

EWSIP Source-to-Tap (STT) Profile Sheet

	STT Subproject	Tukad Unda Water Supply System
1	River Basin	Bali Penida
2	Main River	Tukad Unda
3	Location of Intake/ Water Source (District/Province)	Intake is located at Muara Unda Estuary Dam which located at Kec. Dawan Kab. Klungkung, Bali.
4	Water Availability	<p>With potential catchment area of 220.5 km², the average water availability from Sidan Dam is about 116 mill.m²/year as documented in the DED¹ (2016).</p> <p>A detailed analysis should be undertaken by the ESP Consultant through use of hydrologic modelling and associated hydrometeorological, land use and land cover parameters to characterize historical conditions and future conditions via climate change.</p> <p>The main findings of a regional ADB technical assistance project in Indonesia indicate that the average precipitation is expected to change by ±5% by 2030, and by ±10% by 2050. There are similar findings identified by BMKG, the national agency of Indonesia for climate change studies.</p> <p>ESP consultant should evaluate site-specific conditions by using BMKG driven climate change products and associated impact on the water availability upstream of the existing/proposed storage facilities</p>
5	Sediment Yield	Total sediment yield in Tukad Unda is estimated about 9,576 ton/year ¹ . ESP Consultant shall evaluate the sediment yield upstream existing/proposed facilities in further detail by reviewing existing/proposed conditions for land use/land cover and meteorological conditions.
6	Areas to be Served	1,500 lps of water will be delivered to South Bali Area, especially Kab. Klungkung and possibly also to Sarbagita Area (Kota Denpasar, Kab. Badung, Kab. Gianyar, and Kab. Tabanan)
7	Institutions Involved	DGWR, BWS Bali Penida, DGHS, BP2W, Bappeda Kab. Klungkung, Bappeda Kota Denpasar, Bappeda Kab. Badung, Bappeda Kab. Gianyar, Bappeda Kab. Tabanan, and the related offtaker PDAMs.
8	Proposed Works	As much as 1,500 l/s of water will be extracted from the intake at Muara Unda Estuary Dam, which is an off-stream reservoir that located about 4.2 km from Tukad Unda Weir. The WTP will be located near the dam.

¹ BWS Bali Penida - PT. Multimera Harapan. 2013. Review Desain Waduk Muara Unda di Kab. Klungkung (*Design Review of Muara Unda Dam in Kab. Klungkung*).



This system will be further analyzed by the ESP consultant by using an integrated hydraulic modelling structured in an STT setting.

9 **Upstream Watershed Protection**
 In order to optimize amount of sediment yield and associated impacts on the life cycle of existing/proposed facilities, upstream watershed protection measures must be introduced by the ESP Consultant.
 The global applications introduced by the International Fund for Agriculture Development and FAO should be evaluated by the ESP Consultant to identify applications for site-specific actions.

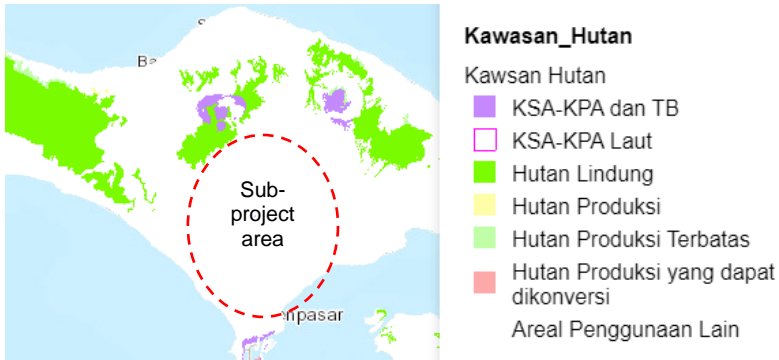

10 **Implementation Plan**
 DED, AMDAL and LARAP will be prepared under ESP in 2020-2021. Land acquisition might be conducted in 2020-2022. The Muara Unda STT will possibly start in 2022 and followed by the downstream system in 2022 until 2024, so that PDAM may start to deliver water in 2024.

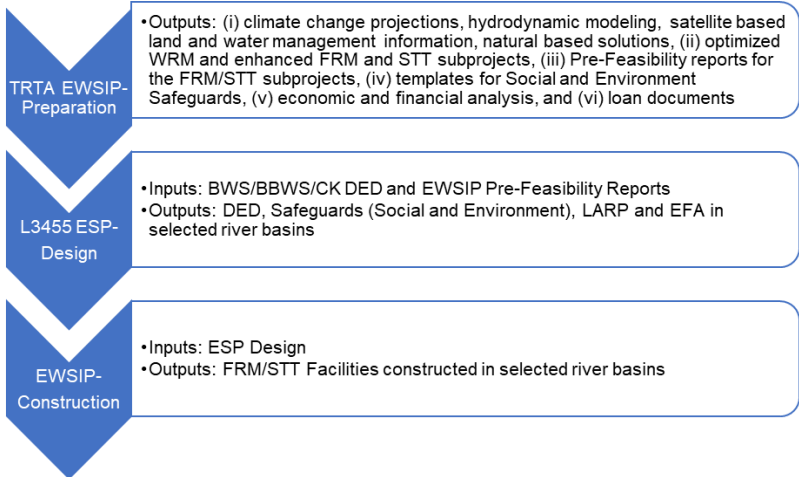
Works	2020	2021	2022	2023	2024
Land Acquisition by Bali Province	■	■	■		
Water Supply System DED Preparation under Loan 3455 INO ESP	■				
Water Supply System AMDAL and LARAP study preparation under Loan 3455 INO ESP		■			
RWS Intake and Transmission Construction by BWS Bali Penida			■		
Water Supply Production and Distribution System Construction by DGHS			■		

The schedule above is excluding the implementation schedule for downstream network. ESP consultant will complete this schedule.

11 **Beneficiaries**
 Approximately 864,000 people of population in Kab. Klungkung, Kota Denpasar, Kab. Badung, Kab. Gianyar, and Kab. Tabanan will have access to drinking water.

12 **Alignment with Spatial Plan**
 The alignment of the subproject with the spatial plan of Bali Province shall be confirmed in coordination with the government agencies

13	Potential Environment Impact	<p>The subproject works are not expected to cross any protected area (forest/swamp), biodiversity sanctuary or protect forest, according to Indonesia Forest Area Map 2019 by Ministry of Environment and Forestry.</p>  <p>There are no documents on environmental impacts (i.e., IEE, AMDAL, etc.)</p>
14	Potential Involuntary Resettlement	<p>The subproject is not expected to require resettlement, since the WTP and offtake will be located at empty lands. The main impact are expected during pipe construction which will further analyzed during DED.</p> <p>There are no documents on land acquisition, socio-economic conditions and resettlement needs along the project corridor (i.e, LARAP, IP&IR, etc.)</p>
15	Potential Indigenous people impact	<p>The proposed subproject doesn't cross any IP area according to the BRWA (Registration Agency of Indigenous Community Territories) map.</p> <p>The potential for crossing areas with Indigenous People (IP) should be evaluated by i) reviewing the BRWA (Indigenous Territory Registration Agency) database, ii) reviewing the AMAN (Indigenous Peoples Alliance of the Archipelago) database, and iii) site-specific surveys by the ESP Consultant during Detailed Engineering Design.</p> 
16	Readiness FS/DED/IEE-EIA/LARP	<p>There are no DED, AMDAL, and LARAP documents available.</p>

17	Proposed enhancements	<p>Enhancements to be administered through the STT framework include the following:</p> <ol style="list-style-type: none"> Automatization system (SCADA system) of the water treatment process control for efficiency improvement and monitoring. Smart meter reading and smart billing system to minimize error reading hence minimize the administrative losses. Sludge management of the excess sludge from the Water Treatment Plant process through design and construction of sludge treatment plant and train the PDAM staff in sludge management and handling. Establishment of District Metered Areas (DMAs) as part of a Non-Revenue Water management system and stay equipped with calibrated telemetry water meter instruments for managing water flows and Non-Revenue Water reduction program. Development of an integrated asset management system via GIS to allow PDAM's efficient management of assets through operation and maintenance activities by including capacity building to the water utilities (PDAM) staff. Development of a real-time operation system equipped with SCADA network, integrated hydraulic model, real-time monitoring of gage network along the integrated STT system. Improvement in the technical operation and maintenance (O&M) through energy efficiency and Non-Revenue Water Management by including capacity building. Introduction of smart water technologies through use of automated and telemetry control of hydrometric equipment along the integrated STT system (reservoir, water treatment plant, pumps/valves along the water transmission/distribution network) for operational efficiency and optimization. Consideration for use of renewable energy sources along the integrated STT system including i) pumped hydropower schemes in reservoirs, ii) solar panels (green technology) at water treatment and water distribution/transmission network to produce the power for pump as Indonesia is located in tropical area (high solar radiation and renewable energy).
18	Linkages between EWSIP and ESP	<p>The linkages between the TRTA, Engineering Services Project (ESP), DED, and construction under EWSIP are schematized below:</p>  <pre> graph TD A[TRTA EWSIP-Preparation] --> B[L3455 ESP-Design] B --> C[EWSIP-Construction] </pre> <p>TRTA EWSIP-Preparation</p> <ul style="list-style-type: none"> •Outputs: (i) climate change projections, hydrodynamic modeling, satellite based land and water management information, natural based solutions, (ii) optimized WRM and enhanced FRM and STT subprojects, (iii) Pre-Feasibility reports for the FRM/STT subprojects, (iv) templates for Social and Environment Safeguards, (v) economic and financial analysis, and (vi) loan documents <p>L3455 ESP-Design</p> <ul style="list-style-type: none"> •Inputs: BWS/BBWS/CK DED and EWSIP Pre-Feasibility Reports •Outputs: DED, Safeguards (Social and Environment), LARP and EFA in selected river basins <p>EWSIP-Construction</p> <ul style="list-style-type: none"> •Inputs: ESP Design •Outputs: FRM/STT Facilities constructed in selected river basins