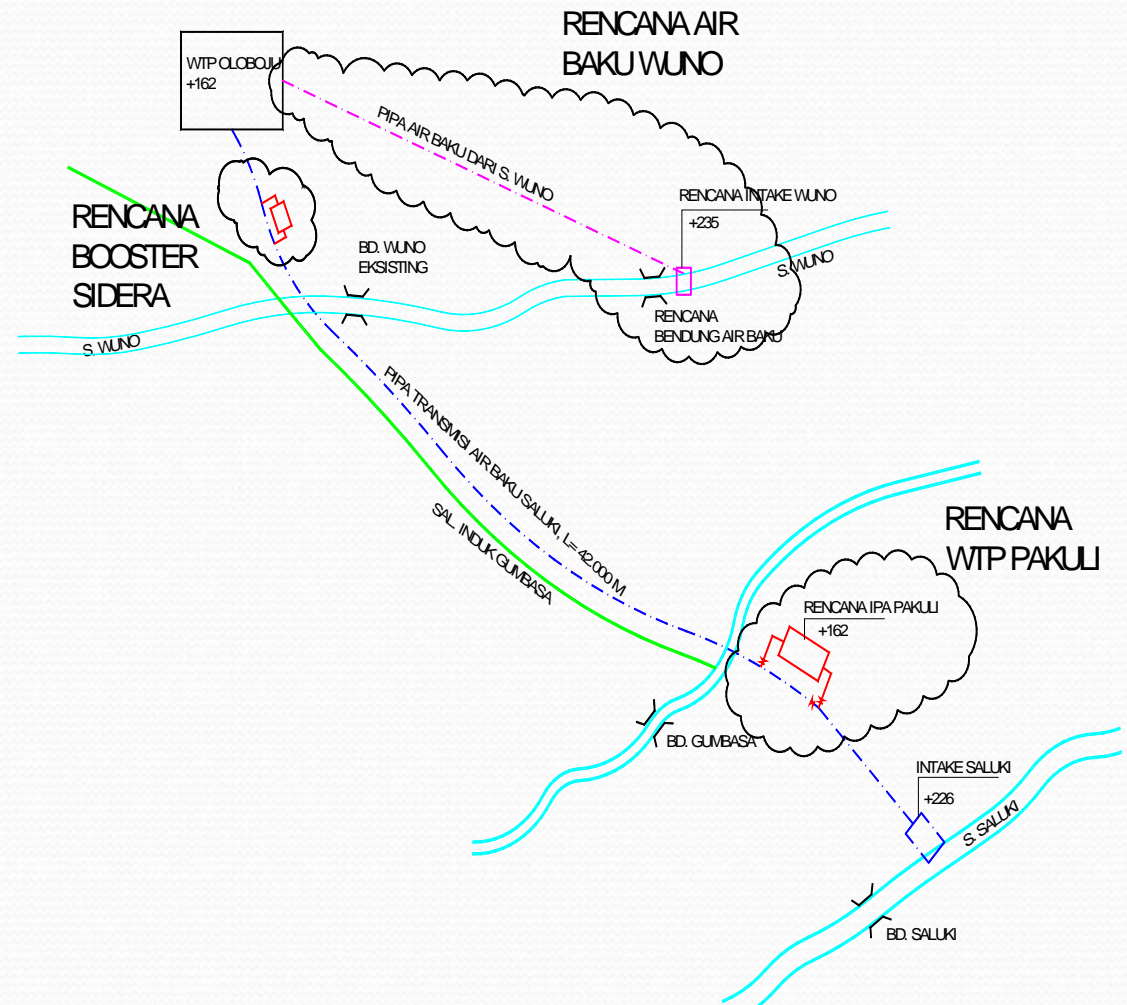


## KONSEP DESIAN

Setelah dilakukan analisis-analisis dan telah didiskusikan dengan beberapa pihak terkait maka dalam alternatif penanganan sistem penyediaan air baku pasigala pasca gempa ini adalah :

1. Pemanfaatan sumber air baku dari Sungai Wuno.
2. Pembangunan WTP Pakuli, untuk memanfaatkan jaringan pipa transmisi sepanjang 42 km, akan digunakan sebagai jaringan distribusi utama (JDU) dengan membangun WTP yang diletakkan di level sekitar +162, dengan harapan tekanan kerja pipa tidak lebih dari 60 m (6 bar), diasumsikan kemampuan pipa transmisi berkurang 20% dari spesifikasi pipa yaitu PN 8 pasca terjadinya gempa.

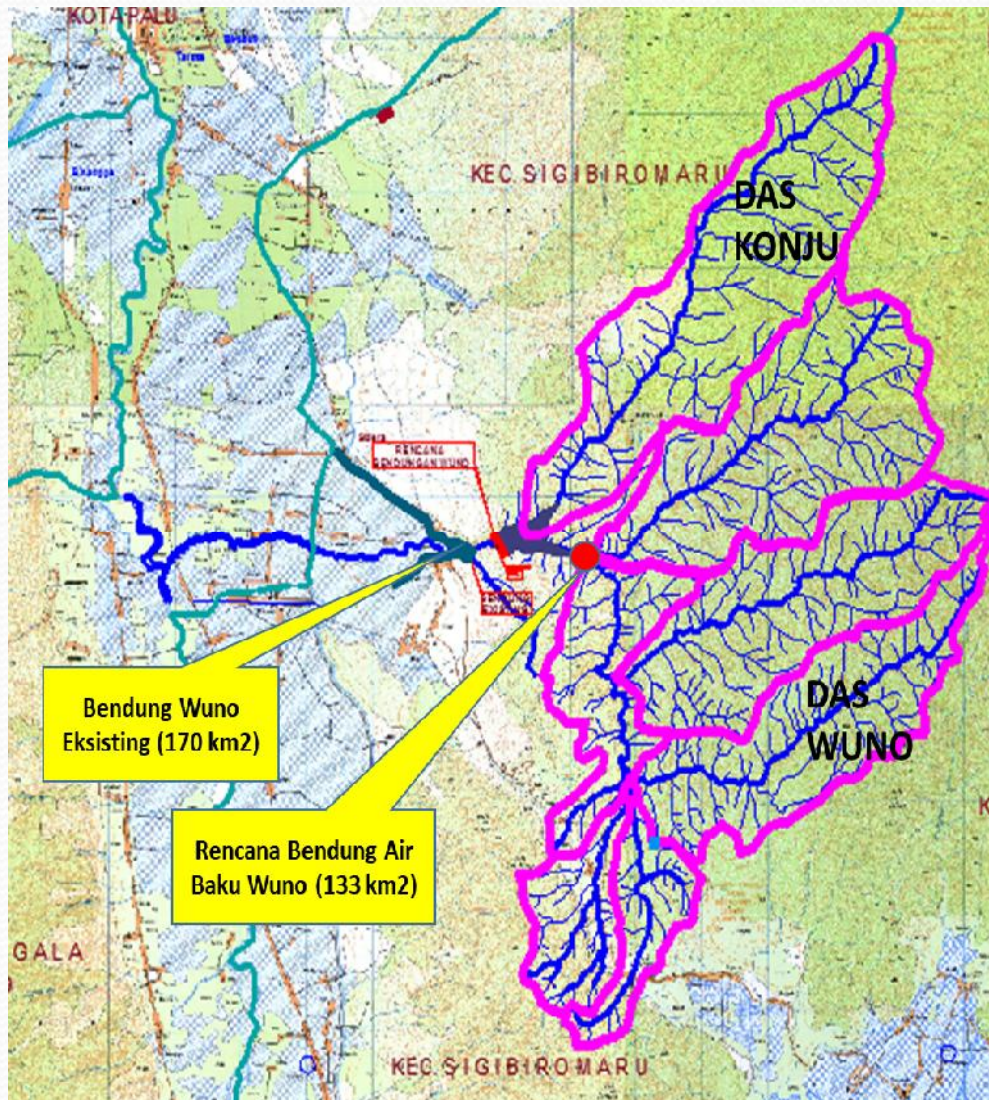
Sedangkan untuk mengetahui lebih jelasnya pemanfaatan jaringan air baku pasigala dapat dilihat pada skematik disamping ini.



Skematik Rencana Alternatif Penanganan Sistem Air Baku Pasigala



## Pembagian DAS Sungai Wuno



1. Lokasi rencana bendung air baku Wuno yang baru berada + 2,00 km di hulu bendung Wuno existing, pada ketinggian +225,00. Luas DAS bendung wuno existing adalah 170 km<sup>2</sup>, sedangkan luas DAS bendung air baku Wuno yang baru adalah 133 km<sup>2</sup>, antara kedua bendung tersebut terdapat luas DAS 2 km<sup>2</sup>, diluar subDAS Konju.
2. PADA Sub DAS Konju terdapat pengambilan air untuk irigasi bawang seluas 500 Ha dan air baku untuk penduduk Oloboju, sedangkan bendung Wuno eksisting mensplai kebutuhan air untuk irigasi seluas 700 Ha.



## Neraca Air Sungai Wuno

- Untuk mengetahui kecukupan air S. Wuno dalam mensuplai kebutuhan, dilakukan analisa neraca airnya. Kebutuhan yang telah ada adalah untuk mengairi irigasi dengan luas potensial 700 Ha, irigasi bawang 500 Ha, air baku penduduk Oloboju 20 l/dt, dan rencana suplai tambahan untuk air baku WTP Oloboju sebesar 300 l/dt dan kebutuhan untuk aliran pemeliharaan sebesar 200 l/dt. Berdasarkan analisa neraca air dari Puslitbang SDA, untuk memenuhi kebutuhan air baku sebesar 300 l/dt terjadi kegagalan suplai pada beberapa periode dasarian.