



ADAPTATION FUND

AFB/PPRC.34/12  
16 October 2024

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Adaptation Fund Board  
Project and Programme Review Committee  
Thirty fourth Meeting  
Bonn, Germany, 8-9 October 2024

Agenda item 12

**REQUEST FOR CHANGE IN PROJECT OUTPUTS,  
MATERIAL CHANGE AND REVISION OF  
DISBURSEMENT SCHEDULE: KEMITRAAN  
(INDONESIA)**

## Background

1. During the intersessional period between its thirty-fifth and thirty-sixth meetings, the Adaptation Fund Board (the Board) approved through Decision B.35.a-35.b/50 a three-year project titled “Safekeeping-Surviving-Sustaining towards Resilience: 3S Approach to Build Coastal City Resilience to Climate Change Impacts and Natural Disasters in Pekalongan City, Central Java Province” in Indonesia, submitted by the Partnership for Governance Reform in Indonesia (Kemitraan), for a requested amount of US\$ 5,972,670.
2. The overall objective of the project is to build resilience to climate change impacts in Pekalongan City by implementing hard and soft adaptation interventions in vulnerable coastal communities. The project includes five components: (i) Enhancing protection along the coastal line of Pekalongan City; (ii) Enhancing coastal community capacity in developing and implementing Local Climate Change Adaptation Action Plan (RAD API), climate change information system, Climate Smart Initiative; (iii) Strengthening vertical coordination by enhancing provincial government’s capacity in mainstreaming climate change adaptation and resilience into Central Java Province development plan which in turn could foster better climate-related policy on climate financing and bottom-up planning; (iv) Strengthening vertical coordination and collaboration between national and local government in climate adaptation context and Enriching knowledge, toolkits and methodologies coastal resilience for the national government; and (v) Improving community’s resilience through initiation of alternative livelihood and improvement of sanitation facility.
3. As mandated by the aforementioned Decision, an agreement was prepared and signed between the Board and Kemitraan on 18 January 2021. The first tranche of disbursement for the implementation of the project was released following the signature of the agreement, for a total amount of US\$ 2,518,797. The project held its inception workshop on 15 July 2021.
4. On 8 August 2022, Kemitraan informed the secretariat that a decision was made by the Province of Central Java and the Municipality of Pekalongan “during the approval process of Kemitraan’s proposal” to construct one of the main adaptation infrastructures the project had intended to deliver (i.e., the construction of a 300 m parapet), using its own budget. Given this situation, Kemitraan proposed to construct two, separate, 150-meter-long breakwaters instead, in a different location than initially envisaged.
5. In September 2022, the Secretariat informed Kemitraan that according to paragraph 12 of Annex 7 of the Adaptation Fund (AF) Operational Policies and Guidelines (OPG), any changes related to project output or outcome indicators, as well as associated targets, required prior approval from the AF Board. This approval would follow a full technical review of the revised project document by the Project and Programme Review Committee (PPRC). In order for the secretariat to initiate such request for changes, Kemitraan was invited to share a revised project document reflecting the requested changes, together with a letter providing background information and justification for the intended changes, a revised budget at output-level, a revised results framework, and a letter from the Designated Authority (DA) endorsing the aforementioned changes. Additionally, the secretariat instructed Kemitraan to refrain from implementing any proposed activities until the PPRC had reviewed the request and the Board had given its approval.
6. Upon review of a first package of documents, the secretariat shared a first technical

review sheet in February 2023, in which Kemitraan was required to submit a new letter of endorsement from the DA, together with a technical feasibility study for the breakwaters, and an Environmental and Social Impact Assessment (ESIA) and revised Environmental and Social Management Plan (ESMP), among others.

7. A second, third, fourth, fifth and sixth technical review sheets were shared with Kemitraan in April 2023, January 2024, February 2024, April 2024, August 2024, respectively, in which the secretariat reiterated the need for Kemitraan to address various Corrective Action Requests (CARs) and Clarification Requests (CRs).

8. On 21 August 2024, Kemitraan shared a sixth response sheet (see annex 1), together with a revised project document highlighting the changes made to the version approved by the Board (see annex 2), following which the secretariat prepared a seventh technical review sheet (see annex 3). Responding to clarification requests from the secretariat, Kemitraan had submitted additional documents and information since February 2023, including a letter from the DA endorsing the request for change (see annex 4), a technical feasibility study (see annex 5), and an Environmental and Social Impact Assessment (see annex 6).

9. On 5 July 2024, the Board approved through Decision 42-43/11 a request for a twelve-months no-cost extension of the project completion date from 15 July 2024 to 14 July 2025. As of 13 August 2024, a total amount of US\$ 4,769,865 had been disbursed by the Trustee to the project.

### **Suggested changes**

10. In light of the decision made by the Province of Central Java and the Municipality of Pekalongan to construct one of the main adaptation infrastructures the project had intended to deliver, Kemitraan's request consists in:

- (i) Modifying outputs 1.1.2 (construction of a 300 m parapet at Slamaran Beach in kelurahan Degayu) and 1.1.3 (Coastal embankment (geo-tube/sand trap) at Kandang Panjang) into the construction of two separate 150-meters-long breakwaters covering the coast of Kandang Panjang (new output 1.1.2).
- (ii) Modifying output 1.1.1 (establishing "6 kilometers of Mangrove Ecosystem") into restoring "3 hectares of mangrove ecosystem" in order to better complement the new infrastructure intended to be constructed under the new output 1.1.2.

11. In addition, when reviewing the documents provided by Kemitraan, the secretariat identified a material change (defined by the Board as a cumulative total budget change at output-level that involves 10 % of more of the total budget of the project). As a result, it subsequently shared the relevant provisions of the Fund's OPG Annex 7 with the Implementing Entity (Kemitraan).

12. Finally, during its review, the secretariat identified a need to revise the project disbursement schedule to ensure compliance with the Fund's policies on Executing Entity costs and Implementing Entity fees.

### **Secretariat's review of the request**

13. Following a review of the revised fully-developed project document (see annex 2), and acknowledging that the request has been endorsed by the Designated Authority in Indonesia (see annex 4), the secretariat is of the view that the request for change in project outputs, material change and revision of disbursement schedule could be recommended for approval, in application of paragraphs 6, 7, 8 and 12 of the Annex 7 of the Fund OPG.

14. It is worth noting that paragraph 12 of Annex 7 of the OPG states that changes in targets and/or indicators may only be accepted in exceptional circumstances and up to the submission of the first Project Performance Report (PPR) for the project.

### **Recommendation**

15. Having considered document AFB/PPRC.34/12 and its annexes, the PPRC may want to consider and recommend the Board to approve the request for change in project outputs, material change and revision of disbursement schedule for the project “Safekeeping-Surviving-Sustaining towards Resilience: 3S Approach to Build Coastal City Resilience to Climate Change Impacts and Natural Disasters in Pekalongan City, Central Java Province”, as requested by the Partnership in Governance Reform in Indonesia (Kemitraan).

### **Annex**

- Annex 1 - Sixth response sheet shared by Kemitraan
- Annex 2 - Revised project document highlighting the changes intended to be made, together with new annexes 13 and 18, and revised ESMP
- Annex 3 - Seventh review sheet prepared by the secretariat
- Annex 4 - Letter of endorsement from the Designated Authority for Indonesia
- Annex 5 – Technical feasibility study
- Annex 6 – Environmental and Social Impact Assessment



## Annex 1 - Sixth response sheet shared by Kemitraan



ADAPTATION FUND

## ADAPTATION FUND BOARD SECRETARIAT TECHNICAL REVIEW OF PROJECT/PROGRAMME PROPOSAL

PROJECT/PROGRAMME CATEGORY: Regular Size Full Proposal

<b>Country/Region:</b>	Indonesia	
<b>Project Title:</b>	Safekeeping-Surviving-Sustaining towards Resilience: 3S Approach to Build Coastal City Resilience to Climate Change Impacts and Natural Disasters in Pekalongan City, Central Java Province	
<b>Thematic Focal Area:</b>	Multi-sectors	
<b>Implementing Entity:</b>	The Partnership for Governance Reform in Indonesia (Kemitraan)	
<b>Executing Entities:</b>	The Partnership for Governance Reform in Indonesia (Kemitraan)	
<b>AF Project ID:</b>	AF00000113	
<b>IE Project ID:</b>		<b>Requested Financing from Adaptation Fund (US Dollars): 5,972,670</b>
<b>Reviewer and contact person:</b>	Hugo Remaury	<b>Co-reviewer(s):</b> Martina Dorigo
<b>IE Contact Person:</b>	Abimanyu Sasongko Aji	

Technical Summary	<p>The project “Safekeeping-Surviving-Sustaining towards Resilience: 3S Approach to Build Coastal City Resilience to Climate Change Impacts and Natural Disasters in Pekalongan City, Central Java Province” aims to build resilience to climate change impacts in Pekalongan City (Indonesia) by implementing hard and soft adaptation interventions in vulnerable coastal communities. This will be done through the five components below:</p> <p><u>Component 1:</u> Enhancing protection along the coastal line of Pekalongan City (USD 1,329,480).</p> <p><u>Component 2:</u> Enhancing coastal community capacity in developing and implementing Local Climate Change Adaptation Action Plan (RAD API), climate change information system, Climate Smart Initiative (USD 1,004,444).</p> <p><u>Component 3:</u> Strengthening vertical coordination by enhancing provincial government’s capacity in mainstreaming climate change adaptation and resilience into Central Java Province development plan which in turn could foster better climate-related policy on climate financing and bottom-up planning (USD 194,815).</p> <p><u>Component 4:</u> Strengthening vertical coordination and collaboration between national and local government in climate adaptation context and Enriching knowledge, toolkits and methodologies coastal resilience for the</p>
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national government (USD 290,371).

Component 5: Improving community's resilience through initiation of alternative livelihood and improvement of sanitation facility (USD 2,506,276).

Requested financing overview:

Project/Programme Execution Cost: USD 559,018

Total Project/Programme Cost: USD 5,325,386

Implementing Fee: USD 88,266

Financing Requested: USD 5,972,670

The 1<sup>st</sup> technical review raises some issues related to the design of the proposed revised interventions, their sustainability, compliance with the Fund's Environmental and Social Policy, among others, as discussed in the number of Clarification Requests (CRs) and Corrective Action Requests (CARs) raised in the review.

The 2<sup>nd</sup> technical review finds that the proposal has not addressed some of the CRs and CARs requests. Namely, the following issues remain: a letter from the Designated Authority must be submitted, the final feasibility study should be provided and reflected in relevant sections of the proposal, the environmental impact assessment should be provided, and its findings reflected in a revised ESMP, and both IE fee and EE cost should be brought in compliance with the caps set in the Fund's Operational Policies and Guidelines.

The 3<sup>rd</sup> technical review finds that the proposal has not addressed some of the CRs and CARs requests. Indeed, an Environmental and Social Impact Assessment (ESIA) for the breakwater construction should be carried out prior to construction and its findings subsequently reflected in a revised ESMP.

The 4<sup>th</sup> technical review finds that the proposal has not addressed some of the CRs and CARs requests. Indeed, an Environmental and Social Impact Assessment (ESIA) for the breakwater construction should be carried out prior to construction and its findings subsequently reflected in a revised ESMP. Similarly, the findings of the technical feasibility study should be reflected throughout relevant sections of the project document.

The 5<sup>th</sup> technical review finds that, although some CRs were addressed, the proposal has not addressed some of the CRs and CARs requests. Indeed, an Environmental and Social Impact Assessment (ESIA) for the breakwater construction should be carried out prior to construction and its findings subsequently reflected in a revised ESMP. Similarly, the findings of the technical feasibility study should be reflected throughout relevant sections of the project document.

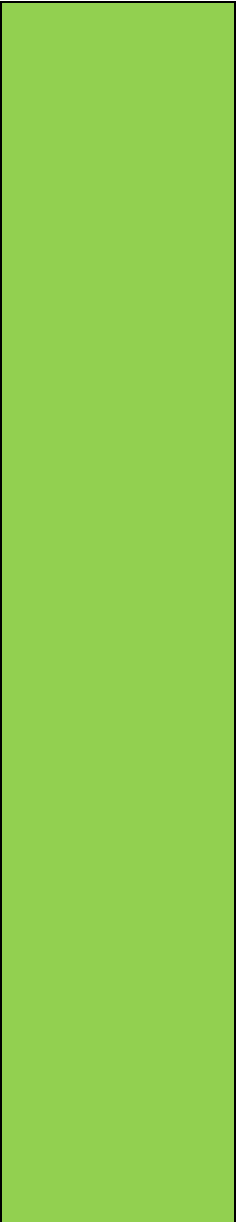
	The 6 <sup>th</sup> technical review finds that, although some progress was made in addressing the pending CR/CAR, the proposal has not fully addressed them. Indeed, findings of both the feasibility study and ESIA should be reflected throughout all relevant sections of the project document and related annexes.
Date:	13 August 2024

Review Criteria	Questions	1 <sup>st</sup> technical review	5 <sup>th</sup> technical review	6 <sup>th</sup> technical review	
Country Eligibility	1. Is the country party to the Kyoto Protocol or the Paris Agreement?	<b>Yes.</b>			
	2. Is the country a developing country particularly vulnerable to the adverse effects of climate change?	<b>Yes.</b> The country's geographic location makes it extremely vulnerable to climate change impacts (i.e., flash floods, sea level rise and urban vulnerability) and these impacts are already being felt by vulnerable coastal communities.			
Project Eligibility	1. Has the designated government authority for the Adaptation Fund endorsed the project/programme?	<b>Yes.</b> As per the Endorsement letter dated January 16, 2020.  <b>CAR 1:</b> Given that Kemitraan intends to serve both as the implementing entity and the executing entity for the project, please kindly submit at your earliest convenience a letter			

		from the Designated Authority requesting such project management arrangement. <b>(Cleared as per the assessment of the 3<sup>rd</sup> technical review)</b>			
	2. Does the length of the proposal amount to no more than One hundred (100) pages for the fully-developed project document, and one hundred (100) pages for its annexes?	<b>No.</b> The revised project document is 116 pages long. Nevertheless, since the original project document was approved (Decision B.35.a-35.b/50), this criterion is waived.			
	3. Does the project / programme support concrete adaptation actions to assist the country in addressing adaptive capacity to the adverse effects of climate change and build in climate resilience?	<b>Yes.</b> <b>CR 1:</b> Please describe how the breakwater and mangroves development activities will be adequate to face the identified climate threats (namely, sea level rise, change in rainfall patterns, increasing frequency and intensity of floods). <b>(Cleared as per the assessment of the 2<sup>nd</sup> technical review)</b>	<b>CR 2: Not cleared.</b> The findings of the feasibility study must be reflected in all relevant sections of the revised project document, including in part II A as well as in all relevant sections. This should allow responding to fundamental questions such as: what would be the expected quantity of building materials needed to	<b>CR 2: Not cleared.</b> Despite having conducted a feasibility study, its main findings are not fully reflected in the revised project document. Relevant sections of the document which must reflect the feasibility study findings include Part II A (e.g., i) describe how would the proposed structure	<b>CR 2:</b> i) The explanation can be found in paragraph 55 point 3 ii) The explanation can be found in paragraph 55 point 3 iii) The explanation can be found in paragraph 55 point 3

		<p><b>CR 2:</b> Please justify the location and design of both the proposed breakwater and mangroves development, using maps and technical studies/assessments as much as possible. Such justification should address why Bandengan and Kandang Panjang were prioritized over Panjang Baru and Penkang Wetan; whether any feasibility studies/assessments were already undertaken for the breakwater (if it was, please kindly share a copy); and why the breakwater will not be continuous along the coastline, among others.</p> <p><b>CR 3:</b> Please confirm whether the plantation of mangroves will take place on public lands or whether the Municipal government plans to acquire private land for this</p>	<p>build the breakwaters; what is the rationale for proposing two separate breakwaters of 150 m each as opposed to one 300 m long breakwater; would the two proposed breakwaters be sufficient to cope with coastal erosion in light of anthropogenic pressures or; how would the proposed breakwaters be suited to the identified climate and anthropogenic pressures, allowing it to be sustained after the project ends, among others.</p>	<p>be suited to the identified climate change related pressure; ii) explain the benefits in building two separate breakwaters instead of a single one; iii) clarify whether a groin will be built in addition to the breakwater, given its expected benefits in expanding the sedimentation area) and II C (e.g., addressing discrepancies between the text provided in II C and those provided in the ESIA in terms of the structure expected lifetime). Please revise the project document accordingly.</p>	<p>Text under II C has been adjusted with the lifetime of rubble mound breakwater in the table of Cost Effectiveness</p>
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		<p>intervention (in which case, please reflect this in relevant sections of the revised proposal). <b>(Cleared as per the assessment of the 4<sup>th</sup> technical review)</b></p> <p><b>CR 4:</b> Please confirm whether the project overall timeline will be impacted by this request for changes and reflect the new timeline in the revised fully-developed project proposal as needed. <b>(Cleared as per the assessment of the 2<sup>nd</sup> technical review)</b></p>			
	<p>4. Does the project / programme provide economic, social and environmental benefits, particularly to vulnerable communities, including gender considerations, while avoiding or mitigating negative impacts, in compliance with the Environmental and Social Policy and</p>	<p><b>Yes.</b></p> <p><b>CR 5:</b> Since the target areas (Kelurahan) have now changed, please confirm whether the number of direct and indirect beneficiaries have changed, and revise the figures provided in paragraph 68 accordingly. <b>(Cleared as per the</b></p>			

	<p>Gender Policy of the Fund?</p>	<p><b>assessment of the 2<sup>nd</sup> technical review)</b></p> <p><b>CR 6:</b> Please confirm whether any marginalized and/or vulnerable groups, including indigenous communities, have been identified in the new target areas (Kelurahan). If such groups were identified, please outline the particular benefits provided to those groups, and describe how the project will enable their full participation into the project, including in terms of decision making. <b>(Cleared as per the assessment of the 2<sup>nd</sup> technical review)</b></p> <p><b>CR 7:</b> Please revise the tables presented in paragraphs 70, 71 and 72 to reflect i) the new target areas and associated beneficiaries; and ii) the new activities proposed. <b>(Cleared as</b></p>			

		<p><b>per the assessment of the 2<sup>nd</sup> technical review)</b></p> <p><b>CR 8:</b> Please revise paragraphs 82 and 89 to reflect the new activities proposed, whenever applicable.  <b>(Cleared as per the assessment of the 2<sup>nd</sup> technical review)</b></p>			
	<p>5. Is the project / programme cost effective?</p>	<p><b>Yes.</b></p> <p><b>CR 9:</b> Please reflect all proposed changes (including the mangrove-related ones) in paragraph 90 and associated tables.  <b>(Cleared as per the assessment of the 2<sup>nd</sup> technical review)</b></p> <p><b>CR 10:</b> In the “Proposed adaptive actions cost-effectiveness rationale” table, please expand on the rationale for selecting the breakwater intervention compared to other more cost-effective options (including geotubes),</p>			



		and the development of 3 ha of mangroves compared to other alternatives options that may exist. <b>(Cleared as per the assessment of the 2<sup>nd</sup> technical review)</b>			
	6. Is the project / programme consistent with national or sub-national sustainable development strategies, national or sub-national development plans, poverty reduction strategies, national communications and adaptation programs of action and other relevant instruments?	<b>This is yet to be demonstrated.</b>  <b>CR 11:</b> The stated rationale behind this request for changes is that “changes in the development policy both of the Province Central Java and the Municipality of Pekalongan city have taken place”. However, these changes in policy/plans are not reflected in this section of the revised fully-developed proposal. As a result, please reflect these changes in policy/plan in the revised fully-developed proposal and describe how the proposed revised interventions will align with these policies/plans.			

		<b>(Cleared as per the assessment of the 2<sup>nd</sup> technical review)</b>			
	7. Does the project / programme meet the relevant national technical standards, where applicable, in compliance with the Environmental and Social Policy of the Fund?	<b>Yes.</b>  <b>CR 12:</b> Considering the selection of the breakwater option, please list relevant building codes and any other national technical standards that would apply; describe how the project will comply with such codes; and explain the steps that will be taken to comply with building codes (and related license/permits that may be required). <b>(Cleared as per the assessment of the 4<sup>th</sup> technical review)</b>			
	8. Is there duplication of project / programme with other funding sources?	<b>This is yet to be demonstrated.</b>  <b>CR 13:</b> The stated rationale behind this request for changes is that on-going initiatives from the municipality of Pekalongan city and the Provincial Government of Central Java are already			

		<p>intervening in the Eastern Part of the city, where the original project proposal intended to intervene. However, these initiatives are not listed in this section of the revised fully-developed proposal. As a result, please list all relevant potentially overlapping initiatives and describe how the proposed new interventions will not overlap but rather build complementarity with them. In addition, please describe the framework the project will establish to coordinate with such initiatives. <b>(Cleared as per the assessment of the 3<sup>rd</sup> technical review)</b></p>			
	<p>9. Does the project / programme have a learning and knowledge management component to capture and feedback lessons?</p>	<p><b>Yes.</b></p>			

	<p>10. Has a consultative process taken place, and has it involved all key stakeholders, and vulnerable groups, including gender considerations in compliance with the Environmental and Social Policy and Gender Policy of the Fund?</p>	<p><b>Unclear.</b></p> <p><b>CR 14:</b> Please confirm whether direct and indirect stakeholders in Bandegan and Kandang Panjang, including local communities, were consulted about the proposed breakwater, and include the key consultation findings (suggestions and concerns raised) in the revised fully-developed project proposal.  <b>(Cleared as per the assessment of the 4<sup>th</sup> technical review)</b></p>			
	<p>11. Is the requested financing justified on the basis of full cost of adaptation reasoning?</p>	<p><b>Unclear.</b></p> <p><b>CR 15:</b> Since on-going initiatives are being implemented in the Eastern part of Pekalongan city, please demonstrate how the proposed breakwater will deliver its expected results regardless of the success of the other on-going initiatives.  <b>(Cleared as per the</b></p>			

		<b>assessment of the 3<sup>rd</sup> technical review)</b>			
	12. Is the project / program aligned with AF's results framework?	<b>Yes.</b>			
	13. Has the sustainability of the project/programme outcomes been taken into account when designing the project?	<p><b>This is yet to be demonstrated.</b></p> <p><b>CR 16:</b> Please remove statements related to the parapet construction and reflect the new proposed interventions throughout this section. <b>(Cleared as per the assessment of the 2<sup>nd</sup> technical review)</b></p> <p><b>CR 17:</b> Please describe how the proposed breakwater and mangroves will be sustained beyond the project lifetime (including but not limited to who will be responsible for operations and maintenance, including from a financial standpoint). <b>(Cleared as per the assessment of the 2<sup>nd</sup> technical review)</b></p>			

	<p>14. Does the project / programme provide an overview of environmental and social impacts / risks identified, in compliance with the Environmental and Social Policy and Gender Policy of the Fund?</p>	<p><b>Unclear.</b></p> <p><b>CAR 2:</b> Please note that, given the environmental and social risks identified, an Environmental and Social Impact Assessment (ESIA) for the breakwater construction should be carried out, in compliance with the Fund's Environmental and Social Policy. Such assessment should consider (i) all potential direct, indirect, transboundary, and cumulative impacts that could result from the proposed breakwater intervention; (iii) assess alternatives to this intervention; (iii) identify possible measures to avoid, minimize, manage or mitigate environmental and social impacts of the proposed breakwater intervention; and iv) be submitted for public</p>	<p><b>CAR 2: Not cleared.</b></p> <p>i) An ESIA in compliance with the AF ESP is required for the construction of the two breakwaters. Kindly refer to both the <a href="#">ESP</a> and the <a href="#">related guidance document</a>.</p> <p>ii) The ESIA findings should be reflected in all relevant sections of the revised project document, and in the ESMP, which should address the shortfalls referred to under the 4<sup>th</sup> technical review CAR 2.</p> <p>iii) The revised project document should clarify whether a UKL-UPL document was submitted for the breakwaters' construction, and whether the</p>	<p><b>CAR 2: Not cleared.</b> A new subset of CRs/CAR is created hereunder to facilitate the tracking of the follow-up comments raised below.</p> <p><b>CR 30:</b> Please kindly confirm whether the ESIA was submitted for public review.</p> <p><b>CR 31:</b> Please translate p.184-185 of the ESIA in English.</p> <p><b>CR 32:</b> The ESIA should clarify why some figures show five breakwaters despite the study assessing the impact of two breakwaters only. Alternatively, these figures may be replaced by others showing two breakwaters only.</p>	<p><b>CR 30:</b> As per AF-ESP requirements, the ESIA document is uploaded to KEMITRAAN's website for public consultation.</p> <p><b>CR 31:</b> the p. 184-185 has been translated.</p> <p><b>CAR 32:</b> All figures are substituted with only two breakwater constructions.</p> <p><b>CR 33:</b> ESMP and project document updated accordingly.</p> <p><b>CR 34:</b> updated accordingly</p> <p><b>CR 35:</b> updated accordingly</p> <p><b>CR 36:</b> updated accordingly</p>
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		<p>review. Outcomes of the ESIA should be reflected in the project ESMP.</p> <p><b>CR 18:</b> Since this section was edited without using track changes, please confirm whether the project was entirely re-screened for ESP-related risks, in light of the new proposed interventions. <b>(Cleared as per the assessment of the 3<sup>rd</sup> technical review)</b></p> <p><b>CR 19:</b> <i>Principle 1:</i> please confirm whether the project was screened for ESP-related risks against all construction-related laws, in light of the proposed breakwater, and reflect this in part II.K. In line with the ESP, please describe the legal and regulatory framework of prior permission (notably construction permit) that the construction of the</p>	<p>associated permit was granted. Any relevant risks mitigation measures described in the UKL-UPL should be reflected in the revised ESMP.</p>	<p><b>CR 33:</b> Principle 1: both the ESMP and project document Part II.K should include the applicable domestic laws listed in section 4.2 of the ESIA.</p> <p><b>CR 34:</b> Principle 1: considering the outcomes of the ESIA Focus Group Discussions with government officials, both the ESMP and project document Part II K should describe the current status, steps already taken, and plan to achieve compliance with the UKL-UPL and securing the (KKPRL) clearance from the Ministry of Marine and Fishery Affairs.</p> <p><b>CR 35:</b> Principle 2: in both the ESMP</p>	<p><b>CR 37:</b> there is no land related conflict in the construction of the breakwater since the construction site is approx.100m away from the coastline, falls under the provincial territorial assets.</p> <p><b>CR 38:</b> there is no potential of involuntary displacement of both physical and economical, since the breakwater construction site is far from settlement area and does not disturb any livelihood activity, both on land and in the sea. The documents are updated accordingly</p>
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		<p>breakwater may entail. <b>(Cleared as per the assessment of the 3<sup>rd</sup> technical review)</b></p> <p><b>CR 20: Principle 2:</b> please confirm whether the proposed construction of a breakwater may impede access of any group to the essential services and rights mentioned in Principle 2 of the ESP. <b>(Cleared as per the assessment of the 3<sup>rd</sup> technical review)</b></p> <p><b>CR 21: Principle 3:</b> please confirm whether any marginalized or vulnerable groups are present in the proposed breakwater target areas. If such groups were identified, please describe them; identify the adverse impacts they are likely to experience from the project; and describe how such impacts will be mitigated. <b>(Cleared as per the assessment of the 3<sup>rd</sup></b></p>		<p>and revised project document, please shift the elements related to “Recruitment of construction workers” related risk identified in the ESIA to Principle 2 Access and Equity (they are currently listed under Principle 6), as well as those of “Opening of Business Opportunities” which are currently not reflected in the ESMP nor in the project document.</p> <p><b>CR 36:</b> Principle 6: given that the ESIA identifies risks related to “Increasing Community Income” and “Work Health and Safety Disturbances” and defines associated mitigation measures, please reflect such risks</p>	<p><b>CR 39:</b> done</p> <p><b>CR 40:</b> done</p> <p><b>CR 41:</b> done</p> <p><b>CR 42:</b> done</p> <p><b>CR 43:</b> signed final ESIA document attached</p> <p><b>CAR 5:</b> the project document has been reassessed and compared with the original one. So far all changes are tracked</p>
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		<p><b>technical review)</b></p> <p><b>CR 22:</b> <i>Principle 8:</i> please confirm whether involuntary resettlements are expected because of the breakwater construction and refer to the related guidance document for IEs compliance with the ESP in such case.  <b>(Cleared as per the assessment of the 3<sup>rd</sup> technical review)</b></p> <p><b>CR 23:</b> Please revise sections related to principles 10 and 15 in light of the proposed interventions (breakwater and mangrove development).  <b>(Cleared as per the assessment of the 3<sup>rd</sup> technical review)</b></p> <p><b>CR 24:</b> Given that the identification of environmental and social risks has changed due to the new proposed interventions, please</p>		<p>and associated mitigation measures in both the ESMP and revised project document part II.K.</p> <p><b>CR 37:</b> Principle 8: the ESIA identifies risks related to land takeover and states “1 case of conflict”. Please clarify whether the project is facing a case of conflict related to land.</p> <p><b>CR 38:</b> Principle 8 : In both the ESMP and revised project document part II K, please determine if physical or economic displacement is required by the project and if it is voluntary or involuntary. Please refer to the <a href="#">guidance document for IEs on compliance</a>.</p>	
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		<p>provide a revised ESMP that includes revised risk mitigation measures and related M&amp;E approach.  <b>(Cleared as per the assessment of the 3<sup>rd</sup> technical review)</b></p>		<p><a href="#">with the AF ESP</a> for more information.</p> <p><b>CR 39:</b> Principle 9: given that the ESIA identifies risks related to “Maintaining the Preservation of Natural Resources and Sustainability and Protection of Pekalongan City Coastal Areas” and “Recovery of Coastal Ecosystems and Mangrove Forests” and defines associated mitigation measures, please reflect such risks and associated mitigation measures in both the ESMP and revised project document part II.K.</p> <p><b>CR 40:</b> Principle 11: in both the ESMP and revised project document</p>	
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				<p>part II.K, please acknowledge a risk of temporary increased of greenhouse gases emission and, as associated mitigation measure, describe how the project will mitigate such emissions. Both ESIA and feasibility study (chapter 8) already include useful elements on building materials which can be used to demonstrate compliance with this principle.</p> <p><b>CR 41:</b> Principle 12: please reflect the risks related to “Decreased Ambient Air Quality and increased dust”, “noise exposure”, “Increased Waste Generation”, “Wastewater generation”, “hazardous waste”</p>	
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				<p>into part II.K of the revised project document, as well as the risks and mitigation measures related to “Increased Noise Intensity”, “Wastewater generation”, “hazardous waste” in both the ESMP and revised project document part II.K.</p> <p><b>CR 42:</b> Principle 15: please reflect the risks related to “Increased Noise Intensity” into part II.K of the revised project document and, in the ESMP, shift the elements related to this risk to “Lands and soil conservation”.</p> <p><b>CR 43:</b> Once all CRs are addressed, please share a copy of the final ESIA signed by Kemitraan.</p>	
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				<p><b>CAR 5:</b> The secretariat noticed that some changes made by Kemitraan do not appear in track change anymore. Please kindly share a revised project document highlighting all changes made in the original version of the project document approved by the Board.</p>	
Resource Availability	1. Is the requested project / programme funding within the cap of the country?	<b>Yes.</b>			
	2. Is the Implementing Entity Management Fee at or below 8.5 per cent of the total project/programme budget before the fee?	<b>Yes.</b>			
	3. Are the Project/Programme Execution Costs at or below 9.5 per cent of the total project/programme	<p><b>No.</b></p> <p>Please note, that in the case of an implementing entity acting as the executing entity for a</p>			

	budget (including the fee)?	<p>project/programme, execution costs are capped at 1.5% of the total budget requested, before the implementing entity fees.</p> <p><b>CAR 3:</b> Please reduce the project execution cost to 1.5% of the total budget requested, before the IE fee.  <b>(Cleared as per the assessment of the 3<sup>rd</sup> technical review)</b></p>			
Eligibility of IE	1. Is the project/programme submitted through an eligible Implementing Entity that has been accredited by the Board?	<b>Yes.</b>			
Implementation Arrangements	1. Is there adequate arrangement for project / programme management, in compliance with the Gender Policy of the Fund?	<p><b>Yes.</b></p> <p><b>CR 25:</b> Please provide a strong justification on why Kemitraan is acting both as IE and EE, considering that the division of roles from an implementing to an executing entity is a principle of the</p>			

		Fund's Operational Policies and Guidelines. <b>(Cleared as per the assessment of the 3<sup>rd</sup> technical review)</b>			
	2. Are there measures for financial and project/programme risk management?	<b>Yes.</b>			
	3. Are there measures in place for the management of for environmental and social risks, in line with the Environmental and Social Policy and Gender Policy of the Fund?	<b>Yes.</b>  <b>CR 26:</b> Given that the project has already started, please confirm whether the grievance mechanism described is already in place and reflect this throughout this section accordingly. <b>(Cleared as per the assessment of the 3<sup>rd</sup> technical review)</b>			
	4. Is a budget on the Implementing Entity Management Fee use included?	<b>Yes.</b>			
	5. Is an explanation and a breakdown of the execution costs included?	<b>Yes.</b>			
	6. Is a detailed budget including budget notes included?	<b>Yes.</b>  <b>CR 27:</b> Please revise the detailed budget to			

		reflect the changes proposed (e.g., rephrase output 1.1.1, etc.).			
	7. Are arrangements for monitoring and evaluation clearly defined, including budgeted M&E plans and sex-disaggregated data, targets and indicators, in compliance with the Gender Policy of the Fund?	<b>Yes.</b>			
	8. Does the M&E Framework include a break-down of how implementing entity IE fees will be utilized in the supervision of the M&E function?	<b>Yes.</b>			
	9. Does the project/programme's results framework align with the AF's results framework? Does it include at least one core outcome indicator from the Fund's results framework?	<b>Yes.</b>  <b>CR 28:</b> Please revise all relevant areas of the results framework (i.e., indicators, targets, risk and assumptions etc.) to reflect the changes proposed (e.g., rephrase output 1.1.1., remove reference to			



		the parapet, geo-tubes etc.). <b>(Cleared as per the assessment of the 3<sup>rd</sup> technical review)</b>			
	10. Is a disbursement schedule with time-bound milestones included?	<b>Yes.</b>  <b>CR 29:</b> Please confirm whether the disbursement schedule still stand in light of the proposed changes, and revise it as necessary. <b>(Cleared as per the assessment of the 2<sup>nd</sup> technical review)</b>			

**Annex 2 - Revised project document highlighting the changes intended to be made, together with new annexes 13 and 18, and revised ESMP**



**REQUEST FOR PROJECT/PROGRAMME  
FUNDING FROM THE ADAPTATION FUND**

The annexed form should be completed and transmitted to the Adaptation Fund Board Secretariat by email or fax.

Please type in the responses using the template provided. The instructions attached to the form provide guidance to filling out the template.

Please note that a project/programme must be fully prepared (i.e., fully appraised for feasibility) when the request is submitted. The final project/programme document resulting from the appraisal process should be attached to this request for funding.

Complete documentation should be sent to:

The Adaptation Fund Board Secretariat  
1818 H Street NW  
MSN P4-400  
Washington, D.C., 20433  
U.S.A  
Fax: +1 (202) 522-3240/5  
Email: [afbsec@adaptation-fund.org](mailto:afbsec@adaptation-fund.org)



ADAPTATION FUND

## PROJECT/PROGRAMME PROPOSAL TO THE ADAPTATION FUND

### PART I: PROJECT/PROGRAMME INFORMATION

Project/Programme Category:	REGULAR Project/Programme
Country/ies:	INDONESIA
Title of Project/Programme:	<b>Safekeeping-Surviving-Sustaining towards Resilience: 3S Approach to Build Coastal City Resilience to Climate Change Impacts and Natural Disasters in Pekalongan City, Central Java Province</b>
Type of Implementing Entity:	National Implementing Entity
Implementing Entity:	Kemitraan (The Partnership for Governance Reform)
Executing Entity/ies:	Kemitraan (The Partnership for Governance Reform)
Amount of Financing Requested:	<b>5,972,670</b> (in U.S Dollars Equivalent)

#### Project / Programme Background and Context:

*Provide brief information on the problem the proposed project/programme is aiming to solve. Outline the economic social, development and environmental context in which the project would operate.*

Climate change is one of the significant factors contributing to severe flooding of Pekalongan City. There are many factors – human and natural – both are intertwined.

Thus we propose three pillars: 1. Adaptive Capacity [survival - sensing and knowing the problem collectively and largely, aligning with on-going government project/programme], 2. Ecological restoration [survival - social-ecological approach], 3. Sustainability [sustaining]

- Indonesia is among the largest archipelago in the world which constituted of over 18,000 islands (both populated and not populated islands) with around 230 million populations. Its vast coastline that stretches over 18,000 km (in total) is the home for almost 60% of Indonesian population<sup>1</sup>. Scientists had observed changes in climate indicators in Indonesia over the past several decades, and concurrently made projection using AR-4 IPCC model to assess the future changes with results as below<sup>2</sup>:
  - Average surface temperature increases will reach 0.8°C-1°C until 2020-2050 relative to the final climate period in the 20<sup>th</sup> century.
  - Sea surface temperature increases will reach 1-1.2°C by 2050 relative to 2000.
  - In the period of 2001-2100, there will be significant changes (especially in 2080s period) with a tendency of rainfall increase in wet season and a decrease in transition months.

<sup>1</sup> Akhmedi et.al., 2012, *Impact of Climate Change on Households in the Indonesia CBMS Area*, SMERU Research Institute

<sup>2</sup> Bappenas, 2010, *Indonesia Climate Change Sectoral Roadmap*

- Sea level rise (SLR) is projected to reach 35-40 cm in 2050 relative to the value of 2000. The maximum SLR may reach 175 cm in 2100.
2. Considering its geographic traits as an archipelagic country that consists of not only large but also great numbers of small islands, changes in the above indicators could potentially bring a significant impact and affect diverse development sectors in Indonesia, and consequently affecting the area's sustainability. The risks are higher for coastal areas and populations as a result of close exposure to coastal-related climate change impacts in the forms of climate-related disaster events, coupled with their low socio-economic capacity.
  3. In March 2015, Indonesian poverty rate reaches 11.22%<sup>3</sup>. Poverty is claimed as rural phenomenon considering that 60% of the poor are living in rural areas; where most of the poor lives in Java Island<sup>4</sup>. Research conducted by the Ministry of Marine and Fishery shows that from a total of around 41 million poor population of Indonesia, over 13.5% of them are living in coastal area; they live in poverty level with minimum services to basic infrastructure<sup>5</sup>. Exposed to sea level rise, high tide, extreme weather and also the subsequent impact such as salt-water intrusion; the coastal population often does not have adequate resources to face those risks, leaving them highly vulnerable to climate change impacts.
  4. The North Coast of Java is one region that has ve repeatedly been affected by climate change impact. Sea level in this region is rising between 6-10 mm/year<sup>6</sup>. Despite SLR projection in this region is not the highest in Indonesia, but its high population density and rapid urban development in comparison to other coastal area has placed North Coast of Java as highly vulnerable to climate change impact. As the major and busiest corridor for human and logistics mobilization in Java, as well as one of the largest rice producer regions in Indonesia, disruption to this region will hinder economic activity in the island. For instance, flash flood and coastal flooding in 2014 (in Central and East Java region of North Coast Java) had inundated over 40,000 Ha of paddy field and damaging thousands of hectares of brackish water fish pond, causing failed harvesting in those land; imposing significant economic cost to the farmers and fishermen<sup>7</sup>. Another coastal flooding in mid-2016 (in Central Java area of North Coast Java) have caused 50-120 cm inundation in the major road access, leads to a significant delay in logistics distribution to several industrial area in central and eastern Java; crippling the industrial activity<sup>8</sup>.
  5. The City of Pekalongan comprises of 4 sub-districts with a total administrative area of 45.25 km<sup>2</sup> and a total population of 296,533 people, where 31.3% of the population lives in Pekalongan Barat sub-district<sup>9</sup>. In 2015, 8.09% of Pekalongan population lives below poverty level, which in this particular city is set at Rp. 352,717 (27.13 USD)/capita/month. This is a slight increase in comparison to 2014, where the poor population was accounted for 8.02% of the population<sup>10</sup>. Geographically, the city is located in lowland plain with an average height of 1 m above sea level (a.s.l) and highest point within the city at 6.5 m a.s.l.
  6. Seven rivers flow through the city and disemogue into the Java Sea, with Pekalongan River as the main river. There are several rivers that often overflow during high intensity rain events, namely Pekalongan River, Bremi River and Bangger River; causing 50-100cm inundation in many communities, and at times forcing the population to be evacuated for several days. This flash flood is considered as a recurring disaster in Pekalongan City.

<sup>3</sup> Indonesia Central Bureau of Statistics, 2015

<sup>4</sup> Akhmadi et.al., 2012

<sup>5</sup> Secretariat of Republic of Indonesia Vice President, 2011, *Presentation on Inventory on Poor Household in Coastal Area/Fishermen*

<sup>6</sup> Suhelmi, 2012, *Assessment on the Vulnerability of Semarang Coastal Area to Sea Level Rise by Utilizing Composite Vulnerability Index*

<sup>7</sup> Kompas, 2014, *Food Production is At Risk (online-reading)*

<sup>8</sup> Kompas, 2016, *When Nature Responds to Human Greed (online-reading)*

<sup>9</sup> Pekalongan Bureau of Statistics, 2015

<sup>10</sup> Pekalongan Bureau of Statistics, 2015





## THE PROBLEM

### 1. From Creative City ~~to~~ urban vulnerability



Figure 4. Severe Flooding in Pekalongan City

7. Pekalongan City has been recognized by UNESCO (United Nations Educational, Scientific and Cultural Organization) as part of Creative City networks on 1<sup>st</sup> December 2015. Pekalongan City is well-known in Indonesia and beyond as the city of “Batik”, the process of traditionally dyeing fabric, performed on cotton and silk using a resist technique, also recognized as World Intangible Cultural Heritage by UNESCO in 2<sup>nd</sup> October 2009.
8. Considering its geographical and hydrological attributes, **Pekalongan City is no stranger to climate change impact in the forms of climate-disaster events.** The city has a history of recurring events of coastal flooding and flash flood. Added with extreme weather events and prolonged drought, Pekalongan population have suffered significant damage from this climate-disaster events that goes beyond physical structure damage and inundated productive land in the coastal area, but they also imposed by socio-economic cost.

### 2. Climate Change Projection

9. **Historical trend shows that there is a 0.6-0.8 cm rise in sea level annually.** In 2030, this number is projected to increase up to 22.5±1.5 cm annually; and in 2100, sea level rise in Pekalongan City is projected to reach 0.8 m and consequently affect 913.8 Ha area within 1.63-2.01 km distance from the city coastline. According to Pekalongan City Agriculture and Marine Agency, the city coastal vulnerability index is at 2.4 from a maximum scale of 3<sup>11</sup>. The impact of coastal flooding will not only affect coastal-related sector such as fishery and tourism, but might also creating domino effect to other development sectors; posing an imminent threat to the sustainability of the city.

<sup>11</sup> DKP, 2008 in Pekalongan City Government, 2011, *Pekalongan City Risk Profile*



Figure 5. Projected Inundation in Pekalongan City Coastal Area in 100 Years Period (Pekalongan City Government, 2011)

10. The same study also shows how the precipitation pattern and level in Pekalongan City have changed in a 40 years period. The peak rainy season is shifting and occurring in a shorter period but with an increasing intensity. In future time, the peak rainy period is projected to become shorter and occurring in November-January period, which could potentially lead to an increase in flooding intensity and frequency. Meanwhile dry season will occur in a longer period with a lower precipitation intensity that could cause prolonged drought and water scarcity subsequently<sup>12</sup>.
11. Other changes that was assessed were surface and sea surface temperature in the North Coast of Java. Historically, there is only slight increase in the surface temperature, with 0.004-0.04°C increase annually. Yet projection shows that in the next 100 years, there will be 0.4-4 °C increases in surface temperature. This is believed to then affect the sea surface temperature at coastal area in a rate of 0.05-0.1°C annually, prompting changes in the surrounding ecosystem<sup>13</sup>.

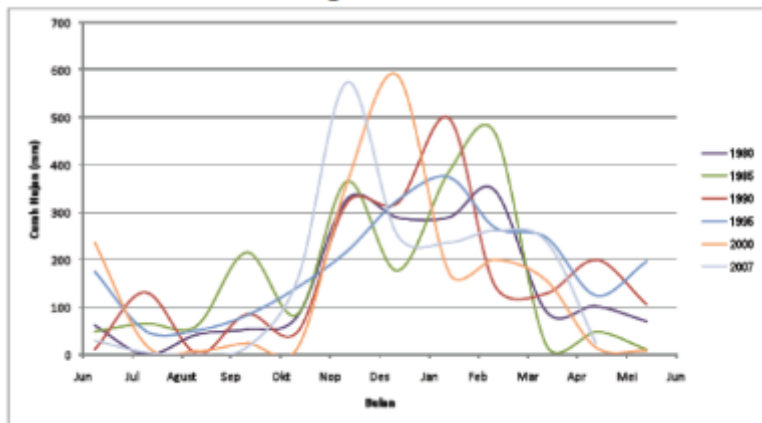


Figure 6. Precipitation Pattern in Pekalongan City in 1980-2007 Period (Pekalongan City Government, 2011)

### 3. Expected Impacts

It was projected that in 2050, the maximum inundation water level could reach 135 cm. This could cover up to 1,295 Ha of residential area, 507 Ha of paddy field and 230 Ha of wetland and fish pond;

<sup>12</sup> DKP, 2008 in Pekalongan City Government, 2011, *Pekalongan City Risk Profile*

<sup>13</sup> DKP, 2008 in Pekalongan City Government, 2011, *Pekalongan City Risk Profile*

covering 51% of the Pekalongan administrative area<sup>14</sup>, where Pekalongan Utara will experience the most severe impact from this event because of its geographical location in the coastline of Pekalongan City. The previously mentioned sea level rise projection in 2100 that would affect area up to 2.01 km from the city coastline further highlights the vulnerability of Pekalongan Utara<sup>15</sup>. Pekalongan Utara population that predominantly works in fishing industries will be highly affected economically from this; forcing them to alter their fishing practices (both those who fishes in the sea and cultivating fish-ponds) and adapting to recurring inundation in their neighbourhood. Overexploitation of groundwater further exacerbated the flood intensity and impacts by causing land subsidence in the coastal area. Salt water intrusion have been experienced by those who rely on ground water for their daily needs, for instance in Panjang Wetan community (Pekalongan Utara Sub-district)<sup>16</sup>.

#### 4. Flood risks and vulnerability in Pekalongan

12. To validate and further emphasize the correlation between the aforementioned risks to climate change impact, a study was conducted in 2012 on Pekalongan City Climate Vulnerability by SMERU Research Institute. The study assesses the exposure of Pekalongan City to three types of climate-related disasters frequently occurred in the city (flash flood, coastal flooding and landslides), the area's human and ecological sensitivity, and their adaptive capacity.
13. The result shows that more than 25% and 10% of Pekalongan City population are exposed to flash flood and coastal flooding due to SLR in that order. With respective climate exposure index to flash flood and coastal flooding of 0.39 and 0.31, **Pekalongan Utara sub-district is assessed as the most exposed area to both climate-related disaster events; putting this area at a total Climate Change Exposure Index of 1**<sup>17</sup>.

Sub-district	Flash Flood	Coastal Flooding from SLR	Landslide	Exposure Index
Pekalongan Barat	0.2365	0.0067	0.0994	0.3426
Pekalongan Timur	0.0851	0.0303	0	0.1154
Pekalongan Selatan	0	0	0.2812	0.2812
Pekalongan Utara	0.3900	0.3100	0.300	1

Table 1. Climate Change Exposure Index of Pekalongan City (SMERU, 2012)

14. **Pekalongan Selatan is the most sensitive sub-district with 0.60 sensitivity index**, due to the fact that the area is the centre for batik industry and agricultural land in the city. Livelihood, ecology and population are three aspects that being considered in measuring Sensitivity Index. Based on the sensitivity assessment, being one of the major industries in Pekalongan, disruption to the sustainability of Batik industry could affect the economic condition of batik workers in particular and the city's income in general. Climate-related disaster could affect batik industry either by flooding the industrial area or contamination of immersion water from flood water. Meanwhile inundation from flash flood in agricultural area could leads to a severe failed harvesting. The second most sensitive sub-district is Pekalongan Utara with 0.48 sensitivity index attributed to the fact that majority of the sub-district's population works in fisheries sector, which at risk of economic losses from the loss of brackish water fish pond, damage to their house as well as changing fishing pattern and location<sup>18</sup>.

Sub-district	Livelihood at	Ecology at Risk	Population at	Sensitivity Index
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<sup>14</sup> Marfai et.al., 2013, *Spatial Modelling of Coastal Flooding Inundation Based on Climate Scenario and Its Impact on Pekalongan Coastal Area*

<sup>15</sup> DKP, 2008 in Pekalongan City Government, 2011, *Pekalongan City Risk Profile*

<sup>16</sup> Akhmadi et.al., 2012

<sup>17</sup> Akhmadi et.al., 2012

<sup>18</sup> Akhmadi et.al., 2012



	Risk		Risk	
Pekalongan Barat	0.06	0.00	0.16	0.21
Pekalongan Timur	0.02	0.14	0.22	0.38
Pekalongan Selatan	0.23	0.13	0.24	0.60
Pekalongan Utara	0.18	0.05	0.25	0.48

Table 2. Climate Change Sensitivity Index of Pekalongan City (SMERU, 2012)

15. **Pekalongan Barat has the lowest Adaptive Capacity Index of 0.0010 which indicates the area is the most adaptive amongst other sub-districts**<sup>19</sup>. For adaptive capacity index, the calculation take account of aspects that are highly needed for dealing with and recovering from climate-related disaster events, comprising of infrastructure, technology, health facilities, institutions and economic conditions.

Sub-district	Infrastructure	Technological Information	Health	Institution	Economic	Adaptive Capacity Index
Pekalongan Barat	0.2600	0.1389	0.1900	0.2000	0.2100	0.0010
Pekalongan Timur	0	0.0883	0.0382	0.0363	0.0946	0.7426
Pekalongan Selatan	0.0469	0.0073	0	0.0557	0.1409	0.7492
Pekalongan Utara	0.2414	0.0315	0.0331	0.669	0	0.6270

Table 3. Climate Change Adaptive Capacity Index of Pekalongan City (SMERU, 2012)

16. **Pekalongan Utara is the most vulnerable sub-district** to climate change with 0.72 index. The high vulnerability of Pekalongan Utara is due to the fact that the area is highly exposed to climate change impact, particularly coastal flooding; while also has a relatively high sensitivity and low adaptive capacity. Meanwhile its high sensitivity and low adaptive capacity is the major factor for Pekalongan Selatan’s vulnerability, despite the fact that the area has a relatively low exposure index.

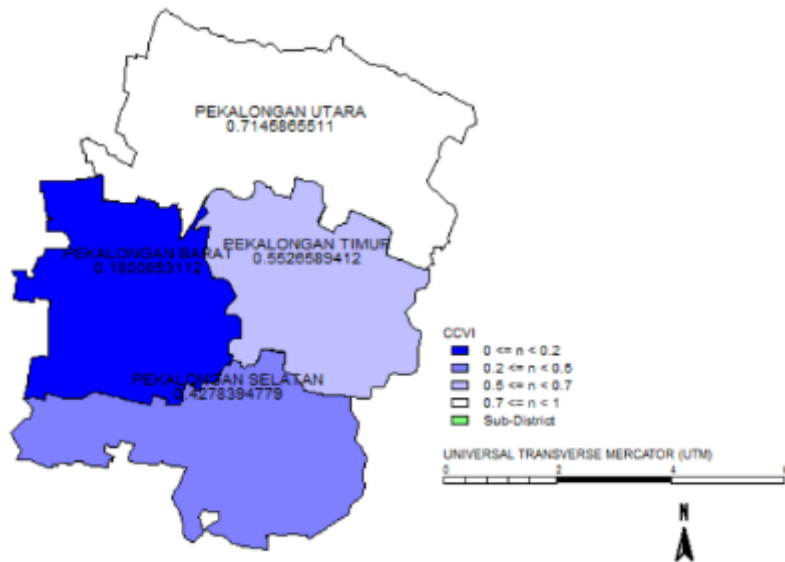


Figure 7. Climate Change Vulnerability Index of Pekalongan City (SMERU, 2012)

<sup>19</sup> Akhmadi et.al., 2012

### Economic Context

17. Pekalongan City's economic state in 2014 shows that Manufacturing Industry, Trading and Retail, and Construction are three economic sectors with the highest contribution for the city's Gross Regional Domestic Product (GRDP), with GRDP growth for each sector ranging between 4-6% from 2013. Looking at the GRDP contributor, it is fair to conclude that 38.46% and 28.14% of the population works in Industrial and Trade sector respectively. This also attributed to the fact that Pekalongan City is one of the main 'Batik' producers in Indonesia that not only supply national but also international market. As part of the largest rice producer region, Agriculture, Forestry and Fisheries sector is also one of the main economic sectors in Pekalongan City; ranks 6<sup>th</sup> on the GRDP contribution in 2014 with over IDR 400 million of income, and attracts 4.65% of the population to work in the said sector<sup>20</sup>.
18. As mentioned above, these climate-related risks will not only damaging the settlement and infrastructure but also pose a severe threat to the area's food security, as well as other area that depends on Pekalongan for their staple food supply. Losses from the inundation of the paddy field are predicted to extend between IDR 19.33 and 24.10 billion (USD 1.486.923 – 1.853.846) for a range of affected paddy field area between 945-1,339 Ha<sup>21</sup>. Another study conducted on loss and damage due to coastal flooding in Bandengan Community (Pekalongan Utara Sub-district) shows that the said community experience over IDR 188 billion (USD 14.461.5380 loss and damage over the period of 2000-2016. This number encompasses the loss of agricultural land productivity, infrastructure damage as well as loss of income and increasing household expenses due to the flooding events<sup>22</sup>.



Figure 8. Pekalongan City Coastal Flooding-prone Map Year 2016 (Pekalongan City Government, 2017)

### Social Context

19. Considering the above climate-related risks and their domino effect faced by Pekalongan, addressing the risks become of importance to the city. Diverse measures have been taken by municipal government of Pekalongan City to address this issue; both conducted self-sufficiently as well as with the assistance from third party. Self-sufficiently, the municipal government has developed evacuation plan annually for the purpose of community mobilization during flooding. They have also implemented short-term measures by providing economic assistance in the form of fish seed and fish nets, as well

<sup>20</sup> Pekalongan Bureau of Statistics, 2015

<sup>21</sup> Kasbullah&Marfai, 2014, *Spatial Modelling of Coastal Flooding Inundation and Assessment on Potential Loss on Paddy Field Agricultural Land, Case Study: Coastal Area of Pekalongan District*

<sup>22</sup> Bintari, 2016, *Loss and Damage – Climate Change Impact in Coastal Area of Pekalongan City*

as physical assistance such as raising embankments and build productive roads in the embankments area. The local community have also implementing voluntary adaptive measures, albeit a simple one due to economic restraints; such as: raising their floor levels, changing livelihood, river cleaning etc. Yet these measures were conducted partially, without a comprehensive planning that could relate the root cause of the issue to the implemented activities, so that the results are slightly ineffective, especially when considering long-term perspective.

20. Pekalongan City had also cooperated with different local and international NGOs as well as development partners in this climate change issue. PAKLIM-GIZ had assisted the city in developing their GHG Emission Profile, Risk Profile and also deriving the relevant Integrated Climate Change Strategy (ICCS); in which the latter is claimed as successfully integrated to the existing Mid-Term Development Plan of Pekalongan City. However in actual, the integration is limited to inserting the actions into development plan matrix, without consideration of climate change as the strategic development issue for the city; losing the actual meaning of mainstreaming process. ACCCRN Indonesia (a programme under Mercy Corps Indonesia) further assist the city in managing the issue by providing capacity building for both the community and local government to enhance their awareness and knowledge on this matter. By doing so, the programme expected that the city could develop the corresponding adaptation activities.

### Environmental Context

21. During ACCCRN implementation period, a city climate working group was developed. The said group is a multi-stakeholder group, comprises of not only local government representative, but also academicians, community member and local NGOs. Throughout its lifetime, city climate working group had been able to provide the municipal government with sound input and recommendation particularly in providing climate perspective when discussing development issue. However, one glaring weakness of the group is that the member was appointed by name, instead of institution, thus their involvement in the group can somewhat diminish. These lessons learned are considered in developing the proposed programme; boosting its strengths and tackle its weaknesses.
22. In 2014, the Government of Indonesia had published their National Action Plan on Climate Change Adaptation (RAN-API), a document outlining adaptation strategy and programme that will be implemented nationally by the country for a 5-year period. RAN API is expected to be mainstreamed into provincial and local level, in which adaptation plan made at both level should reflect and in harmony with the content of RAN API, while at the same time aiming to address climate-related risks in the respective area.
23. At this moment, the RAN API Secretariat is in the process of tagging adaptation activities at national level, whereas the locus area for the said activities will be at city/district level. Ensuring a synchronize local-provincial-national adaptation plan would potentially assist the city in tapping adaptation-related funding that budgeted at the national level. Not to mention the fact that a synchronize activities will assist the national government in assessing the effectiveness of RAN API implementation. Planning can be made at national level, but the implementation would almost always be at local level, as the party that directly facing the risks. Hence developing an effective adaptation activity at local level is essential here.
24. In relation to RAN API, Pekalongan City also has the benefit of being chosen as one among 15 pilot locations of RAN API; putting them at the forefront for adaptation-related activities. Pertinent to this matter, the mainstreaming process that will be conducted under this programme is expected to set an example on how to synchronise adaptation plan and programme at four government levels, as well as mainstream the said plan to the local development plan. Lessons learned from the mainstreaming process can be disseminated to other pilot locations.
25. **Coastal flooding is one of the most frequent risks faced by Pekalongan City.** The coastal community experiences daily coastal flooding for the past 10 years. During high tide, the affected communities will be inundated for a period of 2-4 hours. Houses, public facilities, roads, paddyfield are all flooded by the flood. The flood intensity is deemed as increasing each year. In 2012, coastal flooding

inundated 8 communities and caused significant damages to ports and settlement area (and the infrastructure within) with water level reaching 110 cm, while also affecting 100 Ha of paddy field; whilst in 2016 the affected area is increasing to 10 communities and 197,5 Ha of paddy fields. Historical record shows that the height of coastal flooding in 2016 is considerably higher compared to the previous years; prompted the Mayor of Pekalongan City to declare state of emergency due to coastal flooding<sup>23</sup>.

26. The inundated household has no access to adequate sanitation facilities since their latrine is also inundated. The municipal government of Pekalongan City has limited budget to provide this access to the affected community, which then prompted open defecation practices (often to water body) in some communities. These unhygienic practices coupled with high frequency of coastal flooding have increased the potential of water-borne disease; leaving the community susceptible to health issue.
27. In addition, the dense coastal settlement area is not serviced by water piping from the state-owned water company, prompting the community to rely heavily on groundwater. The combination of this groundwater exploitation with land subsidence from significant coastal land use change over the years could exacerbate the impact of coastal flooding in coastal area. These aspects are among the identified non-climatic barrier for the programme achievement. The design of the proposed programme had considered this potential barrier by developing City Climate Risk Assessment and the subsequent action plan early in programme implementation; while also involving BAPPEDA as the leading sector for development plan within the programme. The Climate Risk Assessment and Action Plan will entail recommendation for climate-resilient development and spatial plan; to reduce massive land use change into built environment in coastal area. Meanwhile BAPPEDA and other relevant government institutions will be equipped with knowledge and information on the correlation between land use change, land subsidence and coastal flooding risk. At the moment, municipal government officials that are involved in the proposal development had understood the connection between land subsidence and coastal flooding.

## PROJECT APPROACH

28. Adaptation measures taken in Pekalongan City to address climate change issues are somewhat lacking in evaluation that derives from the non-existent of a comprehensive climate risk assessment. A such-complex issue such as climate change needs across-the-board measures to be able to address the issue effectively, and from its roots. Considering that most of the risks are deriving from changes in climate indicators, hence it is of importance to develop climate risk assessment prior to intervening with different projects, so that the project's results can be tracked back to the initial level of risk.
29. It is this gap that this proposed programme tries to bridge, by implementing a comprehensive approach encompassing technical assessment, planning, intervention, and also monitoring and evaluation; which will be supported by framework and measures to fortify institutional mechanisms on climate adaptation and resilience issues. In practical the programme components will be started with identifying the roots of the problem (climate risk assessment) and followed by developing and implementing the adaptation plan (in the form of intervention projects) which results can be tracked back to the problem; while simultaneously building stakeholders' capacity and advocating climate resilience policy along the course of the programme.
30. This programme will **focus on building resilience to climate change impacts in Pekalongan City**, one of the coastal cities in Central Java Province (in North Coast of Java region), by **employing interventions in the form of not only hard structure, in the form of coastal protection construction/installation, but also soft structure; touching not only physical interventions but also building their socio-economic and institutional capacity. Due to increased frequency and dimension of coastal or tidal flooding, the Municipal Government of Pekalongan City received assistance from the Central Government and Central Java Provincial Government to construct a polder dyke and to extend**

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<sup>23</sup> Marfai et.al., 2013, *Spatial Modelling of Coastal Flooding Inundation Based on Climate Scenario and Its Impact on Pekalongan Coastal Area*

the coastal parapet. The parapet was constructed up to the eastern part of the Pekalongan City's coast, leaving a gap of 300m exposed directly to the sea and still a threat for the community in the said area during tidal flood occurrence. This 300m gap was requested to be filled by KEMITRAAN during the initial phase of the development of this proposal. In addition to the parapet, the Municipal Government of Pekalongan City has installed geotube within the length of its coastline, indeed leaving some gaps in different spots, both in the western and eastern part of the city's coast. The geotubes are installed to protect the coast from further abrasion and, in some parts, the existing mangrove ecosystem, as well as to enforce the coastal sediments KEMITRAAN was also requested to fill the gaps with new installation of geotubes during the initial phase of this proposal development.

31. Indeed, during the socialisation of the proposal approval, the Municipal Government of Pekalongan City have informed KEMITRAAN that the initially requested 300 parapet construction have been taken over by the provincial government, which was to be covered by the state budget. The Municipal Government has therefore requested KEMITRAAN to **reallocate the budget for parapet construction to alternative solution with the similar output, which is to protect the community from the impact of sea level rise and to mitigate abrasion.** Moreover, the Municipal Government also informed KEMITRAAN to **reconsider the enhancement of the geotube incl. replacement of the damaged once as initially planned.** This request for consideration was **based on consultation with coastal experts from different universities and also on the facts that most of the geotubes did not sustain the expected maximum durability of 20 years.**

~~30. **interventions in the form of not only hard structure, in the form of coastal protection construction/installation, but also soft structure;** touching not only physical interventions but also building their socio-economic and institutional capacity. Due to increased frequency and dimension of coastal or tidal flooding, the Municipal Government of Pekalongan City received assistance from the Central Government and Central Java Provincial Government to construct a polder dyke and to extend the coastal parapet. The parapet was constructed up to the eastern part of the Pekalongan City's coast, leaving a gap of 300m exposed directly to the sea and still a threat for the community in the said area during tidal flood occurrence. This 300m gap was requested to be filled by KEMITRAAN during the initial phase of the development of this proposal. In addition to the parapet the Municipal Government of Pekalongan City has installed geo-tube within the length of its coastline, indeed leaving some gaps in different spots, both in the western and eastern part of the city's coast. The geo-tubes are installed to protect the coast from further abrasion and, in some parts, the existing mangrove ecosystem, as well as to enforce the coastal sediments KEMITRAAN was also requested to fill the gaps with new installation of geo-tubes during the initial phase of this proposal development.~~

34-32. This approach will be taken at **4 governance level; starting from community (kelurahan) level, city level, provincial level up to the national level;** to ensure the interlink of plan and actions across those different level. Capacity building and developing adaptation plan as well as implementing the corresponding plan will be the fundamental of the approach. Meanwhile at provincial and national level, mainstreaming and advocacy will be the primary component. **Synchronization of adaptation plan will be at the core of the approach at every level.**

32-33. Climate risk assessment process will be done at Pekalongan City utilizing **Vulnerability Index Data Information System (Sistem Informasi Data Indeks Kerentanan/SIDIK), a vulnerability assessment tool developed by the Ministry of Environment and Forestry.** SIDIK is a web-based data and information system that can be used to assess the vulnerability level of an area and/or sector to climate change impact. SIDIK has a standardized data and methodology which enable the user to compare vulnerability level across different areas in Indonesia. Despite its standardized character, SIDIK acknowledge that every region has different level of data, type and accuracy; thus the system provides space for adjustment. SIDIK user could use a more accurate data and indicator for the system that is available in their region.

33-34. For the purpose of this programme, given that the system is initially built for land-based region, adjustment will be made to SIDIK. **To be able to capture the vulnerability of Pekalongan City with its coastal characteristics,** vulnerability indicator within SIDIK system need to incorporate coastal-



related data. The adjustment will then provide input for SIDIK developer to improve their system by including coastal attributes. This future improvement will be essential seeing how coastal cities/districts are spread out across Indonesian coastline.

~~34~~**35.** Furthermore, a **Participatory Climate Risk Assessment will also be applied**. The initial step of the programme will be establishing **community working groups** delivering some series of trainings to build their knowledge on climate change adaptation and coastal resilience. This is expected to assist them in developing much sounder climate risk assessment. This two-tier risk assessment at community and city level will be done to ensure a synchronized adaptation planning at both level, which does not happen often in the past; the city government project at times did not fully serve the actual community needs.

~~35~~**36.** Having taken into account the existing Climate Change Vulnerability Index, climate risks faced by the area, as well as losses imposed to the respective community, hence this programme **will specifically address the risks of coastal flooding** (and its secondary impact such as loss of livelihood, health disease etc.) in the coastal area of Pekalongan City which historically imposed by climate-related risk in the form of coastal flooding and abrasion. The coastal area falls under the administrative area of Pekalongan Utara sub-district. Pekalongan Utara is the largest sub-district in Pekalongan City with a total administrative area of 14.88 km<sup>2</sup> that inhabited by 78,470 population (in 2014), the second highest population number amongst sub-districts in Pekalongan City. From that number, 50.2% are women<sup>24</sup>.

~~36~~**37.** Pekalongan Utara constitutes of 7 *kelurahan* (an administrative area similar to Kampongs); in which *kelurahan* Panjang Wetan is the most vulnerable to flash flood, while Krapyak Lor is the most vulnerable to coastal flooding<sup>25</sup>. In addition to 7 communities within Pekalongan Utara Sub-district, the community level scope for this programme will also include *kelurahan* Pasirkraton Kramat Kampong in Pekalongan Barat Sub-district that assessed as prone to coastal flooding. The significance of addressing coastal flooding risks in these communities further underlined by the city government publication of Pekalongan City Coastal Flooding-prone Map 2016 (Figure 5) which shows how the **all of the *kelurahan* targeted in this particular programme are categorized as highly prone to coastal flooding**.

~~37~~**38.** Seeing these risks faced by the area, resilience building process in this proposed programme will be **focusing its work in strengthening food security, enhancing community livelihood while simultaneously preserving the environment**; touching not only practical aspect but also promoting policy. Sustainable development principle will be held at core here to ensure efforts being done at one sector will not create negative impact and incremental losses in the other.

~~38~~**39.** In view of this multifaceted issue, the proposed programme framework will be instilled by **multidisciplinary and iterative process**, with a series of assessment, study and activities to be derived from. Accordingly, the programme will **not only emphasizing on building hard structure, but also strengthen soft structure** (institutional realms, including capacity building) in addressing the issue; creating a paradigm shift from the conventional approach that mostly revolving around building infrastructure that could only serve short-term purposes to newer perspective that allow for continual development and evaluation. At the core of this framework is participatory and collaborative approach by fostering multi-stakeholder involvement, to bring about different interest on the issue and resolve it amicably to achieve common goals.

## TARGET COMMUNITIES

Overall, the target communities within the municipality of Pekalongan City consist of 8 *kelurahan*:

Area 1 – Degayu

Area 2 – Krapyak

<sup>24</sup> Pekalongan Bureau of Statistics, 2014

<sup>25</sup> Akhmadi et.al., 2012

- Area 3 – Panjang Wetan
- Area 4 – Panjang Baru
- Area 5 – Kandang Panjang
- Area 6 – Padukuhan Kraton
- Area 7 – Bandengan, and
- Area 8 – Pasirkraton Kramat

**PEKALONGAN MAIN TARGET BENEFICIARIES IN 8 SUB-MUNICIPALITIES (KELURAHAN)  
PEKALONGAN CITY SEMESTER II YEAR 2016**

AGE	KRAPIYAK			KANDANG PANJANG			PANJANG WETAN			PADUKUHAN KRATON			DEGAYU			BANDENGAN			PANJANG BARU			PASIRKRATONKRAMAT			TOTAL
	M	F	Subtotal	M	F	Subtotal	M	F	Subtotal	M	F	Subtotal	M	F	Subtotal	M	F	Subtotal	M	F	Subtotal	M	F	Subtotal	
15-19	735	752	1.487	535	539	1.074	584	555	1.139	549	465	1.014	324	307	631	281	265	546	460	432	892	640	610	1.250	8.033
20-24	820	735	1.555	603	560	1.163	552	498	1.050	523	533	1.056	324	328	652	292	247	539	434	439	873	735	668	1.403	8.291
25-29	793	684	1.477	538	492	1.030	491	455	946	508	494	1.002	391	363	754	276	217	493	455	383	838	639	629	1.268	7.808
30-34	812	708	1.520	571	509	1.080	556	506	1.062	527	518	1.045	352	330	682	252	264	516	418	405	823	711	702	1.413	8.141
35-39	744	764	1.508	502	529	1.031	578	560	1.138	530	543	1.073	310	303	613	268	246	514	411	398	809	729	657	1.386	8.072
40-44	684	685	1.369	446	489	935	445	459	904	483	481	964	257	247	504	223	217	440	329	347	676	574	595	1.169	6.961
45-49	612	649	1.261	434	487	921	408	423	831	402	451	853	201	232	433	179	194	373	280	272	552	514	520	1.034	6.258
50-54	557	585	1.142	432	518	950	333	413	746	381	464	845	210	190	400	164	152	316	249	311	560	439	558	997	5.956
	5.757	5.562	11.319	4.061	4.123	8.184	3.947	3.869	7.816	3.903	3.949	7.852	2.369	2.300	4.669	1.935	1.802	3.737	3.036	2.987	6.023	4.981	4.939	9.920	59.520

## Project / Programme Objectives

### Goals

39-40. This project is specifically designed to **Building Coastal City Resilience to Climate Change Impacts and Natural Disasters**, with a particular focus on pro-poor adaptation actions that involve and benefit the most vulnerable communities in the city. We believe that the key to do so is to **enhance the capacity of coastal community** in implementing climate change adaptation actions. This will be achieved through three important actions namely: (1) safekeeping actions, (2) surviving actions and (3) sustaining actions with the objectives as follows:

### Objectives

40-41. **Restoring natural protection** to increase resilience from flood hazards and risk exposure and vulnerability by restoring mangrove ecosystem and enhancing coastal protection where there is still gap. – [Safekeeping Actions].

41-42. **Developing Climate Change Information System** based on the various datasets related to climate change indicators at various areas in Pekalongan City. The aim is to **develop resilient livelihood strategies**, by combining formal scientific data and **relevant local knowledge and wisdoms**. – [Surviving Actions]

42-43. **Involving and engaging local government and city stakeholders in developing Local Climate Adaptation Action Plan and implementing climate smart actions**. The proposed programme will conduct capacity building activities for local government and city stakeholders to develop the Plan and to implement climate smart actions. – [Surviving Actions].

43-44. **Mainstreaming climate change adaptation and resilience into Central Java Province development plan**, which in turn could foster better climate-related policy on climate financing and bottom-up planning. – [Sustaining Actions]

44.45. **Strengthening vertical coordination and collaboration between national and local government** in climate adaptation context and enriching knowledge, toolkits and methodologies coastal resilience for the national government. [Sustaining Actions]



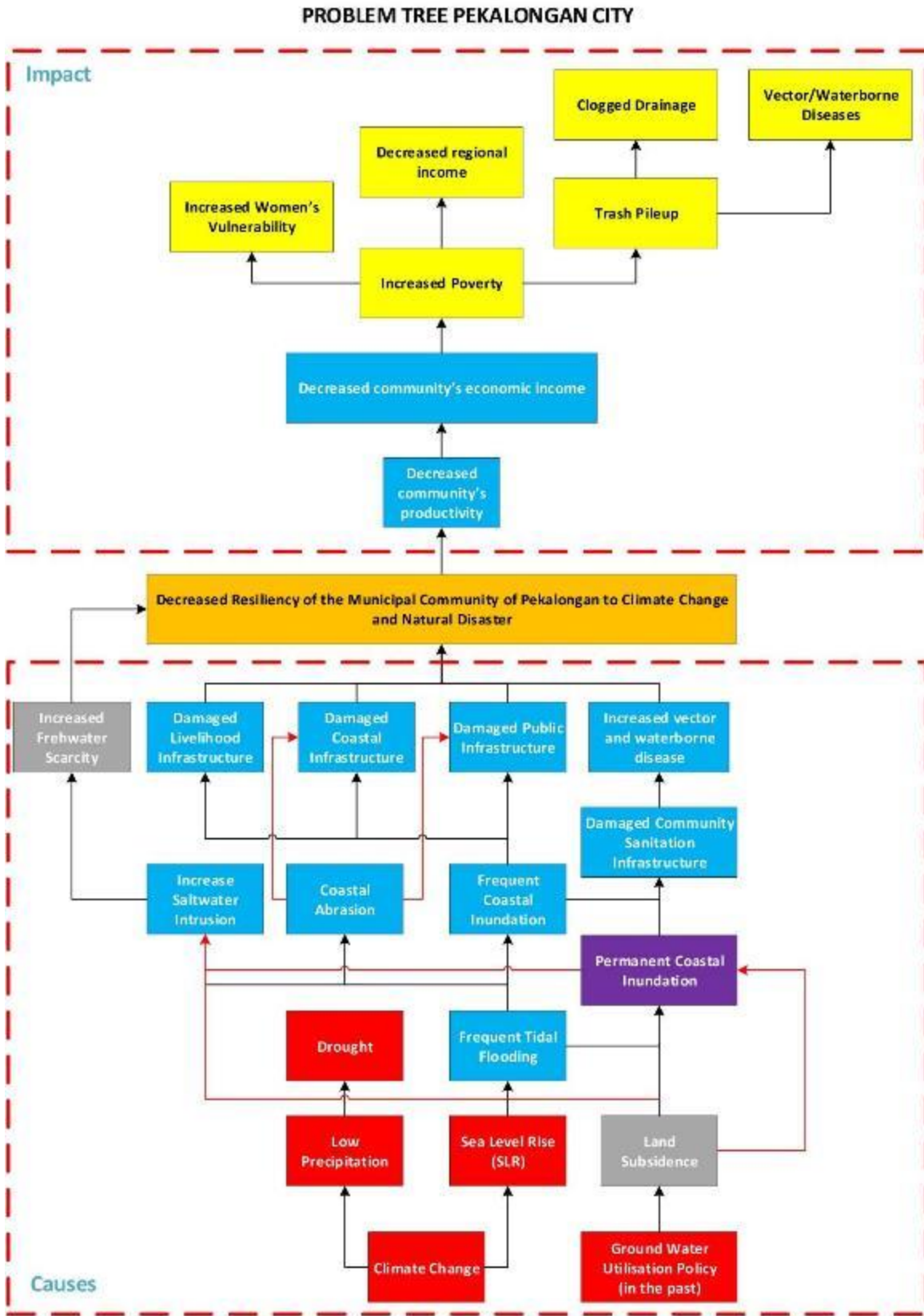


Figure 9. Problem Tree Pekalongan

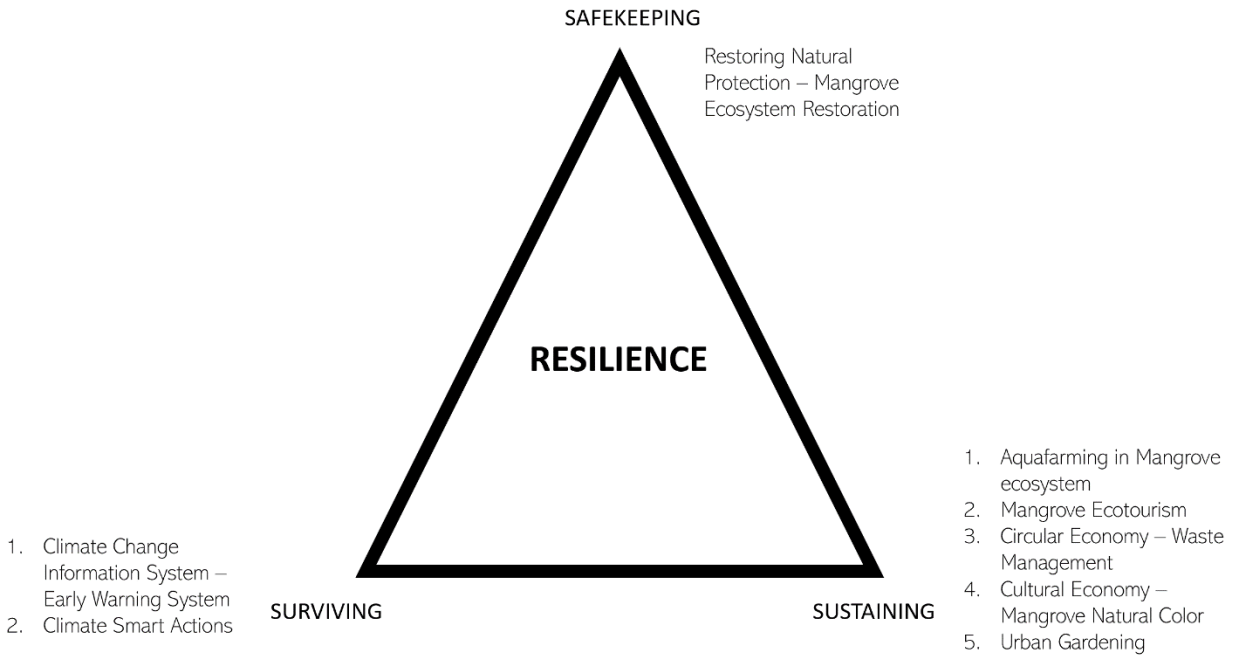


Figure 10. 3S for Resilience Approach: Safekeeping-Surviving-Sustaining

Project Component and Financing

Project/Programme-Components	Expected-Outputs	Expected-Outcomes	Amount (US\$)
<b>SAFEKEEPING</b>			
1. Enhancing protection along the coastal line of Pekalongan City	6 kilometres of Mangrove Ecosystem established	1.1. Increased coastal community resilience in Pekalongan City	1,329,480
	1.1.1. 300 m parapet at Slamaran Beach in Kelurahan Degayu constructed <u>Planning and preparation phase for coastal protection construction.</u>		
	1.1.1. Coastal embankment (geo-tube/sand trap) at Kandang Panjang established <u>(to be changed to</u>		

Project/Programme-Components	Expected-Outputs	Expected-Outcomes	Amount (US\$)
	<del>construction of coastal protection.</del>		
<b>SURVIVING</b>			
2. <del>Enhancing coastal community capacity in developing and implementing Local Climate Change Adaptation Action Plan (RAD API), climate change information system, Climate Smart Initiative</del>	1.0.0. <del>Pekalongan City Climate Working Group reactivated</del>	Enhanced capacity of local actors in identifying, initiating, strengthening, and escalating community-based actions to address climate risk and natural disaster; including capacity in integrating the actions to <i>kelurahan</i> development plan	<del>560,519</del>
	1.0.0. <del>Climate working group established and functioning in each of the 8 target <i>kelurahan</i></del>		
	1.0.0. <del>Enhancing coastal community capacity in developing <i>kelurahan</i>'s information system and implementing the ensuing climate change adaptation actions</del>		
	1.0.0. <del>Engaging youth groups and building their capacity to become Agents of Change in climate change adaptation actions of Pekalongan City</del>		
	1.1.0 <del>RAD API developed based on Pekalongan City Climate Risk Assessment and Climate Coastal Impact</del>	Enhanced capacity of local government and other city stakeholders' in developing climate risk assessment and utilizing the results to develop local climate change adaptation action plan (RAD API)	<del>96,222</del>
1.1.0 <del>Strategy to integrate CCA into local government planning processes (annual work plan or mid-term</del>			

Project/Programme-Components	Expected-Outputs	Expected-Outcomes	Amount (US\$)
	development plan of city) is developed		
	<del>1.2.0 Innovative and collaboration adaptation actions are implemented in collaboration with private sector, Government bodies and NGO (i.e. technology for main productive sectors, model on collaborative CCA programme across coastal <i>kelurahans</i>/ upstream and downstream <i>kelurahans</i>, collaborative action to protect the affected coastal area); and also evaluated for future reference</del>	<del>Enhanced resilience of coastal community through the implementation of Climate Smart Initiatives, including fostered sustainable utilization of natural resources, with implementation scheme that can be replicated and disseminated to broader audience</del>	<del>68,148</del>
	<del>1.3.0 Climate change training and knowledge sharing conducted</del>	<del>2.4. Established knowledge management network at municipality level</del>	<del>283,259</del>
	<del>1.3.0 Knowledge product, Advocacy materials (i.e. lessons learned, research paper, newsletter) published and shared</del>		
	<del>1.3.0 Local knowledge sharing network established</del>		
<del>3. Strengthening vertical coordination by enhancing provincial</del>	<del>2.0.0. Enhanced provincial capacity to develop RAD-API</del>	<del>3.1. Enhanced provincial government's capacity in mainstreaming</del>	<del>194,815</del>

Project/Programme-Components	Expected-Outputs	Expected-Outcomes	Amount (US\$)
government's capacity in mainstreaming climate change adaptation and resilience into Central Java Province development plan which in turn could foster better climate-related policy on climate financing and bottom-up planning	2.0.0.—Appropriate strategy to integrate CCA into Provincial government planning processes (annual work plan or mid-term development plan of city) is developed	climate change adaptation and resilience into Central Java Province development plan	
4.—Strengthening vertical coordination and collaboration between national and local government in climate adaptation context and Enriching knowledge, toolkits and methodologies coastal resilience for the national government	3.0.0.— Knowledge product in the form Handbook on how to use SIDIK for risk assessment at coastal city is published and shared. This handbook is targeted to be used by local government, NGOs and civil society organizations	4.1.— SIDIK as risk assessment tools for coastal area based on local experience enriched	—271,852
	3.0.0.— Strengthened vertical coordination and collaboration between national and local government in climate adaptation context		
<b>SUSTAINING</b>			
5.—Improving community's resilience through initiation of alternative livelihood and improvement of sanitation facility	4.0.0.—Aquafarming in mangrove ecosystem developed and implemented by community	4.0.— Increased economic income and improved community's health in 8 target <i>kelurahan</i> of Pekalongan City	—2,521,091
	4.0.0.— Mangrove ecotourism improved and involving wider participation of affected coastal		

Project/Programme-Components	Expected-Outputs	Expected-Outcomes	Amount (US\$)
	community-of-Pekalongan-City		
	4.0.0. Improved cultural economy through application of ecological batik using mangrove based colouring product		
	4.0.0. Improved food security through the application of urban farming as alternative to conventional agriculture practices		
	4.0.0. Developed circular economy through initiation integrated waste management system and processing		
	4.0.0. Improved sanitation facility in 8 target <i>kelurahan</i> to mitigate risks of waterborne disease		
	5.1.7. Flood Relief for Pekalongan City		
5. Total Project/Programme Cost			<b>-5,325,386</b>
5. Project/Programme Execution cost and ME cost Improved sanitation facility in 8 target <i>kelurahan</i> for better and healthier living condition			<b>-559,018</b>
5. Project/Programme Cycle Management Fee charged by the Implementing Entity			<b>-88,266</b>
<b>Amount of Financing Requested</b>			<b>-5,972,670</b>
<u>Project/Programme Components</u>	<u>Expected Outputs</u>	<u>Expected Outcomes</u>	<u>Amount (US\$)</u>
<b>SAFEKEEPING</b>			
1. <u>Enhancing protection along the coastal line of Pekalongan City</u>	1.1.1. <u>3 ha of Mangrove Ecosystem established</u>		

Project/Programme-Components	Expected-Outputs	Expected-Outcomes	Amount (US\$)
	1.1.2 <u>Breakwater (rubble mound) covering the coast of Kandang Panjang in the area of Mangrove Information Centre (PIM) constructed,</u>	1.1. <u>Increased coastal community resilience in Pekalongan City</u>	<u>\$ 1.329.480</u>
<b><u>SURVIVING</u></b>			
2. <u>Enhancing coastal community capacity in developing and implementing Local Climate Change Adaptation Action Plan (RAD API), climate change information system, Climate Smart Initiative</u>	2.1.1. <u>Pekalongan City Climate Working Group reactivated</u>	<u>Enhanced capacity of local actors in identifying, initiating, strengthening, and escalating community-based actions to address climate risk and natural disaster; including capacity in integrating the actions to <i>kelurahan</i> development plan</u>	<u>\$ 620.511</u>
2.1.2. <u>Climate working group established and functioning in each of the 8 target <i>kelurahan</i></u>			
2.1.3. <u>Enhancing coastal community capacity in developing <i>kelurahan</i>'s information system and implementing the ensuing climate change adaptation actions</u>			
2.1.4. <u>Engaging youth groups and building their capacity to become Agents of Change in climate change adaptation actions of Pekalongan City</u>			
	2.2.1 <u>RAD API developed based on Pekalongan City Climate Risk Assessment and Climate Coastal Impact</u>	<u>Enhanced capacity of local government and other city stakeholders' in developing climate</u>	

Project/Programme-Components	Expected-Outputs	Expected-Outcomes	Amount (US\$)
	<u>2.2.2 Strategy to integrate CCA into local government planning processes (annual work plan or mid-term development plan of city) is developed</u>	<u>risk assessment and utilizing the results to develop local climate change adaptation action plan (RAD API)</u>	<u>\$117.222</u>
	<u>2.3.1 Innovative and collaboration adaptation actions are implemented in collaboration with private sector, Government bodies and NGO (i.e. technology for main productive sectors, model on collaborative CCA programme across coastal kelurahans/ upstream and downstream kelurahans, collaborative action to protect the affected coastal area); and also evaluated for future reference</u>	<u>Enhanced resilience of coastal community through the implementation of Climate Smart Initiatives, including fostered sustainable utilization of natural resources, with implementation scheme that can be replicated and disseminated to broader audience</u>	<u>\$ 68.148</u>
	<u>2.4.1 Climate change training and knowledge sharing conducted</u>	<u>2.4. Established knowledge management network at municipality level</u>	<u>\$ 262.259</u>
<u>2.4.2 Knowledge product, Advocacy materials (i.e. lessons learned, research paper, newsletter) published and shared</u>			
<u>2.4.3 Local knowledge sharing network established</u>			



Project/Programme-Components	Expected-Outputs	Expected-Outcomes	Amount (US\$)
<u>3. Strengthening vertical coordination by enhancing provincial government's capacity in mainstreaming climate change adaptation and resilience into Central Java Province development plan which in turn could foster better climate-related policy on climate financing and bottom-up planning</u>	<u>3.1.1. Enhanced provincial capacity to develop RAD API</u>	<u>3.1. Enhanced provincial government's capacity in mainstreaming climate change adaptation and resilience into Central Java Province development plan</u>	<u>\$ 194.815</u>
	<u>3.1.2. Appropriate strategy to integrate CCA into Provincial government planning processes (annual work plan or mid-term development plan of city) is developed</u>		
<u>4. Strengthening vertical coordination and collaboration between national and local government in climate adaptation context and Enriching knowledge, toolkits and methodologies coastal resilience for the national government</u>	<u>4.1.1. Knowledge product in the form Handbook on how to use SIDIK for risk assessment at coastal city is published and shared. This handbook is targeted to be used by local government, NGOs and civil society organizations</u>	<u>4.1. SIDIK as risk assessment tools for coastal area based on local experience enriched</u>	<u>\$ 284.370</u>
	<u>4.1.2. Strengthened vertical coordination and collaboration between national and local government in climate adaptation context</u>		
<b>SUSTAINING</b>			
<u>5. Improving community's resilience through initiation of alternative livelihood and improvement of sanitation facility</u>	<u>5.1.1. Aquafarming in mangrove ecosystem developed and implemented by community</u>	<u>5.1. Increased economic income and improved community's health in</u>	<u>\$ 2.545.388</u>
	<u>5.1.2. Mangrove ecotourism improved and involving wider participation of affected coastal</u>		

Project/Programme-Components	Expected-Outputs	Expected-Outcomes	Amount (US\$)
	<u>community of Pekalongan City</u>	<u>8 target kelurahan of Pekalongan City</u>	
	<u>5.1.3. Improved cultural economy through application of ecological batik using mangrove based colouring product</u>		
	<u>5.1.4. Improved food security through the application of urban farming as alternative to conventional agriculture practices</u>		
	<u>5.1.5. Developed circular economy through initiation integrated waste management system and processing</u>		
	<u>5.1.6. Improved sanitation facility in 8 target kelurahan to mitigate risks of waterborne disease</u>		
	<u>5.1.7. Flood Relief for Pekalongan City</u>		
<u>6. Total Project/Programme Cost</u>			<u>\$ 5,422,194</u>
<u>7. Project/Programme Execution cost and ME cost Improved sanitation facility in 8 target kelurahan for better and healthier living condition</u>			<u>\$ 82,571</u>
<u>8. Project/Programme Cycle Management Fee charged by the Implementing Entity</u>			<u>\$ 467,905</u>
<u>Amount of Financing Requested</u>			<u>\$ 5,972,670</u>

## Projected Calendar

**Project Duration:** 3 years (36 months)

Indicate the dates of the following milestones for the proposed project/programme

Milestones	Expected Dates
------------	----------------

Start of Project/Programme Implementation	April 2020
Mid-term Review (if planned)	November 2022
Project/Programme Closing	March 2023
Terminal Evaluation	April 2023

## **PpART ii: Project / programme JUSTIFICATION**

- A. Describe the project / programme components, particularly focusing on the concrete adaptation activities of the project, and how these activities contribute to climate resilience. For the case of a programme, show how the combination of individual projects will contribute to the overall increase in resilience.**

45.46. **Climate change has led to the rise of sea level and changes in rainfall patterns in Pekalongan City.** The rainfall pattern in recent years has become more intense and occurs in a shorter period, which then leads to flooding. Flooding in northern part of Pekalongan City, either those caused by increased rainfall or sea level rise, have contributed to a large number of various interconnected problems. Extreme climate events like heavy rains, combined with sea-level rise have resulted in more frequent and more unpredictable floods that threaten populations' security and goods. Climate change is thus impeding Pekalongan City development. One example of this impediment is the decrease of agricultural land area in nine communities of Pekalongan City that reaches 73% between the period 2007-2016 due to the land being submerged in sea water and also high salinity level of the irrigation

water. This condition has threatened Pekalongan City food security by reducing rice and other agricultural production.

46-47. This programme is specifically **designed to Building Coastal City Resilience to Climate Change Impacts and Natural Disasters** through 3S Actions: [safekeeping-surviving-sustaining], with a **particular focus on economic/livelihood, food security and environmental issues**. The development of local climate change adaptation plans required scientific basis to corroborate and better understand the pattern of current and future of climate risk. This information is essential to create and develop an effective adaptation. Effective adaptation action should also be built on existing actions; adjusting and leveraging practices that are socially- and environmentally-friendly, while leaving practices that potentially cause adverse impact.

47-48. Another **key to effective adaptation** is that it needs to be **locally driven and to involve those most at risk**. This notion thus highlights the importance of two key actors, the local government and community-based organizations (Satterthwaite, 2010). Having considered the above, employing a combined **bottom-up** and **top-down** approach, while simultaneously taking into account the current and future climate risk pattern, is considered as important for this programme in developing an effective local adaptation action plan.

48-49. **Bottom-up approach** means that the development of **local action plan should meet local needs** and involve diverse actors by taking into account the local condition (human capacity, resource availability, local knowledge and practices, etc.). **Top-down approach** means that national actors play role in providing direction, guidance and resources for supporting local government in developing adaptation action plan that is in line with national development goals. This programme will combine two approaches and facilitate interaction between national and local actors, in order to achieve better overall results. Combined approach is expected to become best practice and set out example on how to synergize national policies (RAN API) into all level of government (Province, City and Community/*Kelurahan*). Following this approach, activities under this project will then be designed and implemented at four governance level (National, Province, City and Community/*Kelurahan*).

49-50. Building city's and community's resilience is **not merely** equipping them with **hard structure and soft structure** to address climate impact, but **also by building their awareness and capacity in responding to the impact. Collaborative and participatory approach is the core** of this programme. Participatory approach is not only going to be implemented during programme implementation phase, but also in programme design, where the said approach is already applied during the development process of this full proposal. All the interventions to be implemented in this proposal are the result of Focus Group Discussions and Consultation with Local Stakeholders including communities and municipal government of Pekalongan City. The process of these activities could be seen in the Annex 3.

50-51. The interventions approach to different levels of government administration are meant to be in-line with the Law No.23 Year 2014 about Regional Government. This is the sustainability approach on adapting to climate change through local livelihood and economic improvement. This proposed programme will be focusing its work on economic/livelihood, food security and environmental issues. From legal perspective, these 3 issues are in line with resilience sectors in RAN API (specifically Cluster 1, 2 and 3) and with the direction for improvement of communities' resilience in 2015-2019 National Mid-Term Development Plan (RPJMN). As mentioned above, the combined approach at four governance level is in line with Law Number 23/ 2014 on Regional Government. Activities to be implemented at each level are explained below.

51-52. **The main focus at community level is to strengthen the capacity of coastal community in developing community profile/climate-change information system** and adaptation action plan, on top of implementing the derived climate change adaptation action. The profile itself will be built upon participatory climate risk assessment conducted by the community. The project in community level will also stimulate the implementation of community-based adaptation actions that will be focusing mostly on livelihood context; how the community can adjust their conventional livelihood practices to be able

to face climate change impact. The other focus will be on impact from climate-related disaster faced by the community, namely coastal flooding and erosion and sea level rise.

52-53. **At municipal level, more emphasis is placed on increasing the capacity of local government bodies, universities and local NGOs to have the ability to develop local climate-change adaptation action plan (RAD API).** The development process will be facilitated by the Project Management Unit (PMU). The core steps in developing RAD API document will be translation and adjustment of RAN API content into local context. To provide scientific basis to the document, training on utilizing SIDIK to assess climate vulnerability and risk of the city will be conducted. The assessment result will then be a part of local context in RAD API and among the key considerations to develop the list of adaptation actions. Training will also be given on mainstreaming process of adaptation plan to local development plan. The training participants at city level will also involve community representatives. This is to ensure that all stakeholders will have the ability to evaluate and find synergy between RAD API and other relevant regional/local development plans. Furthermore, approach at city level would not only encourage community, but also private sector participation in implementing adaptation action, by exploring the potential of private sector cooperation in supporting local adaptation action. Promoting collaborative climate change adaptation actions, not only within programme timeframe, but also in future time.

53-54. The collaborative adaptation actions that will be implemented ~~at~~ city level will be designed with implementation and financing scheme for selected actions that will **allow for replication and wider implementation**, so that benefit derived from the programme can be further shared after the programme is ended, not only relying from programme funding. It is this existence of such financing scheme that will be the main difference between adaptation actions at community level and city level. Whilst in community level the activities will be conducted in an area with one-off AF grant specifically for aquaculture and innovative latrine will be introduced.

54-55. Adaptation actions that will be implemented at city level will be focusing on:

- 1) Concentrating mangrove enrichment and planting in and around the area of Mangrove Information Centre (PIM), as well as in some part of Kelurahan Degayu, that accumulatively covers an area of around 3 ha (based on the conversion of the initial 6km with 5m thickness). The adjustment to 3 ha is because the possibility to develop mangrove belt east from PIM area is no longer existing. This is the result of municipal city's parapet construction along the coast up to Degayu. Mangrove Planting in this coastal area is therefore not feasible (See Annex 14).
- 2) Enhancing the resilience of main productive sectors through (i) development of aquafarming in mangrove ecosystem as an alternative income generation for the affected community (ii) construction of coastal embankment with breakwater construction. Aside from financial resources, one of the biggest challenges for aquafarming implementation in the targeted area is coastal and tidal flooding. To this, KEMITRAAN received the request to explore options of breakwater construction to protect Pekalongan City's coast in Kandang Panjang.

Following the above request, a series of FGDs involving respective experts have been conducted to find the best solution for the protection of the coastline in Kandang Panjang within the month of August 2021. The solution was including both the substitute to the parapet and alternative to geotube.

Therefore, KEMITRAAN sought assistance from coastal experts to develop alternative solutions for coastal protection structures. Based on the options proposed by experts during the FGD, the chosen form of coastal safety building is a rubble mound breakwater. This form of coastal protection construction was chosen considering the real impact caused by climate change is the massive coastal abrasion and the increasing destructive power of waves against infrastructure in the coastal area, which results in, among others, damage to mangrove ecosystems around the Mangrove Information Center (PIM) area, which is an asset of Pekalongan City. Rubble mound breakwater has proven ability to reduce wave destructive power in terms of minimizing coastal damage, as well as to restore lost coastal sedimentation that is necessary to support mangrove

ecosystem rehabilitation. Therefore, with the design of these breakwater structures protecting the coastline of Kelurahan Kandang Panjang in the Mangrove Information Center (PIM) area, it can reduce the energy of ocean currents, thus causing tidal waves to return sedimentation and increase land for mangrove planting areas previously degraded from 9.2 ha to 2.3 ha (see the picture below).

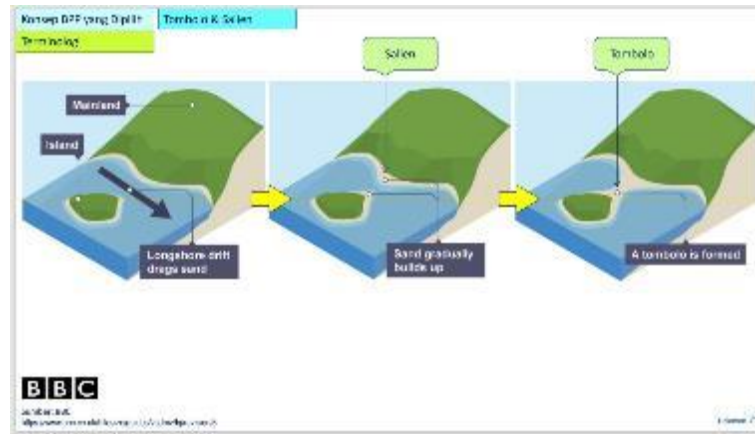


Figure 11 Tombolo and salient concept for the rubble mound breakwater



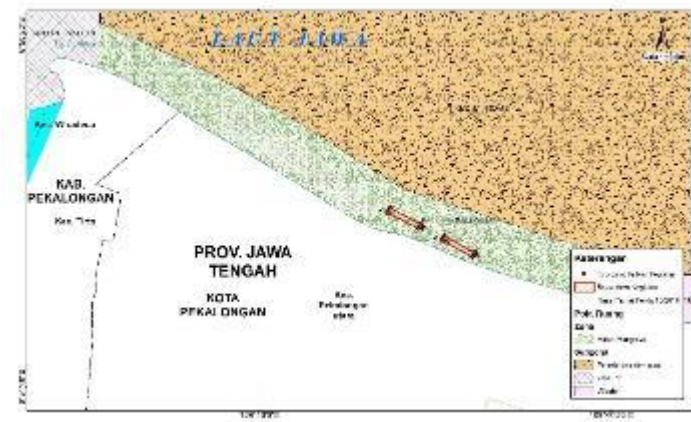
Figure 12 Example of separated offshore breakwater construction

As a follow-up to these coastal experts, KEMITRAAN has conducted a study to determine the appropriate location and design for the construction of the breakwater building in the Kelurahan Kandang Panjang, precisely on the beach in front of the Mangrove Information Center (PIM) of Pekalongan City, considering the available budget. Field studies were conducted for 6 months at the PIM area location to determine the exact location for the construction of the breakwater structure using methodologies such as current surveys, wave surveys, tidal surveys, bathymetric surveys, geotechnical surveys, material availability surveys, and hydro & sediment computational simulations on the breakwater building model based on the obtained data. The methodology used in preparing the study resulted in data consistent with field conditions, ultimately resulting in the design of breakwater structures consisting of natural stone piles ranging from 200 kg to a maximum size of 1.5 tons, with a total required volume of 2,578.5 m<sup>3</sup> for natural stones ranging in size from 200 – 1000kg, then 1,567.5 m<sup>3</sup> for natural stones sized 1000kg, and 7,059 m<sup>3</sup> for natural stones sized 1.5 tons.





**Figure 13 Bird view of the breakwater construction site in front of “Pantai Krematorium”**



**Figure 14 Digitised version of Figure 13 with two breakwater offshore**

Based on the results of the above study and considering the budget availability, it was decided to build 2 units of rubble mound breakwater using natural stones. These natural stones will then be arranged into 2 structures, each 150 meters long with a distance of 100 meters between each structure (Annex 13). The decision to build 2 separate breakwater units is to keep ocean currents conducive and not adversely affect the coastal areas around the site (see figures 13 and 14).

This construction does not require groins because based on the results of oceanographic and bathymetric studies, the presence of groins will lead to a backflow of ocean waves opposite to the natural flow of currents in the area. Coastal protection structures in the form of groins, mostly function as longshore capture and transport. Therefore, groins are not effective in stopping erosion on muddy beaches and are not effective in changing the character of the surf zone which will not change the wave height along the coast.

Supporting the construction plan of the rubble mound breakwater, an **Environmental and Social Impact Assessment (ESIA)** has also been prepared.

**3) Introducing innovative communal latrine (permanent construction with floating septic tank) in flood prone area to reduce impact from water-borne disease.**

- 4) **Developing and promoting community-based ecotourism.** Despite its nature being community-based, this ecotourism activity will fall under the responsibility of Pekalongan City Government considering that the community does not have jurisdictional authority in the city administrative area. Yet the community will be the main actor in implementation and will work closely with city government officials on this matter.
  - 5) **Improving Pekalongan City's cultural economy** into a more resilient and environmentally friendly production method through the application of mangrove based colouring material. This way, not only innovative production method is developed, but another economic opportunity through the production and sales of the natural batik colour can be developed.
  - 6) **Increasing food security** through the introduction of urban farming that offers affected local community with possibility to enhance its food source to meet their daily needs of nutrition on the one hand, and to generate income on the other hand.
  - 7) **Creating income opportunity through support to the Municipal Government of Pekalongan City** with an integrated waste processing facility that separates organic and inorganic waste, offering income opportunity through organic fertilisers and recycling process of inorganic waste. This way, the Municipal Government of Pekalongan City can release affected communities from the monthly waste disposal fee, thus creating a cleaner and healthier environment.
- (0). **Enhancing the resilience of main productive sectors** through (i) development of aquafarming in mangrove ecosystem as an alternative income generation for the affected community (ii) construction of coastal embankment with breakwater construction geo-tube system. Aside from financial resources, one of the biggest challenges for aquafarming implementation in the targeted area is coastal and tidal flooding. The construction of geo-tube will not only serve the purpose of reducing inundated area by protecting the coastal part of Pekalongan City, but also help protecting the mangrove plants in its early development years, in which the mangrove plants are still vulnerable to strong tidal wave. Moreover, the built embankment will also complement national government (BBWS/Balai Besar Wilayah Sungai) initiatives that at the moment are constructing dam in Bandengan area. Initially, the Municipal Government of Pekalongan City has requested to enhance the existing geo-tube installation. This request was made in terms of filling the gaps, where parts of the Pekalongan City's coastline are not protected through geo-tube and also to strengthen and/or restore the coastal sediment to enable mangrove planting. Further, the geo-tube installation was also meant to protect existing mangrove, especially at the Mangrove Information Centre, from the destructive power of the sea that is increasing overtime. Indeed, during the development of this proposal extensive inundation of Pekalongan City's coast has become extensive with increasing frequency of tidal floods. Besides constructing a polder system to curb impact of flooding, the Municipal Government of Pekalongan City has also consulted coastal experts from different universities that recommended the City's BAPPEDA to consider applying **different coastal protection construction other than the geo-tube**. Assessment on the geo-tubes has revealed that this is not strong enough to hold the increasing force of the sea and the weakening coastal sediments leading to the geo-tubes submergence in most cases. **KEMITRAAN received the request to explore different options of coastal protection structures suitable for Pekalongan City's coast**. After long and intensive discussion and engagement of a professional coastal protection expert, the choice fell on breakwater construction. The construction of the breakwater will not only serve the purpose of reducing the destructive force of the sea, thus increasing protection of the coast of Pekalongan City, but also help protect the mangrove plants in its early development years, in which the mangrove plants are still vulnerable to strong tidal wave. Moreover, the built construction will also complement national government (BBWS/Balai Besar Wilayah Sungai) initiatives that are constructing a polder system in Bandengan area behind the planned breakwater construction. The outer wall of the polder system is currently threatened by the strong force of the sea, so the breakwater construction will also protect the polder from possible damage, thus protecting the government investment to protect the city (see Annex 13). The initiatives of BBWS also include **the extension of the 300m parapet** in the eastern of the city, which was part of the Municipal Government requests for KEMITRAAN to construct during the early phase of the development of this proposal. The takeover of this component forced KEMITRAAN to reallocate the funds and merge this with the allocation of the breakwater construction.



- ~~(0). **Introducing innovative communal latrine (permanent construction with floating septic tank) in flood prone area** to reduce impact from water borne disease,~~
- ~~(0). **Developing and promoting community-based ecotourism.** Despite its nature being community-based, this ecotourism activity will fall under the responsibility of Pekalongan City Government considering that the community does not have jurisdictional authority in the city administrative area. Yet the community will be the main actor in implementation and will work closely with city government officials on this matter,~~
- ~~(0). **Improving Pekalongan City's cultural economy** into a more resilient and environmentally friendly production method through the application of mangrove based colouring material. This way, not only innovative production method is developed, but another economic opportunity through the production and sales of the natural batik colour can be developed,~~
- ~~(0). **Increasing food security** through the introduction of urban farming that offers affected local community with possibility to enhance its food source to meet their daily needs of nutrition on the one hand, and to generate income on the other hand,~~
- ~~(0). **Creating income opportunity through support to the Municipal Government of Pekalongan City** with an integrated waste processing facility that separates organic and inorganic waste, offering income opportunity through organic fertilisers and recycling process of inorganic waste. This way, the Municipal Government of Pekalongan City can release affected communities from the monthly waste disposal fee, thus creating a cleaner and healthier environment.~~

61.56. Additionally, **knowledge management networks will be established at municipal level;** enabling information sharing between stakeholders and creating a transparent programme implementation. Among knowledge products that will be produced are documentation of lessons learned, training materials, research paper, and advocacy materials.

62.57. Activities at **provincial level** are more **focused in assisting the provincial team to develop climate risk assessment** with community or *kelurahan* level as the smallest level of analysis, in which the assessment results will be the **basis to develop RAD API**. The province will undergo a series of training to equip them with the following technical skill and knowledge: SIDIK utilisation, RAD API development by considering RAN API and city adaptation plan, translation and integrating RAD API into provincial development plan. These will be the basis to build a **synchronised adaptation action at city, province and national level**. A total of 6 trainings (3 trainings for RAD API development, and 3 trainings for its integration into provincial development plan) will be received by provincial government officials on the aforementioned aspects. From this training, Central Java Province RAD API document and strategic document outlining its integration into Provincial Development Plan will be generated.

63.58. **At national level**, the team will **be focusing in strengthening vertical coordination and advocacy** process by **working closely with 2 national government bodies and secretariats** in issue that will be elaborated as follows:

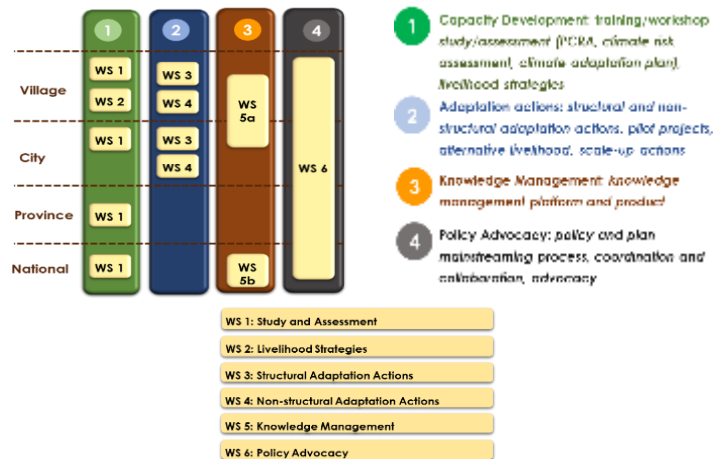
- (1). The Ministry of Environment and Forestry (MoEF) has developed a free web-based tool to calculate the climate risk index known as SIDIK. This tool is highly beneficial for local governments to assess the risk index of their administrative area in an easy and user-friendly manner. Yet the tool has a drawback in its inability to accurately calculate climate risks in coastal areas. Therefore, **this programme will support the MoEF in refining the tool in order to improve its effectiveness and accuracy of its utilisation in coastal areas**. Building upon experience of using SIDIK at city level, a handbook will be developed on how to use SIDIK for risk assessment at coastal city areas, where it will contain coastal-related criteria to generate a more appropriate vulnerability index for coastal cities. This handbook will be communicated to MoEF and broader audiences through dissemination activity. Concurrently, 300 handbooks will be produced and made available for local government, NGOs and civil society organisations.
- (2). The Secretariat of RAN API had developed **gap analysis of RAN API** documents. Building upon experience in translating RAN API at provincial and city level, the **team will provide input to the secretariat on gaps identified during the translation process**. This input will be beneficial for the RAN API review process that is planned to be conducted in 2017-2018. Cooperation with Secretariat of RAN API will also be done to explore potential synergy between the national (RAN API) and regional adaptation actions (RAD API), that could prompt vertical collaboration between

line ministries/government agencies and local governments for implementing adaptation actions that can be implemented at the provincial, city or community level. Seeing Pekalongan City position as one of the pilot areas of RAN API, this synergy and collaboration is seen as highly potential to be implemented.

64-59. In order to explore the potential vertical collaboration in implementing adaptation action, there will be a **series of national dialogue (Musrembang, 3 events) as a consultative meeting/forum among national, province and city representatives**. In the national dialogue, based on the existing national dialogue method and scheme, community representatives might not be involved. However, lessons learned from community implementation will be shared and communicated by PMU during the event. Furthermore, Pekalongan City representatives will represent communities' (as well as wider city stakeholders') voice and interests during the dialogue. To further strengthen the need for collaboration as well as highlighting the role of local level in climate adaptation context, a set of policy advocacy materials (including 3 policy papers on: gaps in national policy, fiscal, regulatory and legal framework that built upon experience and findings at local level; 1 lessons learned documentation, research paper) will be developed and communicated to relevant stakeholders. This communication can be done through the programme's regular involvement in national knowledge network meetings (at least 9 meetings). Engagement with a national network that advocates the same interest is believed to provide assistance to this advocacy process, and thus the team will actively engage and communicate with Indonesia Climate Alliance (ICA); a national network of different national institutions, research institutes and NGOs with interest on climate resilience issues. Policy advocacy will be a continuous and interconnected activity at 4 governance levels; and it will be the main content of the vertical approach. Lessons learned obtained at community and city level will be utilised to build research papers and policy brief as bottom-up advocacy material that will also be communicated at province and national level.

**Interconnection of Programme Implementation at 4 Governance Level**

65-60. **Combination of bottom-up and top-down approach will be implemented within the proposed programme** to ensure a cohesive climate adaptation plan/programme/policy and its implementation at all governance level. In general, the programme will focus on 4 aspects, which are capacity development, adaptation action, knowledge management and policy advocacy. Figure 11 below shows the interconnection between actions at different governance level within the programme, with brief information on each aspect.



**Figure 154. Interconnection of 4 Aspects at 4 Governance Level**

Capacity Development

66-61. Focusing in equipping implementer and beneficiaries with sufficient knowledge and skill to address climate-

related issue. **Capacity development activities will be done at all governance level**, with materials including how to develop, use and integrate climate risk assessment at lower governance level into risk assessment process at higher governance level and its relevant policy-making process. At community (*kelurahan*) level, capacity development process will also include participatory assessment in determining the most suitable and appropriate alternative livelihood strategies for their area. This particular strategy will also be advocated to the municipal government of Pekalongan City for broader replication that complemented with financing scheme.

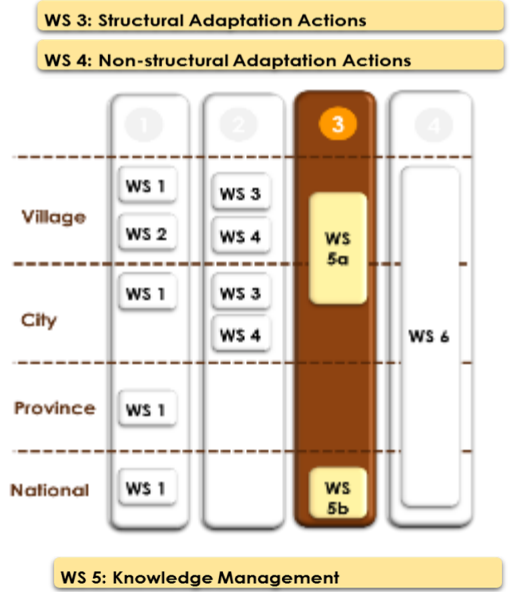
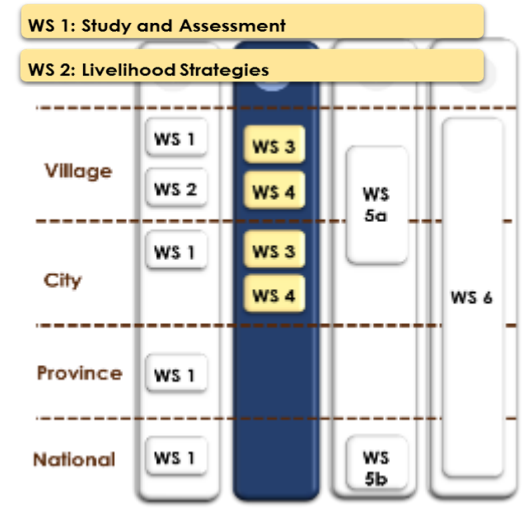
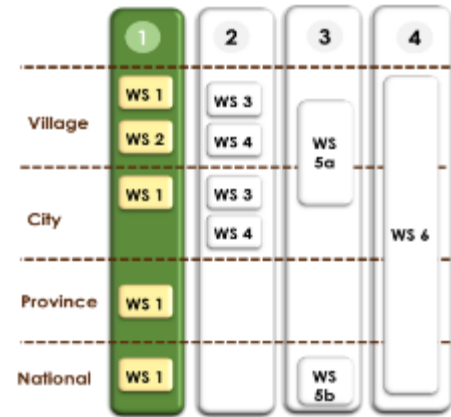
Adaptation Actions

67-62. **Focusing in implementing physical and non-physical interventions** that are expected to assist Pekalongan City in reducing coastal-related climate risk. Considering the scope of programme implementation as well as the fact that local autonomy in Indonesia falls under city government (instead of province/state government) and its lower governance level, hence adaptation actions for this proposed programme will only be implemented at community and city level. Adaptation actions that will be implemented at both level will be depending on the corresponding climate risk assessment results. At city level, the content of climate adaptation plan (and subsequent adaptation actions) will not only consider city climate risk assessment results, but also input from participatory climate risk assessment at community level.

Knowledge Management

68-63. **Focusing in network development for information dissemination and knowledge products development.** This aspect is aiming to ensure an effective horizontal and vertical information sharing on climate-related issue. For the purpose of this programme, knowledge management aspect is embedded in each of 4 governance level. Hence the relevant knowledge management activities are located scattered in each level.

69-64. At community level, **knowledge management aspect will be focusing on collecting and documenting lessons learned at local level** and also two-way vertical communication with city government on climate-related issue. Knowledge management network will be developed at city level with information coming also from lessons learned at community level, in which the network allows a more effective information sharing process. Among knowledge products that will be developed at city level are research paper and policy brief that will support policy-making process at city and higher governance level. At national level, knowledge management activities will be

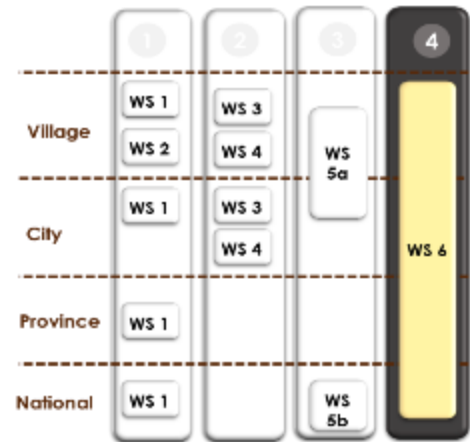


focusing on refinement of SIDIK as risk assessment tools that can be utilized by coastal area. The refinement itself will be utilizing lessons learned obtained from activities conducted at community (*kelurahan*) and city level. Knowledge management activities will not be implemented at province level since province government role in Indonesia governance system is mostly as the extension of national government, with no actual administrative area, since autonomy falls under the hand of city/district government. Yet, city government will continually feed climate-related information and the relevant adaptation plan to province government as key information for them to develop Central Java Province Climate Adaptation Plan which obligated to be developed by the national government.

### Policy Advocacy

#### 70-65. **Focusing in ensuring the integration of climate-related issue into government plan/programme/policy.**

Policy advocacy will be a continuous and interconnected activity at 4 governance level within this particular programme. Adaptation plan at community level will be mainstreamed to community development plan, and then submitted and advocated during development plan meeting at sub-district level. This plan will continue to be advocated during the succeeding development meeting at city level. Furthermore, the results will also be synchronized with adaptation and development plan at province and national level. Aside from the plan, lessons learned obtained at community (*kelurahan*) and city level will be utilized to build research paper and policy brief as bottom-up advocacy material.



71-66. To better illustrate how the advocacy process can be done throughout the programme, figure 12 below shows the applicable National Development Planning System in Indonesia. In this figure, it can be seen that community (*kelurahan*) level is not formally included in the framework of National Development Planning System. However, the deliberation to formulate city development plan is started at community level. The agreed Community Adaptation and Development Plan will be discussed at deliberation meeting at sub-district level. The results then will provide an input to local adaptation plan at city level which will then be integrated to city development plan. Moving vertically, city adaptation plan and development plan will subsequently feed information to shape province adaptation and development plan. Considering their role as national government extension, provincial adaptation and development plan will also be influenced by policy at national level. On the other hand, city government also has the ability to directly feed information to national government by providing sound lessons learned in the form of policy brief. For this particular programme, **the city government will provide policy brief which showcasing lessons learned from development and implementation process of coastal adaptation plan** that at the moment still lacking in Indonesia, including outlining how coastal characteristics can be integrated into SIDIK.

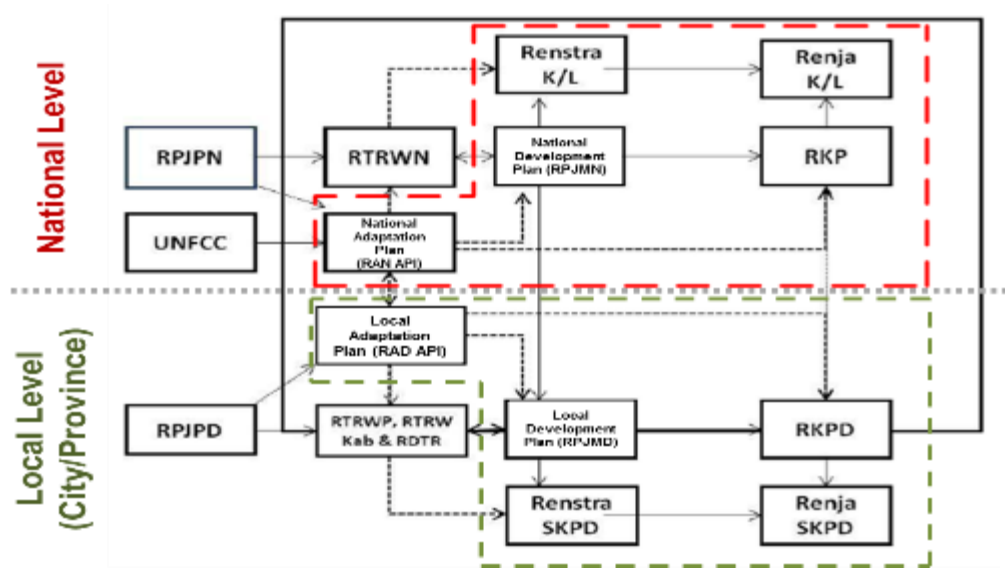


Figure 126. National Development Planning System

72-67. Meanwhile figure 13 shows how the local government (community (*kelurahan*), city and province government) could incorporate climate adaptation plan into their development plan. This scheme would inform the PMU on how to design the best approach for advocacy. **Climate adaptation strategy and plan would provide different perspective to local government in formulating their local development strategy and plan**, in addition to the conventional approach which often only considering local and regional economic perspective.

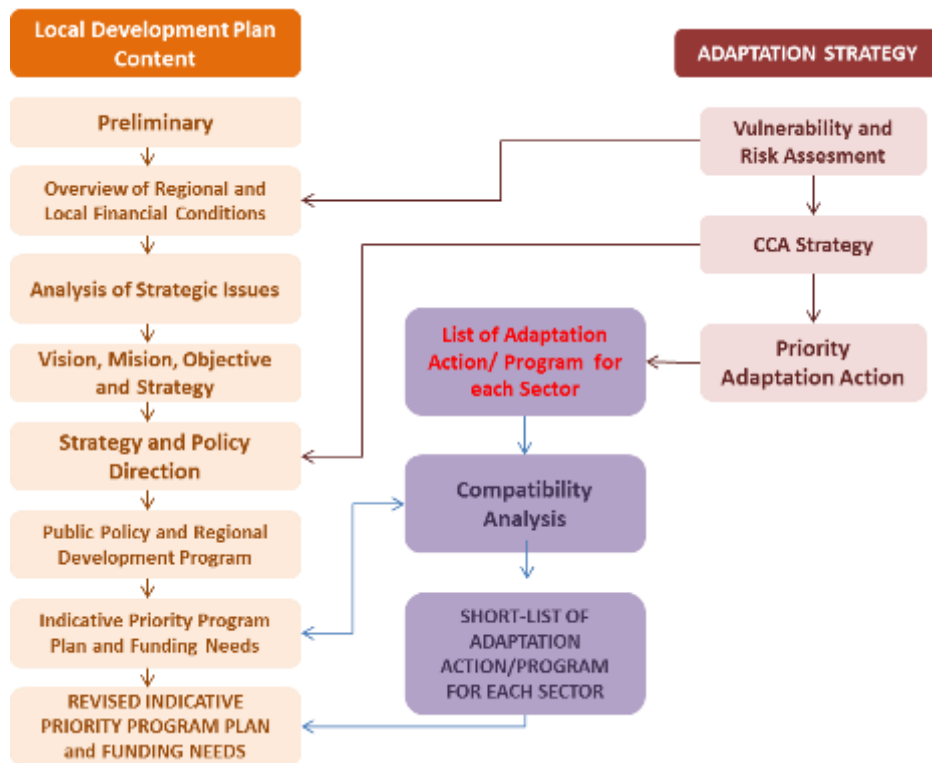


Figure 137. Potential Scheme to Integrate Climate Change Adaptation into Local Development Plan



- B. Describe how the project/programme provides economic, social and environmental benefits, with particular reference to the most vulnerable communities, and vulnerable groups within communities, including gender considerations. Describe how the project / programme will avoid or mitigate negative impacts, in compliance with the Environmental and Social Policy of the Adaptation Fund.**

73-68. **The programme implementation will generate economic, social and environmental benefits and contribute in improving gender equality, women's empowerment, engagement of youth groups and meet the targeted adaptation needs of women and men.** This is marked by the implementation of various consultations with stakeholders at all stages of the project / programme cycle in a gender responsive manner and paying attention to gender equality. Therefore, these benefits came not only from introducing alternative livelihoods and implementing adaptation actions, but also from implementing the whole course of the programme and from various actions mainstreaming gender at every stage of programme implementation. It will bring about and promote a set of innovations that will help improve the lives of the most vulnerable communities and encourage the empowerment of women and engagement of youth. In general, benefits that can be obtained from this programme including protection of the livelihood assets of coastal communities, sustainability of ecotourism and reducing impact from waterborne disease.

74-69. Target beneficiaries of this project through **3S (Safekeeping-Surviving-Sustaining) Approach to Build Coastal City Resilience to Climate Change Impacts and Natural Disasters in Pekalongan City**, Central Java Province in 8 *Kelurahan* comprises 2 different types, direct beneficiaries of 10,477 people consisting of 6,289 (60%) male, 3,145 (30%) female and 1,043 (10%) of vulnerable groups, and also 109,011 both direct and indirect beneficiaries (please refer to Annex...[budget & beneficiaries]).

75-70. Direct beneficiaries are those directly involved either in strategic activities (policy planning and development) or in general activities (awareness raising, construction works and planting). Meanwhile, vulnerable groups consist among others of elderly, children, poor, pregnant women and people with disability.

76-71. From a total of 82 planned activities, 50 activities will involve direct beneficiaries. In the activities involving youth groups, the options can still be applied based on gender and vulnerable definition. The percentage of women's involvement in each important action component is described as follows:

Important Action	Output	Male (Persons)	Female (Persons)	Vulnerable (Persons)
Safekeeping	1.1.1. Establishment of 6 kilometres of Mangrove Ecosystem;	128	64	21
	1.1.2. Construction of 300 m parapet at Slamaran Beach in kelurahan Degayu; (planning and preparation phase, i.e. engagement of consultant, site survey, development of construction design (DED))			
	1.1.3. Coastal embankment (geo-tube/sand trap) at Kandang Panjang (construction process of selected coastal construction			
Surviving	2.1.1. Pekalongan City Climate Working Group reactivated;	4.863	2.432	806
	2.1.2. Climate working group established and functioning in each of the 8 target kelurahan;			
	2.1.3. Enhancing coastal community capacity in developing kelurahan's information system and implementing the ensuing climate change adaptation actions;			
	2.1.4. Engaging youth groups and building their capacity to become Agents of Change in climate change			

	<p>adaptation actions of Pekalongan City;</p> <p>2.2.1. RAD API developed based on Pekalongan City Climate Risk Assessment and Climate Coastal Impact;</p> <p>2.2.2. Strategy to integrate CCA into local government planning processes (annual work plan or mid-term development plan of city) is developed;</p> <p>2.3.1. Innovative and collaboration adaptation actions are implemented in collaboration with private sector, Government bodies and NGO (i.e. technology for main productive sectors, model on collaborative CCA programme across coastal kelurahans/ upstream and donstream kelurahan, collaborative action to protect the affected coastal area); and also evaluated for future reference</p> <p>2.4.1. Climate change training and knowledge sharing conducted;</p> <p>2.4.3. Local knowledge sharing network established;</p> <p>3.1.1. Enhanced provincial capacity to develop RAD API;</p> <p>3.1.2. Appropriate strategy to integrate CCA into Provincial government planning processes (annual work plan or mid-term development plan of city) is developed;</p> <p>4.1.2. Strengthened vertical coordination and collaboration between national and local government in climate adaptation context</p>			
Sustaining	<p>5.1.1. Aquafarming in mangrove ecosystem developed and implemented by community;</p> <p>5.1.2. Mangrove ecotourism improved and involving wider participation of affected coastal community of Pekalongan City;</p> <p>5.1.3. Improved cultural economy through application of ecological batik using mangrove based colouring product;</p> <p>5.1.4. Improved food security through the application of urban farming as alternative to conventional agriculture practices;</p> <p>5.1.5. Developing a circular economy through initiation of integrated waste management systems and processing.</p>	1.395	697	232

77-72. Types and estimated number of target beneficiaries to be involved in the 50 different activities is listed below, with general description of interventions at community and at *Kelurahan* level:

### Capacity building

Activity	Beneficiaries			Total
	Male	Female	Vulnerable Gr.	
Training	869	434	140	1.443
Focus Group Discussion	912	456	152	1.520
Workshop	1.431	716	239	315
Seminar	180	90	30	300
Awareness raising	617	308	103	1.028

### Economic empowerment

Activity	Beneficiaries			Total
	Male	Female	Vulnerable Gr.	

Manpower for planting and construction. In construction include planning, construction/supervision and operational/maintenance during post construction.	97	48	16	161
Economic assistance (production means)	336	168	56	560

78-73. Meanwhile, the types of activities and estimated number of municipal, provincial and national governmental, as well as multi-stakeholders beneficiaries are as follows:

#### Capacity building for Govt. (municipal, provincial, national)

Activity	Beneficiaries			Total
	Male	Female	Vulnerable Gr.	
Focus Group Discussion	360	180	60	600
Training	186	93	31	310
Workshop	1.062	531	177	1.770

#### Multi-stakeholders Capacity building

Activity	Beneficiaries			Total
	Male	Female	Vulnerable Gr.	
Focus Group Discussion/Multi-stakeholder	48	24	8	80
Training/ Multi-stakeholder	132	66	22	220
Workshop/ Multi-stakeholder	72	36	12	120
Seminar/ Multi-stakeholder	84	42	14	140

#### Tidal flood, abrasion and siltation of rivers

79-74. Climate change impacts include the occurrence of tidal flooding, abrasion and siltation of rivers at the programme location. The following table details some of the causes and their impact on the environment and the communities around the programme locations identified from the results of the discussion with the communities.

Causes	Impact
<ul style="list-style-type: none"> <li>- Many development activities don't comply with the "AMDAL" [Environmental Impact Assessment]</li> <li>- Lots of artesian excavation</li> <li>- Many companies make water drill wells</li> <li>- There are still people who throw litter</li> <li>- Trash piles up and burns</li> <li>- Over capacity TPA (lack of waste management)</li> <li>- Many rice fields turn into houses</li> <li>- The amount of disposal of industrial waste into rivers (pollution)</li> <li>- There is no green land</li> <li>- The drainage channel is reduced</li> </ul>	<ul style="list-style-type: none"> <li>- Damaged roads</li> <li>- The difficulties of the transportation</li> <li>- Daily activities are disturbed (ponds)</li> <li>- Home industry is paralyzed</li> <li>- economic downturn</li> <li>- Many ships cannot dock, so raw material supply is disrupted</li> <li>- Slums (dirty and unhealthy)</li> <li>- Water quickly enters the settlement</li> <li>- The wind hit the settlement</li> <li>- Health issues (skin, tuberculosis, vomiting, dysentery, filariasis, leprosy, increased stress and emotions, mental disorders)</li> <li>- Disrupted sanitation</li> <li>- Decreasing groundwater level</li> </ul>



	<ul style="list-style-type: none"> <li>- Disrupted education (children don't want to go to school, the school/study location were moved)</li> <li>- Increasing living costs (repairing motorbikes, houses, etc.)</li> <li>- Damaged/destroyed properties</li> <li>- Need more energy and people to clean the house affected by tidal flood</li> <li>- Disappearing beach (loss of tourist spot/recreation area)</li> <li>- Plants died</li> <li>- Loss of children's playground (open land is flooded)</li> <li>- Domestic violence</li> </ul>
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### Community proposal/suggestions

~~80.75.~~ From a series of programme preparation discussions, the Partnership team also explored community proposals/suggestions, especially among women, so that their problems could be resolved immediately as follows:

1. Grombyang Kali (river's dredging) in Degayu Community
2. Provision of pumps for Degayu Community, because currently there is only one large suction pipe
3. Dredging of Kupang River and construction of Parapet (Tebing) and sluice gates in Panjang Wetan Community
4. Controlling settlements (there are 11 houses) on the Kali Kupang side of Panjang Wetan Community
5. Dredging of city rinse channel repair in the *kelurahan* of Panjang Wetan, Padukuhan Kraton, Kandang Panjang
6. Repair of public toilets for Panjang Wetan Community on the river bank (there are 4 locations)
7. Elevation of roads and normalisation of channels in Panjang Baru Community
8. Normalisation of Kali Bremi (dredging, cleaning of water hyacinth, raising of senderan) in Pasir Kraton Kramat Community
9. Elevation of the talud and repair of the channel (so that water can come out) in Kandang Panjang Community
10. Improvement of public channels and household channels in the Padukuhan Kraton ex-Pabean community
11. Normalisation of the channel in Pasir Kraton Kramat Community because the sediment is already high.
12. Repair of 'MCK' in Pasir Sari, *Kelurahan* Pasir Kraton Kramat
13. Elevation of the road in Kramat Sari ('angkatan 66'). It is because the water overflows into the area.
14. Training and provision of capital for residents whose jobs are affected by rob. Giving capital should be direct to individuals (not per group, because often it doesn't work if per group).
15. Training: selling, convection and sewing, food (processed fish such as shredded meat), dressing
16. Training on waste recycling to reduce waste generation while increasing income
17. Socialisation regarding waste management
18. Optimization of waste banks, currently many garbage banks are flooded due to tidal flood

### Barriers / challenges faced by women in programme participation:

81.76. To ensure women's participation in the entire programme process, it is important to recognize the various potential barriers that hinder their participation. From various discussions with them, the barriers/challenges encountered and need to be anticipated are:

1. Generally, in everyday life, women and children suffer from the effects of tidal flood, from waking up until they sleep at night.
2. Women must do extra work caused by the tidal flood. Among others: cleaning the house (sweeping, mopping), clearing household items, maintaining and saving children, helping to provide consumption for those cleaning the environment after the tidal flood.
3. Female rest periods (including sleep) are much less. The average woman in the beneficiary area wakes up at 2:30 in the morning and sleeps at night at 12.00 a.m. This has an impact on women's health conditions and prevents them from participating in programmes.
4. Meeting activities in the community are often held during the evening, but as mothers it is rather difficult to leave children at this particular time.
5. Climate change adaptation interventions focus more on road elevation, whereas according to them what is considered should be not only roads, but also waterways. In fact, if the road is elevated but the channel is not repaired, water will still be difficult to get out of the inundation area.
6. Even if women submit proposals, the proposal is usually only recorded, but it is not realised because it is not considered a priority scale. The priority is generally based on areas that are considered more severe.
7. NUSP funds are directed to 'SK Kumuh (slum)'. But this 'SK Kumuh (slum)' is not in accordance with his visual condition. So that the really slum areas cannot be handled, even though the NUSP funds are quite high in value. Merged communities and non-demergers, obtaining the same amount of funds for handling, even though the extent of the environment and the severity are different.
8. Due to limited funds while the location and need for handling is very high. Some women's proposals tend not to be prioritised.

82.77. **Participatory approach** being employed in the programme **will ensure the fulfilment of representatives of both women and men in consultation at all stages of the project / programme cycle and community's opinion and interests are taken into account.** The community working group will be composed of representatives from women groups, most vulnerable groups (included here are community members that could represent the voice of elderly, children and disable groups) and community representatives from different socio-economic levels. The planned adaptation actions, including alternative livelihood, will be designed by considering their needs and interests. Community Working Groups at *kelurahan* level (CWG) act as institutions that select those beneficiaries of the project at the community level. The criteria for beneficiaries are affected communities, the poor and vulnerable people, for farmer groups, VWG must ensure that at least 30% of the group members are women.

83.78. While **at city level**, the programme tries to **provide a broader impact** by not only **targeting direct beneficiaries** in the forms of people that are involved in target implementation sites, but **also indirect beneficiaries** which are the wider Pekalongan City community through advocating and fostering a climate-resilient development plan and action plan. The programme will also focus on strengthening local government's capacity in developing and mainstreaming climate change adaptation plan to local development plan and spatial plan by paying attention to the gender aspects in it.

### Capacity Building

84.79. **Capacity development** activity at **community level** in the 8 target *kelurahan* will be mostly done in the form of **training and awareness building** that are focusing on strengthening coastal communities' capacity in climate-related knowledge as well as planning, implementing and monitoring community adaptation plan. These activities will introduce new knowledge that intends to stimulate behaviour changes. For the local environment this would mean less adverse environmental impact from anthropogenic activity as well as an opportunity for promoting new ecosystem services (e.g. coastal conservation activity) and increasing social capital. The community thus will obtain social benefit in the form of improved knowledge and capacity to better address climate-related issues which in turn will increase their adaptive capacity to climate risks; and also environmental benefit that is derived from behavioural changes. Meanwhile the economic benefit comes as an indirect impact of capacity

development at community level, particularly from alternative livelihood training that is aimed to increase the coastal population income. The training and awareness building will also raise some gender issues related to climate change such as gender mainstreaming of climate action into community development plans, including the impacts of climate change on women. Accordingly, the vulnerable groups (including women) will be trained and equipped with new skills; and open up new employment opportunities for them. The total target of training and workshop participants at the community level will be attended by 360 participants where 100 participants are women. Furthermore, **women representatives** will also be the members of community climate working group (**20% of community working groups are women champions** in all communities).

**85-80.** Further, this programme will also **provide social benefit to the local government, both the Municipal Government of Pekalongan City and the Provincial Government of Central Java**, by enhancing their capacity to **develop a participatory gender responsive and sustainable local development plan** that incorporate climate change context; fostering a better institutional framework for climate-related planning and thus creating a ripple effect in building a more resilient coastal city. The existence and implementation of this plan will assist them in better allocating resources (both in terms of monetary, physical and human resources), including improving public services to vulnerable people. Often, resources allocation done by the local government was not on target due to minimal information, especially when trying to synergize vertical planning between city and provincial government; resulting in an ineffective not on-target resource allocation. Implementation of this programme is expected to remedy these previous practices, fostering a better and more synergized planning, and also a more effective and on-target resource allocation.

**86-81.** At city level, social benefit will also be obtained from the **establishment of local knowledge management network** that enable information sharing (including technical information and gender issues) between stakeholders. As one of the member of the knowledge network, local NGO and community-based organizations will also gain social benefit from this programme since they will receive technical training that will be useful for their future operational activity in the area. Local knowledge management network will ensure the diversity of knowledge regardless of gender and age to add to the robustness of the knowledge constructed and insights gained.

#### **Advocacy**

**87-82.** Advocacy conducted at national level has the potential to promote economic benefit for the city by **synergizing city adaptation plan (that built upon community adaptation and development plan), provincial adaptation plan and national adaptation plan**; open-up opportunity for Pekalongan City to tap funding access from the national government budget. The municipal government of Pekalongan City will then be able to allocate the needed funding for implementation at community level. For national government itself, this synergy would enrich their existing information on climate-related issues at local level and also set example for vertical coordination mechanism to other RAN API pilot areas.

#### **Potential Adaptation Actions**

**88-83.** **Potential adaptation actions at community level** in the target *kelurahan* will be focusing on addressing impact from climate-related disaster faced by the community, namely coastal flooding, erosion, sea level rise and changes in sea water properties. Among the potential actions and their corresponding benefits are:

- **Extending the existing mangrove belt** to increase the resilience of the coastline community with natural and local-based structure. Intervention will be done in the targeted communities that are prone to coastal flooding, mainly the community of Panjang Wetan, Kandang Panjang and Bandengan. Mangrove in this design will generate environmental benefit by acting as sediment trap for coastal erosion protection (from prevailing wind) and water purifier; hence creating a more suitable environment for fish pond that will be located behind the mangrove layer. Additionally, mangrove will also act as a natural barrier to protect coastal environment and community from coastal flooding. All of these environmental benefits would in turn create economic benefit for the coastal community by increasing fish population from better water quality and provision of complex food web that

supports different kind of numerous commercial valuable species. Mangrove ecosystem is known as natural habitat of a number of fish species, among others milkfish, white snapper, mudskipper and mullet; shrimps and prawns, as well as fiddler crab and mud crab.-

- **Installing communal latrine to address sanitary issue, including reducing the risk of water-borne disease.** Due to permanent inundation, some household are suffering from inoperable latrine, hence open defecation in body of water can be found in some area. The open defecation habit also driven by the community's economic condition which majority at low level, and thus often do not have individual latrine. The community had indeed provided with communal latrine in the past. However these facilities were inoperable due to inundation as well as low level of maintenance. To overcome problems with water and sanitation, **3** communal latrines will be installed each of the 8 targeted communities (total 24 communal latrines in total). To complement these latrines, a communal waste water management installation will also be built to prevent water pollution from latrine effluent. Both the latrine and waste water installation will be designed to suit with the area's characteristics that at risk from inundation, but still takes the ease of access and maintenance for the community into account, so that the facilities will be well maintained throughout the time and continually benefit the community. Consultation with the community has been conducted on the design of the communal latrine. Yayasan Bintari (Bintari Foundation) has built upon this consultation with the community a pilot communal latrine for the community of Bandengan (see Annex 11 for the design and construction). This programme will continue the construction of the communal latrines in the target *kelurahan* based on the result of consultation conducted by, also in collaboration with, Yayasan Bintari including the provided design and construction.

#### Alternative Livelihood

~~89-84.~~ **Alternative livelihood will be introduced** in this programme to **reduce coastal community's high reliance to their existing livelihood** which has the potential to be **highly affected by climate change impact**, and also to provide additional income for those who currently live in low level economic income. Eco-tourism is the alternative livelihood that will be fostered by this programme and will be implemented at city level.

~~90-85.~~ This new livelihood relies heavily on the **existence of mangrove belt**, which for city level has a high environmental value by **providing coastal protection**. Environmental benefit for Pekalongan City could also be obtained from the introduction and management of eco-tourism. To ensure the site is attractive enough for eco-tourism, protection of its condition is of essential; and hence the management will be driven to preserve environmental condition of the eco-tourism site and its surroundings. At the moment, the existing site can be considered as unkempt despite its potential as tourism site. Having the site dedicated for eco-tourism will drive the community and government officials to preserve its environmental condition. Other benefit arising from these new livelihoods is its potential to contribute in increasing Pekalongan City's income from fisheries and tourism sector as well as provide job opportunity for the community.

~~91-86.~~ Being the habitat for various kinds of species with commercial value, healthy and well conserved mangrove ecosystem can serve not only as alternative source of livelihood for capture fishermen but also a destination for recreational fishing, both for local community or for visiting tourists.

~~92-87.~~ In addition to the above, the Municipal Government of Pekalongan City has raised the issue on waste management in Pekalongan City in the affected area of the 8 target *kelurahan*, especially in the community of Bandengan, Panjang Wetan and Kandang Panjang, which are severely affected by tidal flooding and in some part permanently inundated. The main issue is that the poverty has led to insufficient income of the community and they therefore struggle to even pay the monthly rate for waste disposal. This issue causes the community to pileup their trash, which than washed away once another coming flood. Existing drainage systems are often clogged because of this issue and thus exacerbates the condition of the flood.

93-88. The Municipal Government of Pekalongan City, led directly by the Mayor, is developing a solution of an integrated waste processing centre, in which the trash is separated and processed to income generating waste products, such as organic fertilizer and recycled plastic. A study has been conducted to neighbouring city of Purwokerto that is successfully managing its waste, becoming a zero-waste community, in which trash are collected and processed in rapid manner without having to end at the landfill. Innovative trash separating machine is applied here that can separate organic and light-weight non organic waste (plastic, paper) automatically. Based on the study, the government asked for assistance to develop the waste processing facility that can also offer job opportunity to the surrounding community. The idea was to build one facility in each *kelurahan*, but before that, a pilot needs to be established. The request is to assist with the establishment of this pilot facility in one of the target *kelurahan*, which is Krapyak.

94-89. With a total population of approx. 302,000, with around 109,011 people occupying the 8 target *kelurahan*, and between 0.4 to 0.6 kg of trash per person per day, the whole Pekalongan City produces up to 180 tons of domestic waste, of which around 54 tons come from the 8 target *kelurahan*. Based on the study, 1 kg organic fertilizer and 1 kg recycled plastic can reach an average turnover of approx. IDR 35,000.- (around USD 2.5.-). 50 tons of domestic waste has therefore the value of IDR 1.75 billion (around US 125,000.-). Properly processed, domestic waste can therefore contribute quite significant to local economy.

95-90. From the abovementioned activities and benefits, the **vulnerable groups that will gain benefits** from this programme are encompassing:

**(i) Flood-prone household**

Data recorded in 2017 shows that 12,573 households located in the targeted 8 communities are categorized as prone to coastal flooding. These households will receive direct socio-economic and environmental benefit from the programme since they will be the core subject for project interventions; not to mention how they will receive knowledge enhancement from their involvement in series of trainings and workshops.

**(ii) Fishermen, farmers, aquaculture farmers and batik entrepreneur**

In 2017, 4.65% Pekalongan City population works in Agriculture, Forestry and Fishery sector and around 5% are involved in the industry, mainly the batik industry. This percentage represents over 28,800 people out of approx. 300,000 population<sup>26</sup>. For these people whose works are highly influenced by climate variability, this programme will assist them in creating a livelihood strategy that is more resilient and sustainable; fostering a potential economic benefit for them. This programme provide not only opportunity for fishermen and aquaculture farmers to increase their income through capture fisheries, but also with innovative, ecological solution to the city's batik industry through the development of mangrove based natural batik colouring products.

Well maintained mangrove environment can be beneficial for small scale capture fishery, providing source of protein for local community and additional income through the marketing. A collaborative study conducted by Wetlands International and The Nature Conservancy (TNC) indicated an economic potential of up to USD 1394 /ha/year<sup>27</sup>.

**(iii) Women-headed household, women, children and elderly**

From approximately **109,011 population of 8 communities** that become the geographical **scope of the programme**, around **49.1% of the population are women, including women who act as the head of their household**. This programme will assist this specific women group by providing alternative livelihood to increase their income as well as possible adaptation actions they are able to implement themselves. Meanwhile children and elderly are accounted for around 29% of the total population of Pekalongan City. As

<sup>26</sup> BPS Kota Pekalongan 2018, *Kota Pekalongan dalam Angka 2018*

<sup>27</sup> Hutchinson, Spalding and zu Ermgassen, 2014, *The Role of Mangrove in Fisheries Enhancement*



vulnerable group with limited capacity, children and elderly will be benefited by the creation of a coastal resilient. This programme will build 16 communal latrines, 2 in each of the 8 target *kelurahan*.

Programme Benefits		
Type of Benefit	Baseline	With/at the project completion
<b>Social</b>	<ul style="list-style-type: none"> <li>• Poor adaptive capacities</li> <li>• Lack of mechanism for disseminating proven strategies to adapt to risks has led to relatively high fatality rates, disease incidence and food security, especially for vulnerable people (child, elderly and women-headed household)</li> <li>• High exposure to hazards can be considered as co-drivers of poverty and compounded social problems such as, disease, sanitation <u>and</u>, food security issues.</li> <li>• Slow onset event such as sea level rise and droughts have affected the social well-being and cohesion of local communities and reduce their ability to cope climate change impacts.</li> </ul>	<ul style="list-style-type: none"> <li>• New capacities acquired by populations on coastal protection and aquaculture</li> <li>• Improved food security</li> <li>• Leverage on lessons learnt on coastal management and adaptation to climate change</li> <li>• Improved adaptive capacity through a greater awareness of climate risks and adaptation options at the community and city level.</li> <li>• Strengthening social capital and capacity development to protect the community and surrounding area from disasters, fatality rates, diseases and food security threat</li> <li>• Increased resilience of coastal city and its communities, ecosystems and livelihood</li> <li>• Coastal city resilient planning, infrastructure and services contribute to social well-being</li> </ul>
<b>Economic</b>	<ul style="list-style-type: none"> <li>• Economic losses, physical infrastructure loss and also loss or disruption to livelihood options</li> <li>• Low cost-effectiveness of investments in the main productive sectors</li> <li>• Continuous decline in populations' revenue</li> </ul>	<ul style="list-style-type: none"> <li>• Improved institutional framework and aspect, improved communities and physical and natural assets, and also more resilient ecosystems and livelihoods</li> <li>• Revival of the economic activity</li> <li>• Improved food security and promotion of urban agriculture, changes to resource management, and identification of alternative livelihoods.</li> <li>• Capacity development of urban poor / women to gain new skills and employment opportunities.</li> </ul>
<b>Environment</b>	<ul style="list-style-type: none"> <li>• Abrasion/coastal erosion</li> <li>• Mangrove degradation</li> <li>• Degradation of the vegetation</li> </ul>	<ul style="list-style-type: none"> <li>• Decreases in climate-induced environmental degradation and losses, and improved planning and preparation for disasters</li> </ul>

	<ul style="list-style-type: none"> <li>• Land salinization/salt water intrusion</li> <li>• Ecosystem degradation and increased waste production lead to health issues especially in poor urban communities</li> </ul>	<ul style="list-style-type: none"> <li>• Promotion of ecosystem-based adaptation in the urban environment, leading to environmental benefits</li> <li>• Rebuilding of coastal belt and protection against coastal erosion by sediment trap method</li> <li>• Rebuilding the vegetation</li> <li>• Protection of fishpond fields against salinity and flood by sediment trap method</li> <li>• Reduced adverse impact from anthropogenic activity through changes to coastal zoning and waste management e.g. community-based waste reduction and recycling schemes and energy efficient building construction techniques.</li> <li>• Enhanced resilience of urban poor communities</li> </ul>
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**C. Describe or provide an analysis of the cost-effectiveness of the proposed project/ programme.**

96-91. As described under project objectives, the goal of the programme are to be achieved through safekeeping (component 1), surviving (component 2, 3 and 4) and sustaining (component 5) actions. Following table describe the cost-effectiveness of each component of this programme:

<u>Expected result</u>	<u>Output</u>	<u>Cost-effectiveness (assessment of alternative approaches)</u>
<b>SAFE KEEPING</b>		
<b>1 <u>Enhancing protection along the coastal line of Pekalongan City</u></b>	1.1.1. <u>Multilevel stakeholder engagement in the establishment of 3 ha Mangrove Ecosystem (equivalent to 6km with 5m thickness)</u>	<u>Building natural coastal protection with mangrove belt is not only cost effective but can also give economic benefit both for the community and for the City of Pekalongan.</u>
1.1. <u>Increased coastal community resilience in Pekalongan City</u>	1.1.2. <u>Breakwater (rubble mound) covering the coast of Kandang Panjang in the area of Mangrove Information Centre (PIM) constructed</u>	<u>While serving as ecological tourist destination and/or recreation site, well-maintained and conserved mangrove ecosystem also provides source of protein and offers income opportunities for the affected community through capture fishery.</u>  <u>Reducing risk of coastal abrasion through breakwater can be costly in construction, but in the long term,</u>

		<p><u>breakwater construction can prevent damage to existing coastal facilities and protect vegetation behind it from the force of the wave. In the case of mangrove rehabilitation and conservation, the breakwater construction can provide a more conducive environment for mangrove to grow and enable the development of silvoculture. To ensure long-term cost effectiveness, the choice of breakwater construction is a decisive factor. Therefore, engagement of coastal expert and construction is necessary to determine the feasibility and the right choice of the construction.</u></p> <p><u>The combination of breakwater construction and mangrove also provides stronger protection of existing facilities behind them, including settlement areas, improving community living conditions and reducing possible wave runoff that can damage or inundate public facilities.</u></p> <p><u>Based on the ESIA document, of rubble mound breakwater has a minimum lifetime of 20 years.</u></p>
<b>SURVIVING</b>		
<p><b><u>2 Enhancing coastal community capacity in developing and implementing Local Climate Change Adaptation Action Plan (RAD API), climate change information system, Climate Smart Initiative</u></b></p> <p><u>2.1 Enhanced capacity of local actors in identifying, initiating, strengthening, and escalating community-based actions to address climate risk and natural disaster; including capacity in integrating the actions to community development plan</u></p>	<p><u>2.1.1 Pekalongan City Climate Working Group reactivated</u></p> <p><u>2.1.2 Climate working group established and functioning in each of the 8 target <i>kelurahan</i></u></p> <p><u>2.1.3 Enhancing coastal community capacity in developing the</u></p>	<p><u>Project Management Unit (PMU) of this programme will work closely with Pekalongan city team in programme implementation at community level, in which the city team will play a major role at this level. As part of the city team, the local NGO that has been working in the targeted area will act as the spearhead for establishing community working group and delivering the series of training/workshop. This division of responsibility will ensure effective allocation of financial and human resources</u></p> <p><u>Drawing community support and involvement (in the form of community working group) in arranging community adaptation plan and development plan will reduce the costs since the proposed actions will be on-target and as needed. Thus, this will ensure the ownership of all planning document developed and</u></p>



	<p><u>kelurahan's information system and implementing the ensuing climate change adaptation actions</u></p> <p><u>2.1.4 Engaging youth groups and building their capacity to become Agents of Change in climate change adaptation actions of Pekalongan City</u></p>	<p><u>implemented adaptation actions</u></p> <p><u>Alternatively, if actions are implemented without calculating risk assessment and the implementer is not equipped with training, the end result can be more costly; unnecessary actions may be implemented which may be ineffective in addressing the targeted risk.</u></p> <p><u>Planning arrangement without involving local community will only result in low level of community participation in implementing climate adaptation actions.</u></p> <p><u>Drawing community support and involvement in selecting the adaptation actions will be a cost-effective mechanism since the proposed actions and its corresponding budget and man power allocation will be on-target and as needed. This approach, along with assigning the spearhead role to the local NGO will also ensure programme ownership and subsequently the maintenance of the interventions after the programme ended.</u></p> <p><u>Alternatively, actions that based solely on local climate wisdom or typical development may be selected and implemented as the actions, however it will not target the most vulnerable areas and people. Not to mention that the particular action will not be sustainable</u></p>
<p><u>2.2. Enhanced capacity of local government and other city stakeholders' in developing climate risk assessment and utilizing the results to develop local climate change adaptation action plan (RAD API)</u></p>	<p><u>2.2.1. RAD API developed based on City Climate Risk Assessment and Climate Coastal Impact</u></p> <p><u>2.2.2. Strategy to integrate CCA into local government planning processes (annual work plan or mid-term development plan of city) is developed</u></p>	<p><u>The project pursues a participatory and integrated approach where community, local government, university, NGO, and private sector work together to develop adaptation action plan (RAD API) and integrate it into local development. This approach reflects a more sustainable way and will be more cost-effective especially if considering long-term time scale. A city climate working group that comprises of the abovementioned city stakeholders had previously formed in Pekalongan City, yet the said team is not active in the past year. The first action that will be conducted at city</u></p>

		<p><u>level under this programme is reactivating the working group.</u></p> <p><u>Activating and optimizing the role of city team in this programme is deemed as cost-effective since they already have basic knowledge on climate change and the relevant issues and assessment, so that the team does not has to be trained rigorously on basic matter.</u></p> <p><u>As part of the city team, local government will be equipped with skills to integrate adaptation action and planning to their city development plan (RPJMD/RKP). This integration is considered to be cost-effective measures since it will ensure that there will be budget allocation for adaptation actions that will not be funded under the programme but included in the RPJMD /RKP (including integration of city-wide replication/scaling up of adaptation actions funded by the programme); the programme thus can focus in the most prioritized actions in the prioritized area. Furthermore, the integration would also allow M&amp;E activity for actions undertaken under the programme to be included in the city development plan. Hence this city-level engagement will ensure that local adaptation action will be adequately supported in long-term.</u></p>
<p><u>2.3. Enhanced resilience of coastal community from the Implementing Climate smart initiatives, including those fostering sustainable utilization of natural resources, with implementation and financing scheme that can be replicated and disseminated to broader audience</u></p>	<p><u>2.3.1. Innovative and collaboration adaptation actions are implemented in collaboration with private sector, Government bodies and NGO (i.e. technology for main productive sectors, model on collaborative CCA programme across coastal communities/ upstream and downstream communities); and also evaluated for future reference</u></p>	
<p><u>2.4. Established knowledge management network at city-level</u></p>	<p><u>2.4.1. Climate change training and knowledge sharing conducted</u></p> <p><u>2.4.2. Knowledge product, Advocacy material (i.e. lessons learned, research paper, newsletter) published and shared</u></p> <p><u>2.4.3. Local knowledge sharing network established</u></p>	<p><u>From their experience and acquired knowledge and skill during risk assessment development process, the local government officials can use this approach for periodical M&amp;E activity of the city development</u></p> <p><u>During proposal development process, by employing collaborative and participatory approach (on top of observation, interview and assessment), adaptation actions that will be implemented in the targeted area had been selected.</u></p> <p><u>Technical support will ensure that options with the highest resilience impact will be selected, as well as options that foster sustainable</u></p>

		<p><u>utilization of natural resources. The selected options should be complemented with implementation and financing scheme that can be replicated and disseminated to broader audience. This process of selecting on-target actions that have the highest impact will ensure the effectiveness of the selected actions in addressing climate change impact.</u></p> <p><u>The type of adaptation actions conducted in community level are similar to those that will be implemented at city level, particularly on aquaculture/farm pond, mangrove restoration and construction of sanitation facilities. This similarity is due to the fact that actions implemented at the targeted community will be treated as pilot measures for city-wide replication, allowing for evaluation on the implemented pilot scheme. This piloting approach is seen as cost-effective approach rather than implementing city-wide scale directly. This approach will assist in identifying weaknesses and strengths arise from the pilot process; where the weaknesses can be addressed and the strengths can be amplified for the purpose of city-wide replication.</u></p> <p><u>Alternatively, climate change adaptation and DRR planning activity can be implemented but in an unsustainable way and with a limited vulnerable target group (where the activity may not be suitable in future time since calculation will only be made on current risk)</u></p>
<p><b><u>3. Strengthening vertical coordination by enhancing provincial government's capacity in mainstreaming climate change adaptation and resilience into Central Java Province development plan which in turn could</u></b></p>		<p><u>Provincial government have limited authority on activities conducted at city level, yet they play significant role in vertical coordination and conveying national budget allocation for climate-related programme/activity (provincial government responsible for one national budgeting channel to city). Considering this role, the programme will not touch physical development at this level, merely capacity development and advocacy process. Thus activity at this level will be</u></p>

<p><u>foster better climate-related policy on climate financing and bottom-up planning</u></p> <p>3.1. <u>Enhancing provincial government's capacity in mainstreaming climate change adaptation and resilience into Central Java Province development plan</u></p>	<p>3.1.1 <u>Enhanced provincial capacity to develop RAD API</u></p> <p>3.1.2 <u>Appropriate strategy to integrate CCA into Provincial government planning processes (annual work plan or mid-term development plan of city) is developed</u></p>	<p><u>focusing on building provincial officials' knowledge on climate risk assessment so that they could develop risk assessment at province scale.</u></p> <p><u>This assessment and the corresponding RAD API will be the basis to build a synchronize adaptation action between city, province and national. Mainstreaming climate change adaptation and resilience into Central Java Province development plan could in turn foster better climate-related policy at provincial level and bottom-up planning. This approach is deemed as a cost-effective and resource-effective approach at provincial level to achieve the targeted objectives of the programme</u></p> <p><u>Alternatively, climate change adaptation and DRR [Disaster Risk Reduction] planning can be implemented without considering the city's/district's characteristics and needs, however the results will be most likely unsustainable</u></p>
<p><u>4. Strengthening vertical coordination and collaboration between national and local government in climate adaptation context and enriching knowledge, toolkits and methodologies coastal resilience for the national government</u></p> <p>4.1. <u>Enriching SIDIK as risk assessment tools for coastal area based on local experience</u></p>	<p>4.1.1. <u>Knowledge product in the form Handbook on how to use SIDIK for risk assessment at coastal city is published and shared. This handbook is targeted to be used by local government, NGOs</u></p>	<p><u>SIDIK has significantly help cities and regencies in developing climate risk assessment. However, SIDIK has drawbacks when being used to asses coastal city, resulting in an inaccurate assessment, which could consequently lead to the implementation of action that considered as maladaptation</u></p> <p><u>Since SIDIK cannot accurately assess the vulnerability and risk area with coastal characteristics, hence adjustment is needed when using SIDIK in Pekalongan City so as appropriate coastal resilience/adaptation actions are developed</u></p> <p><u>SIDIK adjustment for coastal area based on experience from Pekalongan City is expected to provide valuable lessons learned for other Indonesian coastal cities that intending to use SIDIK. Dissemination of this lessons learned is deemed as</u></p>

	<p><u>and civil society organizations</u></p> <p><u>4.1.2. Strengthened vertical coordination and collaboration between national and local government in climate adaptation context</u></p>	<p><u>more efficient and cost-effective by developing SIDIK Handbook specifically for coastal city that accessible for coastal cities throughout Indonesia, rather than through knowledge sharing forum or training solely which often only attended by limited cities/representatives.</u></p> <p><u>Yet this handbook development does not necessarily mean that the materials will not be shared in such forum and trainings. This programme will collaborate with national level network in advocating climate resilience issue (ICA), including advocating lessons learned drawn from local experience, in which the handbook is amongst them.</u></p> <p><u>To date, adaptation action often implemented in silo manner by each level of government, so that the adaptation actions are not synchronized. At national level, the project is aiming to foster a stronger vertical coordination and collaboration between national and local government in climate adaptation context to make the local adaptation action synchronized with adaptation plan at the higher level of government. This objective is in sync with the line of work of the national network that always thriving to foster bottom-up planning process in climate change context; connecting local experience with policy at different level of government.</u></p> <p><u>Having considered the similar objective, thus advocacy through national network engine is deemed as the most cost-effective approach to foster vertical coordination. To date, the national network itself is an active network and had provided different climate resilience-related input to different line ministries in Indonesia. Riding on this network is believed to more cost-effective in comparison to conducting the advocacy process on our own.</u></p>
<p><b><u>SUSTAINING</u></b></p>		

<p><b><u>5. Improving community's resilience through initiation of alternative livelihood and improvement of sanitation facility</u></b></p> <p><u>5.1. Increased economic income and improved community's health in 8 target kelurahan of Pekalongan City</u></p>	<p><u>5.1.1. Capture fishery in mangrove ecosystem developed and implemented by community</u></p> <p><u>5.1.2. Mangrove ecotourism improved and involving wider participation of affected coastal community of Pekalongan City</u></p> <p><u>5.1.3. Improved cultural economy through application of ecological batik using mangrove based colouring product</u></p> <p><u>5.1.4. Improved food resiliency through the application of urban farming as alternative to conventional agriculture practices</u></p> <p><u>5.1.5. Developed circular economy through initiation integrated waste management system and processing</u></p>	<p><u>Vast areas of agriculture and aquafarming were lost or severely damaged due to sea level rise causing frequent tidal flood that frequently hit the coastal area of Pekalongan City. To date, many families have lost their regular income and thus fell into poverty. Many have to do irregular jobs to survive, including women that still have to take care of the household at the same time.</u></p> <p><u>One possibility to restore the loss livelihood facilities is to relocate to other areas, which can be very costly and might not cover all those affected. Not to mention the needs to develop new settlement areas in the case of relocation to other part of the city or even to the rural suburbs.</u></p> <p><u>Capture fishery and eco-tourism through mangrove restoration and expansion provide less costly solution of alternative livelihood, while at the same time improve coastal protection and can contribute to recovery of the frequently or even permanently inundated areas in the long term.</u></p> <p><u>Well maintained and vast area of mangrove can even apply to improve local batik industry and reduce environmental impact through its utilisation as a natural colouring product.</u></p> <p><u>Replacing lost agricultural land, especially bound with the relocation of community, can also be as costly as replacing damaged aquaculture facility. Urban farming can be more cost efficient and suitable for promoting urban style agriculture that can cover daily nutrition and eventually be commercially beneficial, even if it is not in the same dimension as land intensive agriculture activity.</u></p> <p><u>- Poverty in the affected target community has also led to other issues related to hygiene condition, which is the pileup of domestic waste that exacerbates the impact of tidal flood, and can also lead to rain flooding, due to clogged drainage,</u></p>
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		<p><u>causing prolong inundation. Improvement of sanitation condition and proper waste management plan can provide better living conditions, help reduce risks of waterborne disease and increase the community's adaptive capacity to climate change impact at coastal areas, and thus prevent further social and economic damage to the affected communities. This model provides a financially win-win-solution for the Municipality of Pekalongan City through improvement of health and hygiene conditions by generating income from waste processing at the same time. This approach is also more cost effective compared with relocation and/or provision of land for agriculture/aquaculture to communities in other areas.</u></p> <p><u>Waterborne disease can easily spread to a wide area, especially during floods and poor sanitation are involved. Without a proper solution to the latter, waterborne disease can evolve to an epidemic condition that could affect the economic situation in Pekalongan City. Improvement of individual sanitation facilities has proven to be difficult and expensive, especially once different expectations of individual households arise. Providing communal water and sanitation facilities has, in many cases, been efficient not only to improve the health quality of communities but also to stimulate them to improve their own sanitation facility in the household when possible. Provision of communal water and sanitation facilities is obviously more cost effective instead of providing improvement for individual population.</u></p>
	<p><u>5.1.6. Improved sanitation facility in 8 target kelurahan to mitigate risks of waterborne disease through establishment of communal latrine and water supply</u></p>	
<b>Expected result</b>	<b>Output</b>	<b>Cost-effectiveness (assessment of alternative approaches)</b>
<b>SAFE KEEPING</b>		
<b>0—Enhancing protection along the coastal line of Pekalongan City</b>	<b>0.0.0—Multilevel stakeholder engagement in the establishment of 6</b>	<b>Building natural coastal protection with mangrove belt is not only cost-effective but can also give economic-benefit both for the community and for</b>



<p>Increased coastal community resilience in Pekalongan City</p>	<p>kilometres of Mangrove Ecosystem</p> <p>1.1.0. Construction of 300 m parapet at Slamaran Beach in <i>kelurahan</i> Degayu <u>Planning and preparation phase for coastal protection construction.</u></p> <p>1.1.0. Coastal embankment (geotube/sand trap) at Kandang Panjang <u>(to be changed to construction process of coastal protection</u></p>	<p>the City of Pekalongan.</p> <p>While serving as ecological tourist destination and/or recreation site, well-maintained and conserved mangrove ecosystem also provides source of protein and offers income opportunities for the affected community through capture fishery.</p> <p><u>Reducing risk of coastal abrasion through breakwater can be costly in construction, but in the long term, breakwater construction can prevent damage to existing coastal facilities and protect vegetation behind it from the force of the wave. In the case of mangrove rehabilitation and conservation, the breakwater construction can provide a more conducive environment for mangrove to grow and enable the development of silvoculture. To ensure longterm-cost effectiveness, the choice of breakwater construction is a decisive factor. Therefore, engagement of coastal expert and construction is necessary to determine the feasibility and the right choice of the construction. Reducing risk of flooding through parapet can be costly in construction, but in the long term, parapet can prevent damage to existing coastal livelihood facility. It will be even more costly to relocate community and create alternative livelihood at the same time in other area, especially if vast area of land is to be purchased for that purpose. Yet, not to mention the possibility of other environmental issues caused by the establishment of new settlement and the needs for economic development.</u></p> <p><u>The combination of breakwater construction and mangrove also provides stronger protection of existing facilities behind them, including settlement areas, improving community living conditions and reducing possible wave runoff that can damage or inundate public facilities.</u> Most part of the coastal area of Pekalongan City suffered under strong abrasion. The municipal government has therefore taken the initiative to</p>
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		<p>construct permanent coastal embankment, such as parapet and dykes. Still, the construction cannot cover all section of the coast. Where there are still opening to the beach, abrasion threat. Mangrove belt can provide solution to reduce abbration, but high tide and wave attack can easily damage new planted, young mangrove saplings. Here, geotube construction will be helpful to protect the young mangrove from being washed up by the wave, thus increase the possibility for the mangrove to grow. This approach appears to be cost effective and environmentally friendlier than construction of sea wall or dikes, especially that it provides economic benefit for the community and Pekalongan City once the mangrove belt is established as previously explained.</p>
<b>SURVIVING</b>		
<p><b>0—Enhancing coastal community capacity in developing and implementing Local Climate Change Adaptation Action Plan (RAD API), climate change information system, Climate Smart Initiative</b></p> <p>0.0—Enhanced capacity of local actors in identifying, initiating, strengthening, and escalating community-based actions to address climate risk and natural disaster; including capacity in integrating the actions to community development plan</p>	<p>1.0.0—Pekalongan City Climate Working Group reactivated</p> <p>1.0.0—Climate working group established and functioning in each of the 8 target <i>kelurahan</i></p> <p>1.0.0—Enhancing coastal community capacity in developing the <i>kelurahan</i>'s information system and implementing the ensuing climate change adaptation actions</p>	<p>Project Management Unit (PMU) of this programme will work closely with Pekalongan city team in programme implementation at community level, in which the city team will play a major role at this level. As part of the city team, the local NGO that has been working in the targeted area will act as the spearhead for establishing community working group and delivering the series of training/workshop. This division of responsibility will ensure effective allocation of financial and human resources</p> <p>Drawing community support and involvement (in the form of community working group) in arranging community adaptation plan and development plan will reduce the costs since the proposed actions will be on target and as needed. Thus, this will ensure the ownership of all planning document developed and implemented adaptation actions</p> <p>Alternatively, if actions are implemented without calculating risk assessment and the implementer is not equipped with training, the end result can be more costly; unnecessary actions may be</p>

	<p>1.0.0— Engaging youth groups and building their capacity to become Agents of Change in climate change adaptation actions of Pekalongan City</p>	<p>implemented which may be ineffective in addressing the targeted risk.</p> <p>Planning arrangement without involving local community will only result in low level of community participation in implementing climate adaptation actions.</p> <p>Drawing community support and involvement in selecting the adaptation actions will be a cost-effective mechanism since the proposed actions and its corresponding budget and man power allocation will be on target and as needed. This approach, along with assigning the spearhead role to the local NGO will also ensure programme ownership and subsequently the maintenance of the interventions after the programme ended.</p> <p>Alternatively, actions that based solely on local climate wisdom or typical development may be selected and implemented as the actions, however it will not target the most vulnerable areas and people. Not to mention that the particular action will not be sustainable</p>
<p>1.0.— Enhanced capacity of local government and other city stakeholders' in developing climate risk assessment and utilizing the results to develop local climate change adaptation action plan (RAD-API)</p>	<p>1.0.0.— RAD-API developed based on City Climate Risk Assessment and Climate Coastal Impact</p> <p>1.0.0.— Strategy to integrate CCA into local government planning processes (annual work plan or mid-term development plan of city) is developed</p>	<p>The project pursues a participatory and integrated approach where community, local government, university, NGO, and private sector work together to develop adaptation action plan (RAD-API) and integrate it into local development. This approach reflects a more sustainable way and will be more cost-effective especially if considering long-term time scale. A city climate working group that comprises of the abovementioned city stakeholders had previously formed in Pekalongan City, yet the said team is not active in the past year. The first action that will be conducted at city level under this programme is reactivating the working group.</p> <p>Activating and optimizing the role of city team in this programme is deemed as cost-effective since they already have basic knowledge on climate change and the relevant</p>

		<p>issues and assessment, so that the team does not has to be trained rigorously on basic matter.</p> <p>As part of the city team, local government will be equipped with skills to integrate adaptation action and planning to their city development plan (RPJMD/RKP). This integration is considered to be cost effective measures since it will ensure that there will be budget allocation for adaptation actions that will not be funded under the programme but included in the RPJMD /RKP (including integration of city-wide replication/scaling up of adaptation actions funded by the programme); the programme thus can focus in the most prioritized actions in the prioritized area. Furthermore, the integration would also allow M&amp;E activity for actions undertaken under the programme to be included in the city development plan. Hence this city-level engagement will ensure that local adaptation action will be adequately supported in long term.</p>
<p>1.0. Enhanced resilience of coastal community from the Implementing Climate smart initiatives, including those fostering sustainable utilization of natural resources, with implementation and financing scheme that can be replicated and disseminated to broader audience</p>	<p>1.0.0. Innovative and collaboration adaptation actions are implemented in collaboration with private sector, Government bodies and NGO (i.e. technology for main productive sectors, model on collaborative CCA programme across coastal communities/ upstream and downstream communities); and also evaluated for future reference</p>	
<p>1.0. Established knowledge management network at city level</p>	<p>1.0.0. Climate change training and knowledge sharing conducted</p> <p>1.0.0. Knowledge product, Advocacy material (i.e. lessons learned, research paper, newsletter) published and shared</p> <p>1.0.0. Local knowledge sharing network established</p>	<p>From their experience and acquired knowledge and skill during risk assessment development process, the local government officials can use this approach for periodical M&amp;E activity of the city development</p> <p>During proposal development process, by employing collaborative and participatory approach (on top of observation, interview and assessment), adaptation actions that will be implemented in the targeted area had been selected.</p> <p>Technical support will ensure that options with the highest resilience impact will be selected, as well as options that foster sustainable utilization of natural resources. The selected options should be complemented with implementation and financing scheme that can be replicated and disseminated to broader audience. This process of selecting on-target actions that have the highest impact will ensure the</p>

		<p>effectiveness of the selected actions in addressing climate change impact.</p> <p>The type of adaptation actions conducted in community level are similar to those that will be implemented at city level, particularly on aquaculture/farm pond, mangrove restoration and construction of sanitation facilities. This similarity is due to the fact that actions implemented at the targeted community will be treated as pilot measures for city-wide replication, allowing for evaluation on the implemented pilot scheme. This piloting approach is seen as cost-effective approach rather than implementing city-wide scale directly. This approach will assist in identifying weaknesses and strengths arise from the pilot process; where the weaknesses can be addressed and the strengths can be amplified for the purpose of city-wide replication.</p> <p>Alternatively, climate change adaptation and DRR planning activity can be implemented but in an unsustainable way and with a limited vulnerable target group (where the activity may not be suitable in future time since calculation will only be made on current risk).</p>
<p><b>1. Strengthening vertical coordination by enhancing provincial government's capacity in mainstreaming climate change adaptation and resilience into Central Java Province development plan which in turn could foster better climate-related policy on climate financing and bottom-up planning</b></p> <p>1.0. Enhancing provincial government's capacity in mainstreaming</p>	<p>2.0.0 Enhanced provincial capacity to develop RAD-APL</p>	<p>Provincial government have limited authority on activities conducted at city level, yet they play significant role in vertical coordination and conveying national budget allocation for climate-related programme/activity (provincial government responsible for one national budgeting channel to city). Considering this role, the programme will not touch physical development at this level, merely capacity development and advocacy process. Thus activity at this level will be focusing on building provincial officials' knowledge on climate risk assessment so that they could develop risk assessment at province scale.</p> <p>This assessment and the corresponding RAD-APL will be the</p>

<p>climate-change-adaptation-and-resilience-into-Central-Java-Province-development-plan</p>	<p>2.0.0-Appropriate-strategy-to-integrate-CCA-into-Provinciall-government-planning-processes-(annual-work-plan-or-mid-term-development-plan-of-city) is developed</p>	<p>basis-to-build-a-synchronize-adaptation-action-between-city,-province-and-national. Mainstreaming-climate-change-adaptation-and-resilience-into-Central-Java-Province-development-plan-could-in-turn-foster-better-climate-related-policy-at-provincial-level-and-bottom-up-planning. This-approach-is-deemed-as-a-cost-effective-and-resource-effective-approach-at-provincial-level-to-achieve-the-targeted-objectives-of-the-programme</p> <p>Alternatively,-climate-change-adaptation-and-DRR [Disaster Risk-Reduction]-planning-can-be-implemented-without-considering-the-city's/district's-characteristics-and-needs,-however-the-results-will-be-most-likely-unsustainable-</p>
<p><b>1.— Strengthening vertical coordination and collaboration between national and local government in climate adaptation context and enriching knowledge, toolkits and methodologies coastal resilience for the national government—</b></p> <p>1.0.— Enriching SIDIK as risk assessment tools for coastal area based on local experience—</p>	<p>1.0.0. Knowledge product in the form Handbook on how to use SIDIK for risk assessment at coastal city is published and shared. This handbook is targeted to be used by local government, NGOs and civil society organizations</p> <p>1.0.0. Strengthened vertical coordination and collaboration between national and local</p>	<p>SIDIK has significantly help cities and regencies in developing climate risk assessment. However, SIDIK has drawbacks when being used to asses coastal city, resulting in an inaccurate assessment, which could consequently lead to the implementation of action that considered as maladaptation-</p> <p>Since SIDIK cannot accurately assess the vulnerability and risk area with coastal characteristics, hence adjustment is needed when using SIDIK in Pekalongan City so as appropriate coastal resilience/adaptation actions are developed</p> <p>SIDIK adjustment for coastal area based on experience from Pekalongan City is expected to provide valuable lessons learned for other Indonesian coastal cities that intending to use SIDIK. Dissemination of this lessons learned is deemed as more efficient and cost-effective by developing SIDIK Handbook specifically for coastal city that accessible for coastal cities throughout Indonesia, rather than through knowledge sharing forum or training solely which often only attended by limited-</p>

	<p>government in climate adaptation context</p>	<p>cities/representatives.</p> <p>Yet this handbook development does not necessarily mean that the materials will not be shared in such forum and trainings. This programme will collaborate with national level network in advocating climate resilience issue (ICA), including advocating lessons learned drawn from local experience, in which the handbook is amongst them.</p> <p>To date, adaptation action often implemented in silo manner by each level of government, so that the adaptation actions are not synchronized. At national level, the project is aiming to foster a stronger vertical coordination and collaboration between national and local government in climate adaptation context to make the local adaptation action synchronized with adaptation plan at the higher level of government. This objective is in sync with the line of work of the national network that always thriving to foster bottom up planning process in climate change context; connecting local experience with policy at different level of government.</p> <p>Having considered the similar objective, thus advocacy through national network engine is deemed as the most cost effective approach to foster vertical coordination. To date, the national network itself is an active network and had provided different climate resilience related input to different line ministries in Indonesia. Riding on this network is believed to more cost effective in comparison to conducting the advocacy process on our own.</p>
<p><b>SUSTAINING</b></p>		
<p>1. Improving community's resilience through initiation of alternative livelihood and improvement of sanitation facility</p>		<p>Vast areas of agriculture and aquafarming were lost or severely damaged due to sea level rise causing frequent tidal flood that frequently hit the coastal area of Pekalongan City. To date, many families have lost their regular income and thus fell into poverty. Many have to do irregular</p>

<p>1.0. Increased economic income and improved community's health in 8 target <i>kelurahan</i> of Pekalongan City</p>	<p>1.0.0. Capture fishery in mangrove ecosystem developed and implemented by community</p> <p>1.0.0. Mangrove ecotourism improved and involving wider participation of affected coastal community of Pekalongan City</p> <p>1.0.0. Improved cultural economy through application of ecological batik using mangrove-based colouring product</p> <p>1.0.0. Improved food resiliency through the application of urban farming as alternative to conventional agriculture practices</p> <p>1.0.0. Developed circular economy through initiation integrated waste management system and processing</p>	<p>jobs to survive, including women that still have to take care of the household at the same time.</p> <p>One possibility to restore the loss-livelihood facilities is to relocate to other areas, which can be very costly and might not cover all those affected. Not to mention the needs to develop new settlement areas in the case of relocation to other part of the city or even to the rural suburbs.</p> <p>Capture fishery and eco-tourism through mangrove restoration and expansion provide less costly solution of alternative livelihood, while at the same time improve coastal protection and can contribute to recovery of the frequently or even permanently inundated areas in the long term.</p> <p>Well maintained and vast area of mangrove can even apply to improve local batik industry and reduce environmental impact through its utilisation as a natural colouring product.</p> <p>Replacing lost agricultural land, especially bound with the relocation of community, can also be as costly as replacing damaged aquaculture facility. Urban farming can be more cost efficient and suitable for promoting urban style agriculture that can cover daily nutrition and eventually be commercially beneficial, even if it is not in the same dimension as land intensive agriculture activity.</p> <p>-</p> <p>Poverty in the affected target community has also led to other issues related to hygiene condition, which is the pileup of domestic waste that exacerbates the impact of tidal flood, and can also lead to rain flooding, due to clogged drainage, causing prolong inundation. Improvement of sanitation condition and proper waste management plan can provide better living conditions, help reduce risks of waterborne disease and increase the community's adaptive capacity to climate change impact at coastal areas, and thus</p>
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	<p>1.0.0. Improved sanitation facility in 8 target <i>kelurahan</i> to mitigate risks of waterborne disease through establishment of communal latrine and water supply</p>	<p>prevent further social and economic damage to the affected communities. This model provides a financially win-win solution for the Municipality of Pekalongan City through improvement of health and hygiene conditions by generating income from waste processing at the same time. This approach is also more cost effective compared with relocation and/or provision of land for agriculture/aquaculture to communities in other areas.</p> <p>Waterborne disease can easily spread to a wide area, especially during floods and poor sanitation are involved. Without a proper solution to the latter, waterborne disease can evolve to an epidemic condition that could affect the economic situation in Pekalongan City. Improvement of individual sanitation facilities has proven to be difficult and expensive, especially once different expectations of individual households arise. Providing communal water and sanitation facilities has, in many cases, been efficient not only to improve the health quality of communities but also to stimulate them to improve their own sanitation facility in the household when possible. Provision of communal water and sanitation facilities is obviously more cost effective instead of providing improvement for individual population.</p>
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## Proposed adaptive actions cost-effectiveness rationale

Adaptation Actions	Detailed activity	Alternative interventions and rationale why priority interventions/activities have been selected from a cost-effectiveness perspective
Improvement of water and sanitation condition to reduce risks of waterborne disease	Communal Latrine	<p>The alternative would be to construct drainage pipes in 8 communities in North. However, because of lower densities and other situations (i.e. land ownership) would not be cost effective. Moreover, possible drainage pipes channels considered would be less effective in addressing flash flood and sea level rise situations in North Pekalongan.</p> <p>Another alternative is to construct a sewerage</p>



		<p>system, but this is both not in the scope of the project and way too expensive.</p> <p>Moreover, with this approach, the most vulnerable / poor people will benefit.</p>
Protection of coastal areas and mangrove restoration activity	Coastal <del>protection embankment with geotube (change-breakwater)</del>	<p>Hard infrastructure embankment is too expensive.</p> <p><u>Hard infrastructure embankment is too expensive.</u></p> <p><u>With the right choice of the right type of breakwater construction, less ecosystem disruption from mobilization and construction process will occur. The concept of sediment building/enhancement through breakwater construction is part of natural development. We will also ensure to choose breakwater construction that is a risk-free solution. In comparison to geotube, breakwater construction is more long-lasting in the long run and in the example of rubble mound that does not need concrete construction, it offers low cost maintenance. Geotube only last for a maximum of approx. 20 years. In the case of Pekalongan City, most of the installed breakwater only last for less than 10 years. As for protection function, breakwater construction breaks and therefore reduces the force of tidal wave, thus avoids further abrasion of the coast. Breakwater's ability to also trap sediment can enforce the remaining coastline and provide enabling condition for the manifestation of coastal vegetation</u> <del>With the right choice of the right type of breakwater construction, Geotube is less ecosystem disruption from mobilization and construction process will occur. The And concept of sediment building/enhancement sand traps through breakwater construction from geotube system is part of natural development. We will also ensure to choose realize that breakwater geotube construction that is a risk-free solution. Rubble mound Geotube structure might face some structural challenges, which stemmed from various sources, such as submergence among others the climate change impact. Severe sea level rise might cause damage to the stone layer. In both cases, stone layer can respectively be added or replaced. the ineffectiveness of geo-tube structure.</del></p>
Establishment of mangrove belt and enhancement of the	Integrated Mangrove	Planting mangroves along the coast is very good, but the main challenge is land ownership

mangrove information sites	plantation with capture fishery and ecotourism	<p>issue. More than 80% of the land is private land. Indeed, the Municipal Government of Pekalongan City has declared its support for mangroves development and to, if necessary, acquire land for this purpose.</p> <p>The integration model of mangrove restoration with ecotourism becomes attractive for private landowners to join the project based on the opportunity to be involved in ecotourism business.</p>
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97-92. Bintari Foundation had conducted loss and damage studies by taking a sample of North Bandengan Community in North Pekalongan, concluding that loss and damage per household in the Bandengan Community is USD 1,800 / year. The indicators for the losses are: the loss of paddy field, disable toilets, unoccupied houses, disable wells and indicators for damage are decreased income, increased domestic and services expenditure, fragile houses. There are 11,065 households in the 8 target *kelurahan*, so the potential loss if not doing anything can reach up to 19,917.00 / years. The expected benefits after the end of this project is to prevent loss and damage or decrease in income of no more than 10%.

93. Activities proposed are **expected to be completed in three-year period**. The first year will be programme preparation stage with activities that are mostly intended to strengthen local stakeholders' (including community) awareness and understanding on climate-related issue and also build their ownership on the programme. Key studies and assessment conducted on this stage, not only will serve the purpose of building stakeholders' knowledge and awareness, but also ensuring that the proposed actions will not leads to mal-adaptation and further jeopardizing Pekalongan City sustainability. The studies and assessment is expected to be completed ~~in~~ within a time frame of 6-months. Afterwards, the programme will focus ~~on~~ ~~actions~~-implementation **actions**. This arrangement is aimed to ensure ~~that~~ the programme ~~isto-be~~ completed ~~in a timely~~~~in timely~~ manner.

**D. Describe how the project / programme is consistent with national or sub-national sustainable development strategies, including, where appropriate, national or sub-national development plans, poverty reduction strategies, national communications, or national adaptation programmes of action, or other relevant instruments, where they exist.**

**I. This proposed programme is consistent with the following institutional and policy framework and commitment at National Level:**

**1. First Nationally Determined Contributions (NDC) Republic of Indonesia**

98-94. The document stated how the Government of Indonesia (Gol) will implement enhanced actions to study and map regional vulnerabilities as the basis of adaptation information system, and to strengthen institutional capacity and promulgation of climate change sensitive policies and regulations. It further emphasized the need for local capacity strengthening, improved knowledge management, convergent policy on climate change adaptation and disaster risks reduction, and also application of adaptive technology; in order to achieve the medium-term goal of Indonesia's climate change adaptation strategy which aiming to reduce risks on all development sectors. **The proposed approach of this programme is in line with the NDC document by focusing on mapping area vulnerability and risk, fostering public and institutional**

**capacity building and also advocating relevant policy.** Climate Risk Assessment and Climate Impact Assessment that will be conducted at community and city level will provide vulnerability and risk map that will subsequently utilized to develop adaptation plan. This adaptation plan will then be integrated into local development plan and advocated to the higher governance level to ensure synergize climate-sensitive development plan from local to national. This sequence is in consistent with the First NDC of GoI where they see regional vulnerabilities as the basis of adaptation information system and foster climate-responsive policies.

## 2. National Action Plan for Climate Change Adaptation (RAN-API)

~~99-95.~~ **Action Plan in RAN API is divided into 5 sectors** with Resilience of Special Areas as one of the sectors. This particular sector is further divided into 2 sub-sectors, one of which is Sub-sector of Coastal Area and Small Islands. There are 5 strategies developed for this sub-sector, which are:

- Life stability of coastal and small islands communities against climate change threat;
- Improvement of environmental quality of coastal areas and small islands;
- Development of adaptation structures in coastal areas and small islands;
- Adjustment of urban spatial plan by taking into account the risk of climate change;
- Development and optimization of research and information system on climate change in coastal areas and small islands.

~~100-96.~~ This proposed programme aimed at delivering the above mentioned strategies in the form of different project components and outputs, including developing and implementing adaptation plan, mainstreaming process into local development plan and spatial plan, and also developing knowledge management network. Pekalongan City is named as one of the pilot locations of RAN API. A successful implementation of vertical approach within the programme will set an example of synchronize planning to the other RAN API pilot area; in which RAN API also promote this vertical approach as part of their framework.

## 3. Law No. 32 Year 2009 on Environmental Protection and Management

~~101-97.~~ Climate change issue was taken into account in 2 articles in Chapter 3 on The Development of Environmental Protection and Management Plan (RPPLH), which are:

- Article 10 clause (2); which stating that climate change is one of the factors that need to be considered during the development of RPPLH
- Article 10 clause (4); which stating that climate change adaptation and mitigation plan is among the contents of RPPLH

~~102-98.~~ Considering that city and provincial governments are obligated to develop their Environmental Protection and Management Plan, hence the **proposed programme will assist the development process by providing and advocating the integration of climate risk assessment results** and the proposed adaptation actions into the plan.

## 4. Law No. 16 Year 2016 on Ratification of Paris Agreement to The United Nations Framework Convention on Climate Change

~~103-99.~~ The ratification shows GOI commitment to its people as well as international community to address climate change issue, particularly considering Indonesia's characteristics as an archipelagic country that is vulnerable to climate change impact. Based on the global agreement, adaptation is aimed to increase adaptive capacity, strengthen resilience and reduce vulnerability to climate change. **This proposed programme supports the ratification by aiming to address climate change issue at city level while at the same time aiming to foster a better institutional framework for climate change realm.** Activities implemented under the programme are aiming to build and strengthen coastal community resilience; by not only reducing their vulnerability (such as through mangrove restoration and geo-tube construction), but also increase their adaptive

capacity (for instance by building latrine as sanitation facilities, developing capture fishery, and also developing ecotourism site and activities).

#### 5. Government Regulation No. 2 Year 2015 on The National Midterm Development Plan (RPJMN) 2015 – 2019

104-100. In section 1.2.2-Climate Change and sub-section 1.2.2.1-Problems and strategic issues of the RPJMN, the decrease of Greenhouse Gas (GHG) emission (climate change mitigation) and improvement of communities' resilience (climate change adaptation) were stated. The development of resilience coastal communities and communities that are aiming to be done by this programme is in line with the RPJMN content. Furthermore, in RPJMN 2015-2019, the national government also set a target of Universal Access of Sanitation facilities in 2019; where the term Universal Access here means every population will be served with adequate sanitation facilities. **Construction of individual and communal latrine for coastal communities with no adequate access to sanitation facilities that will be done under the programme will surely support the aforementioned government target.**

#### 6. Presidential Decree No. 60 Year 2015 on Government Work Plan Year 2016

105-101. The general objective for the 2016 Work Plan is to "Accelerate Infrastructure Development to Strengthen the Qualitative Development" by focusing on 6 leading sectors, which are: food sovereignty, energy and electrical sovereignty, maritime, industry, tourism, and also innovation and technology. **The development of eco-tourism site in Degayu Community that complemented with breakwater geo-tube construction and mangrove restoration are amongst semi-hard and soft structures that will be developed during this programme.** Not only contribute in the acceleration of infrastructure development in tourism sectors, the aforementioned actions will also assist in increasing the quality of life of the targeted coastal population in specific and Pekalongan City population in general.

#### 7. Ministry of Environment and Forestry Regulation No. 33 Year 2016 on Guidance for the Development of Climate Change Adaptation Action

106-102. This regulation is the reference for national and local governments to develop their climate change adaptation action plan and subsequently mainstreaming the plan into the corresponding development plan. The regulation states that identification of area/sector that will be the subject should be followed by climate vulnerability and risk assessment, prior to developing climate change adaptation actions and its implementation priorities. The actions then should be mainstreamed to the corresponding development plan, programme and policy. As described in this proposal, **general approach and activities that are outlined for this programme are referring to and in line with the abovementioned steps; ensuring programme compliance to the said regulation.**

#### 8. Ministry of Marine and Fisheries Regulation No. 23 Year 2016 on Management Plan of Coastal Area and Small Islands

107-103. This particular regulation was developed as a means to foster cross-level and cross-sector synergy in managing coastal areas and small islands. The regulation states that the relevant strategic plan should consist of a cross-sector policy directive for the dedicated development plan area through the development of objectives, targets, and broader strategy, as well as implementation targets that are equipped with appropriate indicators to monitor the plan. It further states that the management plan should contain policy framework, procedure and responsibilities in the event of decision-making process among stakeholders regarding agreement on resource use or development activity in the designated zone. **The proposed programme supports the regulation by fostering cross-level and cross-sector coordination in its approach;** involving not only government actors but also non-government institutions including lay public, driving multi-stakeholder involvement and coordination at any steps possible. Formation and operationalization of community and city climate working group as well as implementation of the arranged coordination line under the programme is the example of this cross-level and cross-sector synergy. The development process of city development plan that takes account of the programme's vertical approach and results further demonstrate how the city policy directive are made with a synergized process across different levels and different sectors.

**9. Vulnerability Index Data Information System (2015) developed by Adaptation Directorate, Directorate General of Climate Change Control, Ministry of Environment and Forestry**

408-104. Preliminary assessment by utilizing standardized data in SIDIK shows that there are 15 vulnerable communities located in the coastal area of Central Java Province (including Pekalongan City); where some of them are severely affected by sea level rise. The selection of Pekalongan City coastal area as the geographical scope is in line with this preliminary assessment. However at the moment, SIDIK is not compatible to be utilized by coastal area to assess their vulnerability, since coastal characteristics had not been fully considered in SIDIK method. **Hence this programme is aiming to refine SIDIK with recommendations on coastal indicator that can be included in SIDIK to better illustrate the vulnerability of coastal area**, so that local government of coastal city/district could utilize SIDIK results for their local plan and policy.

**II. This proposed programme is also consistent with the following institutional and policy framework and commitment at Provincial and City Level:**

1. *Central Java Province Local Regulation No. 9 Year 2009 on Management of Coastal Area and Small Islands*
2. *Central Java Province Local Regulation No. 4 Year 2014 on 2014-2034 Zoning Plan of Central Java Province Coastal Area and Small Islands (RZWP3K)*
3. *Central Java Province Local Regulation No. 5 Year 2014 on 2013-2018 Mid-term Development Plan (RPJMD) of Central Java Province*
4. *Central Java Governor Regulation No. 1 Year 2011 on Strategic Plan of Central Java Province Coastal Area and Small Islands*

**5. Pekalongan City Local Regulation No. 4 Year 2010 on Zoning Plan of Pekalongan City Coastal Area (RZWP)**

409-105. **RZWP document is a long-term planning document that is aiming to create a balance between development needs and conservation efforts by creating a sound planning, management and development of coastal area.** Capacity building and community-based planning are amongst fundamental principle for this document. The geographical scope of this RZWP is 6 communities located within Pekalongan Utara sub-district that directly interfacing Java Sea or affected by activities conducted at coastal area and the sea. **These 6 communities are among 9 communities that are selected as the geographical scope for this proposed programme**, and thus the programme is consistent with the aforementioned Local Regulation.

**6. Pekalongan City Local Regulation No. 4 Year 2016 on 2016-2021 Mid-Term Development Plan (RPJMD) of Pekalongan City**

410-106. **Improv**ement of environmental carrying capacity and infrastructure is among strategic issues stated in the RPJMD document, in which flash flood and coastal flood were acknowledged as issues that driven the need for the improvement. The local government is targeting a reduction of inundated area to 37.57% in 2018 by building and strengthening flood (both flash and coastal flood) prevention and control infrastructure. In the same year, the government is also targeting 37% of the generated solid waste to be managed at 3R facilities; reducing the volume that being disposed at drainage channel and/or river. **The proposed programme will support this inundation reduction target by constructing breakwater semi-hard structure in the forms of moundgeo-tube to protect coastal areas from further abrasion and coastal flooding.** In addition to that, mangrove restoration is also deemed as the most suitable and feasible flood prevention action that can be implemented under the programme.

**7. Pekalongan City Local Regulation No. 7 Year 2012 on The Border**

411-107. **Articles** 16 of city local regulation no 7/2012 states that the building boundary line to the coast is 100 meters from the highest tide point to the land and on article, and then articles 26 states that Reservoir, river and coast border areas can be utilized by the community / agency / institution / agency for the following



activities: a. agricultural cultivation with types of perennials that function as protected; b. limited tourism activities; c. construction of water traffic infrastructure and water collection buildings; d. installation of billboards, extension boards and warnings, and job signs; e. utility network placement; f. the road to the location.; The utilization of the border area may not reduce its protected function and must obtain permission from the Mayor through the Office in accordance with the applicable laws and regulations. This is in line with the project for mangrove restoration and aquaculture activities.

**E. Describe how the project / programme meets relevant national technical standards, where applicable, such as standards for environmental assessment, building codes, etc., and complies with the Environmental and Social Policy of the Adaptation Fund.**

**1. Ministry of Environment and Forestry Regulation No. 33 Year 2016 on Guidance for the Development of Climate Change Adaptation Action**

442.108. Approach  
 for the proposed programme is designed by following steps elaborated in the particular regulation; from area and sector identification, developing climate risk assessment up to developing the corresponding adaptation plan and mainstreaming process to the relevant development and spatial plan, programme and policy. Assessment during the full proposal development process shows that no adjustment will be made to the steps provided in the guideline since the local characteristics are in accordance with conditions that had been stated in the guidance.

**2. Ministry of Marine and Fisheries Regulation No. 16 Year 2008 on Management Plan of Coastal Area and Small Islands**

443.109. According  
 to Chapter 2 Article 2 of the regulation, this particular regulation is the norm, standard, and guidance for local governments (provincial and district levels) to develop their areas management plan of coastal area and small islands. Steps taken in this proposed programme have considered and been in line with the planning principle elaborated in the regulation, including:

- In accordance with and/or complementing the local development plan system
- Integrate different activities of diverse stakeholders, including private sector and community; as well as activities relevant to both land and sea ecosystem
- Undertaken in accordance with the area's characteristics and potential
- Involvement of local community and other stakeholders

444.110. The  
**approach and methodology for this proposed programme are also designed by taking into consideration the abovementioned principles.** Activities and planning process will be undertaken in line with the applied development planning system at local, provincial and national level; with multi-stakeholders involvement at the core by involving lay public in the planning process and private sector in the future stage to create public-private partnership in implementing adaptation actions.

**3. Strategic Environmental Assessment as Compulsory Assessment in Spatial Plan and Development Plan**

445.111. Climate  
**vulnerability and risk assessment is one of 6 analysis options needed for the development of Strategic Environmental Assessment (SEA);** in which the SEA itself is a compulsory assessment in the development and/or evaluation process of Spatial Plan and Development Plan. To date, there is no standardized step in specific manner (only general approach available) to develop the SEA; the proponent could use only the CRA result to develop SEA and subsequently benchmark the contents of the proposed plan with the CRA. Relevant to this programme, to advocate the integration of CRA into SEA process, the proposed programme will follow the nationally standardized steps of SEA; from issue identification to adjustment recommendation for the benchmarked plan:

1. *Ministry of Environment Regulation No. 5 Year 2012 on Types of Activities that Require AMDAL*

2. Ministry of Environment Regulation No. 16 Year 2012 on Guidance to Develop Environmental Document (AMDAL, UKL-UPL and SPPL)
3. Ministry of Environment Regulation No. 8 Year 2013 on Procedure for Assessment and Checking of Environmental Document, as well as Environmental Permit Issuance
4. Ministry of Environment and Forestry Regulation No. 4 Year 2021 on The List of Bussines and/or Activity that require EIA (AMDAL), UKL-UPL or SPPL
- 3.
- 4.5. Ministry of Public Works Regulation No. 10 Year 2008 on Types of Activities under Public Works Sector that Require UKL/UPL

112. For Environmental Impact Assessment (EIA), Appendix 1 of the Ministry of Environment and Forestry Regulation No. 38 Year 2019 (PermenLHK P.38/MENLHK/SETJEN/KUM.1/7/2019) and No.4 Year 2021 (PermenLHK 4/2021) listed types of activities that require AMDAL/EIA prior to its construction. Hence for this programme, EIA will only need to be done for adaptation actions that included in the list; otherwise EIA is not compulsory to be undertaken and will be replaced by Environmental Management Measures and Environmental Monitoring Measures (UKL-UPL) document. Referring to PermenLHK P.38/MENLHK/SETJEN/KUM.1/7/2019 and PermenLHK 4/2021 content, figure 11 illustrates environmental document screening process need to be done to any projects that will be implemented in Indonesia, including adaptation actions under the programme.

For Environmental Impact Assessment (EIA), Appendix 1 of the Ministry of Environment Regulation No. 5 Year 2012 (PermenLH 5/2012) listed types of activities that require AMDAL/EIA prior to its construction. Hence for this programme, EIA will only need to be done for adaptation actions that included in the list; otherwise EIA is not compulsory to be undertaken and will be replaced by Environmental Management Measures and Environmental Monitoring Measures (UKL-UPL) document. Referring to PermenLH 5/2012 content, figure 11 illustrates environmental document screening process need to be done to any projects that will be implemented in Indonesia, including adaptation actions under the programme.

### Environmental Document Screening

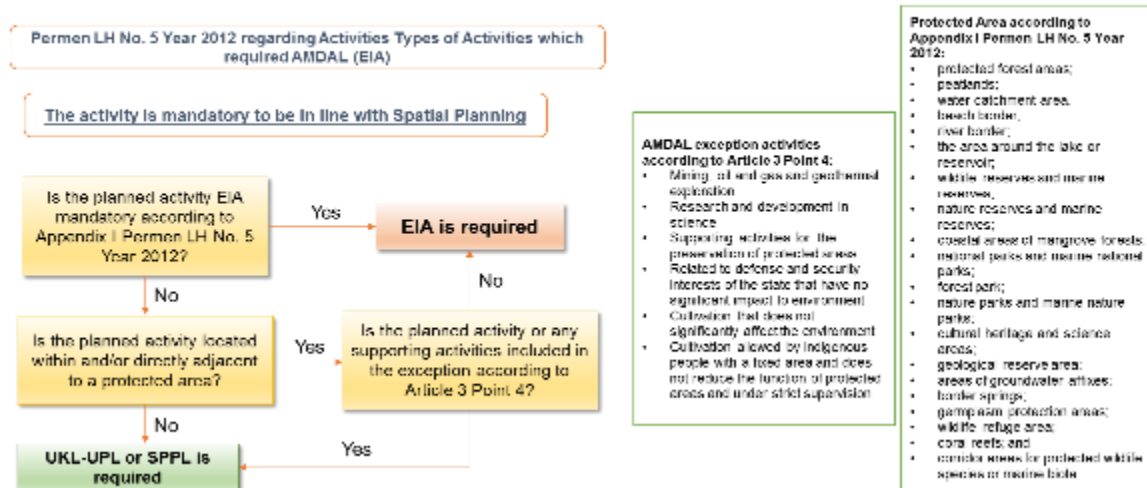


Figure 184. Environmental Document Screening Process

113.

Each of the selected adaptation action has been screened against the EIA-compulsory activities list and the results show that the actions are not categorized as activities that need to be complemented by EIA. The next process then identified whether the actions are located within and/or directly adjacent to a protected area; where the term protected area here is define as different areas listed in Figure 11. Results from this screening process are;

- **Individual and communal latrine**; not included in the EIA compulsory list and not located within and/or directly adjacent to a protected area. Further benchmarking utilizing Ministry of Public Works Regulation 10/2008, the construction of individual and communal toilet is not categorized as project/activity that needs to develop UKL/UPL. Accordingly, the programme implementer only needs to submit Environmental Management Statement Letter (SPPL).
- **Eco-tourism**; not included in the EIA compulsory list, but located within and/or directly adjacent to a protected area (coastal border). However, seeing how the eco-tourism site is aiming to protect the environment while at the same time provide natural tourism for the community, the activity is included in the exception listed in Article 3 Point 4 of PermenLH 5/2012 (preservation of protected area). Accordingly, the programme implementer should submit UKL-UPL.
- **Breakwater construction**; covering the coast of Kandang Panjang in the area of Mangrove Information Centre (PIM) constructed. However, this total length will not be constructed continuously along the coastal line of Bandengan and Kandang Panjang, since some coastline sections had been protected by geotubes and a watercourse in between that disemboques to the sea. Considering this non continuous manner, the particular option is thus not categorized as requiring EIA. Conducting further process under the screening diagram show that the construction will be located within a protected area (coastal border), however the activity is included in the exception listed in Article 6 Point 1c of PermenLHK P.38/MENLHK/SETJEN/KUM.1/7/2019 and PermenLHK 4/2021 (supporting activities for the preservation of the protected areas); and thus according to the screening diagram, it should be followed by UKL-UPL. To date, the UKL-UPL document has been submitted to provincial authority in charge, reviewed and principally approved. Indeed, for the breakwater construction activity to proceed, it needs clearance from the Ministry of Marine and Fishery Affairs. This clearance, stipulated under the Marine and Fishery Affairs Ministerial Decree No. 6/2023, is an official document confirming the suitability of marine space utilisation (KKPRL). Once the KKPRL document issued by the said Ministry, the provincial authority can officially approve the UKL-UPL document.
- ~~**BreakwaterGeo-tube construction**; the breakwatertotal length for rubble moundgeo-tube construction under the programme will be installed within 1,2400 m in the area of Bandengan and Kandang Panjang coast. However, this total length will not be constructed continuously along the coastal line of BandenganDegayu Community and Kandang Panjang Village, since some coastline sections had been protected by concrete embankment and geo-tubes and, with a watercourse in between that disemboques to the sea, and other sections are river estuary. Geo-tube construction will be done in area within Degayu Community that has not been protected (such as in front of ecotourism site and potential aquaculture farm site); fill in the gap between government embankments and create a better coastal protection structure. Considering this non continuous manner, the particular option is thus not categorized as requiring EIA. Conducting further process under the screening diagram show that the construction will be located within a protected area (coastal border), however the activity is included in the exception listed in Article 3 Point 4 of PermenLH 5/2012 (supporting activities for the preservation of the protected areas); and thus according to the screening diagram, it should be followed by UKL-UPL.~~
- **Mangrove restoration**: the proposed action is not categorized as requiring EIA, but instead supports the preservation of protected area.

117,114.

To

conclude:

- ~~**Eco-tourism and breakwater geo-tube construction isare all located within and/or directly adjacent to protected areas** but those activities are classified as EIA exception activities as per article 3 point 4 since they are considered as cultivation that does not significantly affect the environment and supporting activities to the preservation of protected area. As such, they do not need to submit EIA, instead replaced by UKL/UPL.~~
- **Eco-tourism and breakwater construction is located within and/or directly adjacent to protected areas** but those activities are classified as EIA exception activities as per article 3 point 4 since they are considered as supporting activities to the preservation of protected area. As such,



[they do not need to submit EIA, instead replaced by UKL/UPL as outlined in PermenLHK P.38/MENLHK/SETJEN/KUM.1/7/2019 and PermenLHK 4/2021.](#)

- The size of individual and communal latrine proposed in the programme ~~is does~~ not categorized as activities that need to be complemented by EIA.
- [Mangrove restoration with a size that is proposed in this programme is not included in Environment Ministry Regulation PermenLHK P.38/MENLHK/SETJEN/KUM.1/7/2019 as activities that are required to have EIA.](#)
- ~~Mangrove restoration with a size that is proposed in this programme is not included in Environment Ministry Regulation PermenLH 5/2012 as activities that are required to have EIA.~~

~~419-115.~~

Despite

the adaptation actions are not categorized as requiring EIA, **PMU will assure that all activities will not pose adverse impacts to the surrounding environment by implementing the needed mitigation measures**; including implementing environmental rehabilitation if the activities contaminate the area. As an initial assessment, this proposal document also contains initial findings on environmental and social risks from the programme, which elaborated on Part II - Section K as well as on the Environmental and Social Management Plan (ESMP). PMU will also continue to monitor any potential risks that had not been identified at this moment and might arise during programme implementation, and will carry out the necessary mitigation measures. The development of climate risk assessment, UKL-UPL, SPPL and ESMP within the programme will ensure that environmental and social impacts and risks are being considered, assessed and addressed throughout the project.

1. *Indonesia National Standard on Design Procedure for Septic Tank with Infiltration System and Latrine*
2. *Housing Construction and Development Standard from Ministry of Public Works*

~~420-116.~~

**Hard**

**structure that will be constructed as part of the proposed programme in future time will be ensured to conform to building codes**, especially since conformity to the codes is the primary requirements for granting the building license. For hard structure that serve as public facility, the construction and development will be ensured to follow infrastructure construction and development standard from Ministry of Public Works and Housing as well as Indonesia National Standard. Construction of sanitation facilities will be among the selected adaptation actions under this programme. The facilities' design and construction process will adhere to the aforementioned applicable standard to prevent negative impacts to the surrounding environment.

~~424-117.~~

**The**

**construction of latrine and septic tank** (on-site waste-water treatment system), both individual and communal facilities, **will follow the requirements stated in Indonesia National Standard on Design Procedure for Septic Tank with Infiltration System** (SNI 03-2398-2002) and **Indonesia National Standard on Design Procedure for Latrine** (SNI 03-2399-2002). Design approval and the corresponding environmental permit will be issued by the agency prior to facilities construction.

~~422-118.~~

**In**

comparison to the previous version of proposal, there are two regulatory frameworks/standards that omitted from this latest proposal version, which are the **Water Supply Regulatory Framework** and **Building Codes**. For Water Supply Regulatory Framework, the omission is due to the fact that based on discussion with city stakeholders (including local community), water supply facility will not be included as the selected adaptation actions; and thus this particular regulatory framework has no relevancy to the programme. Meanwhile for building codes, the omission is due to its irrelevancy with the selected adaptation actions under this programme. Indonesia National Standard (SNI) is more relevant to the actions in comparison to building codes standard. At the moment, Indonesia Building Codes and Indonesia National Standard only apply to some activities; and the proposed activities within the programme (with the exception of latrines) are not among the activities that are regulated by building

codes and national standard. The submission of UKL/UPL and SPPL are adequate to obtain relevant environmental permit

~~123.119.~~ Further more, in relation to land-ownership issue mentioned in the earlier part of the proposal document, **land tenure policy** (Presidential Regulation No. 71 Year 2012 on Land Procurement for Development Purposes) will not take effect in this programme since awareness building approach that will be taken under the programme is expected to create land-owner willingness to allocate their land for mangrove restoration site. This decision for not conducting land procurement process had been discussed and agreed by the city government.

**F. Describe if there is duplication of project / programme with other funding sources, if any.**

**National Urban Development Project (NUDP)**

~~124.120.~~ NUDP is a World Bank project applying loan mechanism aiming to increase capacity of selected cities in terms of assisting the spatial climate change adaptation planning. This project is still active and runs until 2024. The difference between this project and NUDP is that NUDP assist only up to the spatial plan, while Kemitraan proposes implementation up to grassroots level, especially to improve livelihood. NUDP also targets cities with population number over 500,000, which exclude cities like Pekalongan which only have less than 300,000 population. More detail on NUDP can be seen [here](#)

**PAKLIM GIZ-ICLEI Oceania**

~~125.121.~~ Pekalongan City had collaborated with external parties in climate change issue. **In 2010, this city was among 8 pilot cities in Central and East Java Province that implement Integrated Climate Action approach that was developed by PAKLIM GIZ and ICLEI Oceania.** Based on this approach, the city was able to develop Climate Risk and Greenhouse Gas Emission Profile; in which the risk profile methodology employs a more qualitative approach, with participants perception became the basis for the profile. Following the profile, the city with assistance from PAKLIM GIZ thus developed Integrated City Climate Strategy which outlining climate mitigation and adaptation strategy that detailed into corresponding actions. Several actions in ICCS had been inserted into RPJMD of Pekalongan City, receiving funding from local government budget. PAKLIM GIZ does not provide further funding assistance for the city after ICCS development and their intervention in Pekalongan City had ended in 2014.

**ACCCRN-Mercy Corps Indonesia**

~~126.122.~~ Other external party that works closely in Pekalongan City is **Mercy Corps Indonesia (MCI)**, where one of the organization's programmes is run in the said city, which is **Asian Cities Climate Change Resilience Network (ACCCRN)**. This programme is aiming to build climate change resilience knowledge in the city. Pekalongan City was selected as ACCCRN Replication City, and the programme was commenced in 2013. ACCCRN in Pekalongan City was focusing on capacity building for community and local government on climate change issue. This capacity building process includes not only series of training and discussion in the city, but also involving Pekalongan City local officials and practitioners in different knowledge sharing event outside Pekalongan. Yet the trainings and discussions conducted were none on the topic of quantitative climate risk assessment. Starting last year, ACCCRN is in its closing phase and the programme finished its implementation by the end of 2017, hence there is no more funding assistance given to the city. Pekalongan City Team was established as part of ACCCRN programme with member comprises of representative from local government officials, academics, practitioners and local NGOs. This team's main role is building climate change awareness in the city and fostering the implementation of adaptation actions under the umbrella ACCCRN programme. This programme will reactivate the working group that will work closely with the programme's PMU. Aside from the city team, this particular programme will also draw upon lessons

from the implementation of adaptation actions under ACCCRN programme; where it fails and where it succeeded, including reflecting on the sustainability of the implemented actions.

## JICA

127,123.

At a higher government level, Central Java Province had work closely with **Japan International Cooperation Agency (JICA)**, specifically in implementing Project of **Capacity Development for Climate Change Strategies in Indonesia (2010-2015)**. The main activity from the collaboration was mainstreaming adaptation/mitigation of climate change in National Development Planning, with Central Java as part of the scope. JICA had also developed study on Integrating Climate Change Adaptation into Spatial Planning Policies at 2 pilot sites which are 1) Java Island and 2) South Sulawesi (West & South coastal area, Selayar). Among the output of the study is recommendation on integration mechanism of adaptation plan into spatial planning. The JICA programme is completed in 2015, hence the proposed programme will not overlap with JICA funding. Seeing that the mechanism is developed at a higher government level that has to cater to different city/regency characteristics in its planning proves, but on the other hand considering the fact that Pekalongan City is part of Central Java Province that will somewhat affected by planning conducted at provincial level, hence this programme will learn from JICA study on mainstreaming and integration mechanism, and assess whether the proposed mechanism can be applied in Pekalongan City context and how to adjust the mechanism.

## Central River Region Pemali Juana (Directorate Generale Water Resources, Ministry of Public Works

124. Earlier this year, the **Central River Region Pemali Juana (BBWS Pemali Juana)** start the **construction of cross-boundary dam that intended to protect Pekalongan City and Pekalongan District from coastal flooding**; where the construction process is expected to be completed in 2019. This project is done in collaboration between BBWS Pemali Juana, Central Java Province, Pekalongan District and Pekalongan City. In Pekalongan City, the dam is constructed in Bandengan Community which located in the western part of Pekalongan. In addition, this BBWS project will also close the gap of 300 meters parapet in the eastern of Pekalongan City (Degayu). Considering this information, thus **coastal protection (Breakwater) planned in Kandang Panjang will complement this BBWS project** (see Annex 14).

~~7. Earlier this year, the **Central River Region Pemali Juana (BBWS Pemali Juana)** start the **construction of cross-boundary dam that intended to protect Pekalongan City and Pekalongan District from coastal flooding**; where the construction process is expected to be completed in 2019. This project is done in collaboration between BBWS Pemali Juana, Central Java Province, Pekalongan District and Pekalongan City. In Pekalongan City, the dam is constructed in Bandengan Community which located in the western part of Pekalongan. Considering this information, thus coastal embankment planned in the programme will complement this BBWS project, and will be built in the eastern part of Pekalongan City, specifically in Degayu Community (see Figure 11 below).~~

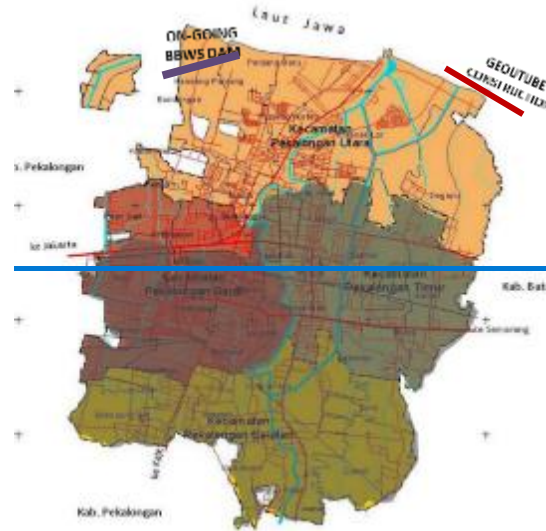
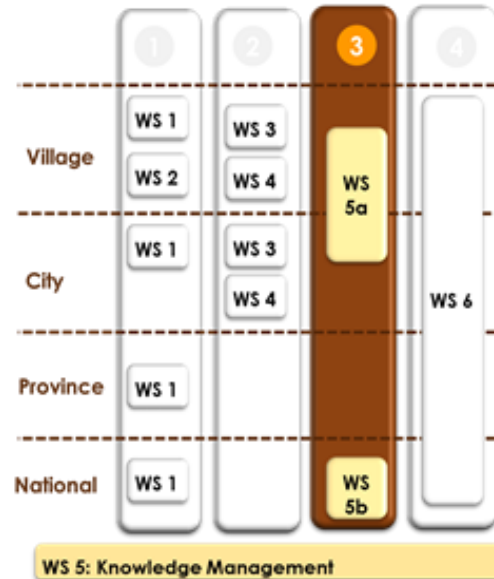


Figure 15. Location of BBWS Pemali Juana Dam and Geo-tube Construction

**K.G. If applicable, describe the learning and knowledge management component to capture and disseminate lessons learned.**

428-125. The knowledge management component will contain **activities that capture and disseminate both tacit and intrinsic knowledge**. For tacit knowledge, climate change training and knowledge exchange activities will serve as information and experience sharing media. These such forums will facilitate learning and co-creation of opportunities for various stakeholders. The intrinsic knowledge will be captured through more traditional methods, by conducting research that can be disseminated to government, practitioners, academic community and also general public. The output of the research could be both in form of knowledge product or advocacy material.

429-126. The overall knowledge transfer process is under component 3 and component 4. **Component 3 provides the cornerstone for capturing and disseminating lessons learned**, other project components / activities directly contributing to knowledge management and dissemination mechanisms from community to city and inter-regional levels, while **component 4 focuses more on share learning from the local to the national level**.



**Figure 169. Knowledge Management Component is Embedded at Different Level of Governance**

130-127. **At community level**, a participatory approach (involving communities and local authorities in conduct community based risk assessment, planning and implementation activities) will lead to increased local knowledge on climate change adaptation. Project demonstration sites will contribute, from the start and in an ongoing way, to share lessons and training through local disseminators and tools and guidelines. Knowledge dissemination tools that will be utilized in the proposed programme encompassing regular newsletter, social media network and knowledge board (contain information on climate-related issue as well as programme progress) in community centre or community office. Lessons learned obtain at this level will also be communicated to stakeholders at city level.

131-128. **At city level**, transfer of results and lessons learned to other communities across community and broader city area will be promoted. The programme's knowledge management product will be disseminated not only to Pekalongan City and Central Java Province area, but also broader community. For Pekalongan City dissemination, the project management team will collaborate with the existing knowledge sharing network, the Mangrove Information Centre (Pusat Informasi Mangrove/PIM). At the moment, PIM is focusing only on mangrove issue, however preliminary discussion with PIM shows that the organization is highly willing to broaden their scope to incorporate climate change resilience issue. In this project **PIM will play a major role at city level in disseminating knowledge product and programme benefit to wider city stakeholders**, thus will be facilitated through an online knowledge hub that will include capacity-building webinars, technical documents, multi-media knowledge products thus will be developed as an information and training centre for climate adaptation action.

132-129. **At national level**, we will use two approaches, **First approach is supporting the Ministry of Environment and Forestry (MoEF) to make improvements SIDIK** to suitable for coastal risk assessment based on pilot in pekalongan city. One knowledge product that will be the output for the proposed programme is Handbook on SIDIK for Coastal Risk Assessment that can be used by local government, NGOs and Civil Society Organizations. The handbook development will be based on climate risk assessment process conducted at city level. Related to advocacy material, the research will be the basis for developing policy briefs that highlight the shortcomings in national policy, fiscal and other institutional framework in developing a resilience coastal city. A direct linkage will be established, through the partnering MoEF, ICA and Apeksi facilitating countrywide dissemination to other cities/regencies, NGOs and Civil Society Organizations.

133.130.

Second

**d approach is that the project management team will actively engage with the existing national climate change network**, the Indonesia Climate Alliance (ICA). ICA member consists of different national level organizations that share the same interest in climate change issue. This collaboration will assist the team to share experience from local context and elevate the issue at national level, as well as advocating the developed policy brief. Throughout the course of the programme, an active communication and discussion will be conducted with the network to advocate lessons learned from local experience in Pekalongan City as well as on common interests. During the programme period, the programme will apply as the network member.

134.131.

Additio

nally, the **proposed programme also has Monitoring and Evaluation Unit** as part of the project management team. This unit responsible for knowledge management and sharing within project team member, organizing knowledge sharing event and outreach, and conducting pre and post-test survey on given interventions for evaluation purpose. All those activities will be documented, reported and made available.

135.132.

Knowle

dge management in this programme tries to **link science, implementation, management and policy both horizontally (between different sector) and vertically (between different government level)**. Changes in science could affect implementation strategy and subsequently alter how the project being managed, and consequently affecting the advocacy process. Considering the dynamics of this link, adaptive management approach thus became an important factor here. PMU will exercise adaptive management approach in programme implementation, by emphasizing 'learning and adapting' context, through partnerships with diverse community and city stakeholders; allowing them to work and learn together with the stakeholders in building a sustainable Pekalongan City. Adaptive management approach will allow PMU to acknowledge the existence of uncertainty and provide them with flexibility to work around the emerging issue; giving them space for adjustment in order to achieve the targeted objectives.

136.133.

Involve

**ment of diverse stakeholders within the working group**, as well as building knowledge management network are considered as the two main factors that could decide upon the sustainability of knowledge management strategy outcomes after the programme period is ended. These efforts enable the generated knowledge to be disseminated to wider stakeholders, and not only those directly involved in the programme; creating a potential for replication in other area by other actors. During the course of the programme, the knowledge management network will be used effectively and regularly to disseminate information as measure to build stakeholders need on climate-related information, open up their perspective on the benefit that can be obtained by interacting with the network as well as nurturing knowledge sharing habit. It is expected that by creating this need on information and realizing on benefit that they could get, the stakeholders will have a sense of ownership to the network and work together to maintain its operation in future time, after the programme is ended.

137.134.

Further

more, building upon this sense of need and ownership, **PMU will work with city working group to search for a host for the network and integrate network management into local development plan**. The host is needed to allow government funding stream to flow to the network. The proposed host for the network is Pekalongan City BAPPEDA as the leading sector for development planning. This particular institution does not have a specific work focus, instead they deals with diverse development issue. Climate change and coastal resilience are considered as development issue, and thus BAPPEDA will be the most appropriate host for the network. A successful integration into local development plan will ensure that the network will get continual budget allocation from the local government. To successfully advocate this integration, community working group will prepare a case study that will show the positive correlation between network existence and successful implementation of adaptation action.



138-135.

**PIM is a**

**local network in Pekalongan City that specifically works in mangrove-related issue.** Despite the programme also touch mangrove context, however the network that will be developed at city level will not be focusing on mangrove, instead on climate change and coastal resilience. Thus PIM and the future network will complement each other and could implement cross-learning mechanism.

139-136.

**Meanw**

**hile ICA is a national level network that works around general resilience issue.** The proposed city-scale network will not overlap and duplicate ICA efforts since both have a different scale (local vs national level network). Moreover, during its implementation period, the proposed programme will join ICA and use ICA as a vehicle for national advocacy process. This advocacy collaboration is feasible since ICA also has common interest in coastal resilience issue. Information and lessons learned at community and city level will be communicated by PMU in regular ICA meeting as a part of advocacy material to the national government. Hence ICA and the future local network complement each other by drawing upon common interest for advocacy. Without the existence of a nationally-known advocacy partners, such ICA, it will be difficult to get traction for advocacy process at national level.

#### **L.H. Provide justification for funding requested, focusing on the full cost of adaptation reasoning**

<b>Component</b>	<b>Baseline</b>	<b>Additional (with AF)</b>
<a href="#">Enhancing the coastal resilience through construction of coastal protection in the form of breakwater</a>	<ul style="list-style-type: none"> <li><a href="#">Rising sea level has increased abrasion at the coast line of Kandang Paniang</a></li> <li><a href="#">Rising sea level has increased tidal run off to PIM area and adjacent residential area</a></li> <li><a href="#">Potential of degraded coastline around PIM area</a></li> </ul>	<ul style="list-style-type: none"> <li><a href="#">Abrasion in can be reduced through the breakwater construction</a></li> <li><a href="#">Reduced tidal run off to PIM area and adjacent residential area</a></li> <li><a href="#">New sedimentation can be develop to enhance the degraded coastline around PIM area</a></li> <li><a href="#">Increased opportunity of mangrove development</a></li> </ul>
<a href="#">Enhancing coastal community capacity in developing and implementing Climate change adaptation actions and community information system</a>	<ul style="list-style-type: none"> <li><a href="#">Local actors have limited capacity to prepare for and respond to climate change and natural hazards</a></li> <li><a href="#">The most vulnerable areas and groups receive limited infrastructure support and no targeted object to receive resilience building support because of limited capacity and resources.</a></li> <li><a href="#">Detailed/specific climate change threat and hazard information / evidence is not available at community scale in Pekalongan City, which means the local government and communities can't plan for appropriate adaptation actions</a></li> </ul>	<ul style="list-style-type: none"> <li><a href="#">Local actors and communities are enabled to prepare for and respond to climate change and natural hazards</a></li> <li><a href="#">The vulnerable groups in coastal areas are targeted and appropriate resilience measures</a></li> <li><a href="#">Participatory Climate risk assessment by community will enhance community awareness and capacity to develop community adaptation actions thus how to mainstreaming into community development plan</a></li> </ul>
<a href="#">Enhancing local government and other city stakeholders' capacity in developing local climate change adaptation action plan (RAD API) and implement Climate smart</a>	<ul style="list-style-type: none"> <li><a href="#">Lack of capacity of the local governments officer and related stakeholders to lead climate change adaptation and disaster risk reduction plan</a></li> <li><a href="#">Any interventions in the proposed intervention areas will continue as small-scale and stand-alone projects that lack integration and miss important opportunities for synergies. They also will not consider the impact of future climate change and the need to include consideration in the design of community level interventions.</a></li> </ul>	<ul style="list-style-type: none"> <li><a href="#">Local governments and related stakeholders can lead climate change adaptation action and disaster risk reduction plan thus mainstreaming into city development plan</a></li> <li><a href="#">City government and climate stakeholders will have ability to develop a climate-smart approach that builds resilience to current climate variability and future climate change and specifically tackles the gendered inequalities around climate change. The integrated</a></li> </ul>



Component	Baseline	Additional (with AF)
<u>Enhancing the coastal resilience through construction of coastal protection in the form of breakwater</u>	<ul style="list-style-type: none"> <li>• <u>Rising sea level has increased abrasion at the coast line of Kandang Panjang</u></li> <li>• <u>Rising sea level has increased tidal run off to PIM area and adjacent residential area</u></li> <li>• <u>Potential of degraded coastline around PIM area</u></li> </ul>	<ul style="list-style-type: none"> <li>• <u>Abrasion in can be reduced through the breakwater construction</u></li> <li>• <u>Reduced tidal run off to PIM area and adjacent residential area</u></li> <li>• <u>New sedimentation can be develop to enhance the degraded coastline around PIM area</u></li> <li>• <u>Increased opportunity of mangrove development</u></li> </ul>
	<ul style="list-style-type: none"> <li>• <u>The most vulnerable communities are not targeted/reached</u></li> </ul>	<p><u>approach, grounded in local community development plans and a gender responsive approach, will enable interventions that are consistent with the National Action Plan on Climate Adaptation Actions (RAN API) to be implemented at the local level</u></p> <ul style="list-style-type: none"> <li>• <u>The most vulnerable communities are the main beneficiaries of the project</u></li> </ul>
<u>Strengthening vertical coordination by enhancing provincial government's capacity in mainstreaming climate change adaptation and resilience into Central Java Province development plan, which in turn could foster better climate-related policy on climate financing and bottom-up planning</u>	<ul style="list-style-type: none"> <li>• <u>Lacking capacity of provincial government officer to put forward climate change adaptation issue in development plan as well as incapability to lead by example in mainstreaming the issue</u></li> </ul>	<ul style="list-style-type: none"> <li>• <u>Provincial government officers have the capacity to promote climate change adaptation action plan and mainstream the said plan into development plan, setting out example and support all cities and regencies within its administrative region to do the same</u></li> </ul>
<u>Strengthening vertical coordination and collaboration between national and local government in climate adaptation context and Enriching knowledge, toolkits and methodologies coastal resilience for the national government</u>	<ul style="list-style-type: none"> <li>• <u>SIDIK unable to appropriately and accurately assess the vulnerability and risk of coastal region</u></li> <li>• <u>Adaptation programmes planned at ministry level (national level) often incompatible with the needs of adaptation actions at city/local level</u></li> </ul>	<ul style="list-style-type: none"> <li>• <u>SIDIK is improved and able to appropriately assess vulnerability and risk of area that has coastal characteristics</u></li> <li>• <u>Ministries and local government collaborate and cooperate to implement the appropriate adaptation actions</u></li> </ul>
Component	Baseline	Additional (with AF)
<u>Enhancing coastal-community capacity in developing and implementing Climate change adaptation actions and community information system</u>	<ul style="list-style-type: none"> <li>• <u>Local actors have limited capacity to prepare for and respond to climate change and natural hazards</u></li> <li>• <u>The most vulnerable areas and groups receive limited infrastructure support and no targeted object to receive resilience building support because of limited capacity and resources</u></li> <li>• <u>Detailed/specific climate change threat and hazard information / evidence is not available at community scale in Pekalongan City, which means the local government and communities can't plan for appropriate adaptation actions</u></li> </ul>	<ul style="list-style-type: none"> <li>• <u>Local actors and communities are enabled to prepare for and respond to climate change and natural hazards</u></li> <li>• <u>The vulnerable groups in coastal areas are targeted and appropriate resilience measures</u></li> <li>• <u>Participatory Climate risk assessment by community will enhance community awareness and capacity to develop community adaptation actions thus how to mainstreaming into community development plan</u></li> </ul>
<u>Enhancing local government and other city stakeholders' capacity in developing local climate change adaptation</u>	<ul style="list-style-type: none"> <li>• <u>Lack of capacity of the local governments officer and related stakeholders to lead climate change adaptation and disaster risk reduction plan</u></li> </ul>	<ul style="list-style-type: none"> <li>• <u>Local governments and related stakeholders can lead climate change adaptation action and disaster risk reduction plan thus</u></li> </ul>

Component	Baseline	Additional (with AF)
<p><u>Enhancing the coastal resilience through construction of coastal protection in the form of breakwater</u></p>	<ul style="list-style-type: none"> <li>● <u>Rising sea level has increased abrasion at the coast line of Kandang Panjang</u></li> <li>● <u>Rising sea level has increased tidal run off to PIM area and adjacent residential area</u></li> <li>● <u>Potential of degraded coastline around PIM area</u></li> </ul>	<ul style="list-style-type: none"> <li>● <u>Abrasion in can be reduced through the breakwater construction</u></li> <li>● <u>Reduced tidal run off to PIM area and adjacent residential area</u></li> <li>● <u>New sedimentation can be develop to enhance the degraded coastline around PIM area</u></li> <li>● <u>Increased opportunity of mangrove development</u></li> </ul>
<p><del>action plan (RAD-API) and implement Climate smart</del></p>	<ul style="list-style-type: none"> <li>● <del>Any interventions in the proposed intervention areas will continue as small-scale and stand-alone projects that lack integration and miss important opportunities for synergies. They also will not consider the impact of future climate change and the need to include consideration in the design of community level interventions.</del></li> <li>● <del>The most vulnerable communities are not targeted/reached</del></li> </ul>	<p><del>mainstreaming into city development plan</del></p> <ul style="list-style-type: none"> <li>● <del>City government and climate stakeholders will have ability to develop a climate smart approach that builds resilience to current climate variability and future climate change and specifically tackles the gendered inequalities around climate change. The integrated approach, grounded in local community development plans and a gender responsive approach, will enable interventions that are consistent with the National Action Plan on Climate Adaptation Actions (RAN-API) to be implemented at the local level</del></li> <li>● <del>The most vulnerable communities are the main beneficiaries of the project</del></li> </ul>
<p><del>Strengthening vertical coordination by enhancing provincial government's capacity in mainstreaming climate change adaptation and resilience into Central Java Province development plan, which in turn could foster better climate-related policy on climate financing and bottom-up planning</del></p>	<ul style="list-style-type: none"> <li>● <del>Lacking capacity of provincial government officer to put forward climate change adaptation issue in development plan as well as incapability to lead by example in mainstreaming the issue</del></li> </ul>	<ul style="list-style-type: none"> <li>● <del>Provincial government officers have the capacity to promote climate change adaptation action plan and mainstream the said plan into development plan, setting out example and support all cities and regencies within its administrative region to do the same</del></li> </ul>
<p><del>Strengthening vertical coordination and collaboration between national and local government in climate adaptation context and Enriching knowledge, toolkits and methodologies coastal resilience for the national government</del></p>	<ul style="list-style-type: none"> <li>● <del>SIDIK unable to appropriately and accurately assess the vulnerability and risk of coastal region</del></li> <li>● <del>Adaptation programmes planned at ministry level (national level) often incompatible with the needs of adaptation actions at city/local level</del></li> </ul>	<ul style="list-style-type: none"> <li>● <del>SIDIK is improved and able to appropriately assess vulnerability and risk of area that has coastal characteristics</del></li> <li>● <del>Ministries and local government collaborate and cooperate to implement the appropriate adaptation actions</del></li> </ul>

140.137. In addition to gender assessment done during the preliminary assessment for this proposal, Kemitraan's has also conducted additional gender assessment in Pekalongan City within the period of 2017 to 2018. The result of this gender assessment is added on the last page of Annex 3 of this document.

141.138. Based on the result of the assessment, Kemitraan has seen the importance to engage a number of woman and youth organisations in the activities in

Pekalongan, especially in the capacity building related to climate change adaptation measures. Following table lists the mapping of existing CSO and community groups to be involved in the project:

No	Community	Active Member	Registered Member	
			Offline	Online
1	Bintari Foundation			
2	Insta Pekalongan (Pekalongan Instagram Community)	50	100	73.000
2	PEKKA (Women as Leader of Family)	200	500	-
3	Doodle Art	51	100	-
4	Great of Pekalongan	44	30	3.467
5	Pekalongan Photography Community	150	100	700
6	Mahakarya (College Students of Pekalongan)	350	60	1.100
7	Pekalongan Blogger Community	40	302	1.304
8	Drone Pekalongan Community	20	20	500
9	Bara Air Activist	50	60	-
10	Pekalongan River Lover Community (Kali Lodji)	1.400	1.400	1.800
11	Painting Community (PERUPA)	100	400	700
12	Batik Kauman Community	100	300	1.000
13	Akademi Berbagi Pekalongan (Knowledge Sharing Community)	35	35	1.137
14	Boys scout of Pekalongan	100	166	256
15	Explore Pekalongan (tourism, ecotourism)	35	60	56.000
16	Generasi Pariwisata Pekalongan (Pekalongan Youth Generation for Tourism)	25	25	60
17	Pekalongan Info (Ecotourism)	4	3	222.000
Total		2.754	3.661	363.024

**Table 4. Partners & Beneficiaries of Pekalongan Project**

142-139.

The

above listed CSO and community organisations have been actively involved in various activities in Pekalongan, such as establishment of Climate Change Forum (Bara Air Activist), assistance to women headed household (PEKKA), empowerment in batik industry (Batik Kauman Community), mangrove planting (Great of Pekalongan), photography and knowledge & communication (Doodle, Pekalongan Photography Community, Pekalongan Blogger Community, Insta Pekalongan) and ecotourism (Pekalongan Info, Explore Pekalongan). More on consultative process can be seen in Annex 8 of this document.

**M.I. Describe the consultative process, including the list of stakeholders consulted, undertaken during project preparation, with particular reference to vulnerable groups, including gender considerations, in compliance with the Environmental and Social Policy of the Adaptation Fund**

[We have conducted consultations with different stakeholders at various levels to ensure that we are able to build a proposal which represent the needs and the interests of all stakeholders related to the climate-change adaptation in Pekalongan City. As for the construction of breakwater, consultation process has been also conducted involving the community in Kandang Panjang to make sure that the respective community is aware about the construction plan. Below are descriptions of some of the consultation processes. We summarize the consultations processes in a table that can be accessed in Annex 8 and Minutes of Consultation in Annex 18 related to coastal protection and breakwater.](#)

~~[We have conducted consultations with different stakeholders at various levels to ensure that we are able to build a proposal which represent the needs and the interests of all stakeholders related to the climate-change adaptation in Pekalongan City. Below are descriptions of some of the consultation processes. We summarize the consultations processes in a table that can be accessed in Annex 8.](#)~~



### Consultation with community members and Planning Bureau of Pekalongan City

~~143.~~140. Mobility  
 constraint and lack of involvement in decision-making process are two main barriers for women participation regarding CCA activities. In this programme, women representative, both full-time working and housewife, will be included as working group member. The meetings will be scheduled to be taken place in days and times that are feasible for them, and the other member, to attend; for instance during weekend morning or afternoon. The regular meeting will not only allow them to voice relevant information, thoughts and experiences on that matter but also act as a consultation room to share the related problems. In a more informal setting, these women representative will be urged to approach their women 'colleagues' that are not involved as working group member, gather their opinion and share it during the meetings as appropriate.

~~144.~~141. To  
 follow up initial consultation, individual consultations were conducted with Bandengan, Kandang Panjang and Degayu community representatives. So in total, 4 communities were consulted individually in concept and proposal development process, which are: Tirto, Bandengan, Kandang Panjang and Degayu Community; meanwhile the representatives of other communities were unable to be met individually. However they, -including the women group representative-, attended and actively participated in the 3 (three) separate Focus Group Discussion events discussing:

- Potential Adaptation Activities at Community and City Level;
- Gender Aspect; and
- Framework and Potential Implementation of the Proposed Programme. ]

~~145.~~142. One  
 issue being raised by the former Pekalongan City Mayor during consultation process is **on land ownership issue**. Except from geo-tube and ecotourism locations, as well as some are for mangrove restoration which had been confirmed as government land, the decision upon which specific area for activities' implementation will be discussed during early in programme implementation stage. From consultation process (interview and FGD), the local community are very welcome and support the proposed activities. They believe latrine construction and improvement of aquaculture activities could enhance their quality of life, and thus there will be no issue on land ownership. They will not oppose to programme implementation in their land. But for mangrove restoration, there is a small risk that land ownership could hinder the activities. During proposal development stage, identification has been made on potential mangrove restoration area that are owned by the government, such as in the vicinity of eco-tourism site, PIM, geo-tube area etc. If during discussion process (early in programme implementation stage), there are private land that will be suitable for mangrove restoration, the following measures will be undertaken. The main focus to address this issue is in building community perspective and awareness on the benefit of turning unproductive land into something that benefit them as a whole community, and not merely individual benefit. This awareness building process will be done by conducting workshops on climate adaptation action and coastal resilience, where among the workshop

material will be the importance of mangrove restoration for coastal protection, including for protection their dwelling and neighbourhood. The workshop is expected to build their knowledge and awareness on mangrove function. Additionally, during the workshop, the community will also be informed that not all of their land will be utilized for mangrove restoration activity; only selected one. Furthermore, considering its current condition as unproductive land, utilizing the land as mangrove restoration site will not result in economic loss for the community, instead benefit them by protecting their area. The workshop itself will be done by the PMU in collaboration with community working group. Aside from their involvement in the workshop process, community working group will also be tasked to **conduct a more personal and informal approach to the land owner that identified as hesitant to 'donate' their land for mangrove restoration; persuade and build their awareness on the issue at hand, and how they can support in addressing the issue.**

146-143. \_\_\_\_\_ Indeed, during preparation of full proposal, the Municipal Government of Pekalongan City through its BAPPEDA has declared its endorsement for this project and its plan and readiness to compensate land use for green open areas incl. for mangrove restoration purpose (Annex 4).

**N.J. Describe how the sustainability of the project / programme outcomes has been taken into account when designing the project / programme.**

147-144. \_\_\_\_\_ As mentioned in the previous section of this proposal, this programme is aiming to address multifaceted issue in coastal area, specifically those related to climate change impact; fostering coastal resilience building in the area. Seeing the considerable benefit trying to be achieved by the programme, it is thus important to ensure the sustainability of the programme in order to spread out the benefit to wider community. Approach taken for this programme rely heavily on **stakeholders involvement and collaboration**, hence the derived activities for those two aspects are designed to ensure the programme's sustainability.

**Building Sense of Ownership in the Municipality of Pekalongan**

148-145. \_\_\_\_\_ At community level in the 8 target *kelurahan*, **benefit arises from the existence of adaptation actions and the alternative livelihood will directly affect community's life in tangible manner.** Their financial capital will be strengthened from the combination of increases of income and decreases of disaster-related expenses. Their income will increase from the alternative livelihood and better management of the fishing practices, while their physical environment will be better protected from coastal hazards such as coastal flooding, and thus reducing their household expenses in dealing with this such hazard. Further, development of urban farming provide substitute, although in a smaller scale, to the loss agriculture land, accommodating farmers who have lost their possibility to cultivate. Involving existing farmer community can ensure the sustainability of this alternative solution, especially if it is combined with a financial mechanism such as farmer cooperative. To further ensure the sense of ownership will always be maintained, **local CSOs will continue to work closely with community working group** to share their knowledge on the issue, including on matters relevant to new alternative livelihood. These CSOs are member of city team and have been working with the targeted local community for a period of time, and thus they will be committed to maintain the programme's outcome in the targeted area. Moreover, engagement of the Municipal Fishery and Agricultural Office will ensure that the Municipal Government is involved in providing assistance to the farmers and solution to any occurring administrative and/or cultivation issues.

149-146. \_\_\_\_\_ Sense of ownership can also be built up amongst community members through provision of communal facility applying community participatory approach. Community involvement in the establishment of the communal water and sanitation facility, not only through public consultation but also through community's direct involvement in the construction, will provide better understanding in the importance



of community's health and hygiene in the whole aspect of their life. This will increase public awareness and strengthen public's sense of ownership of the facility. More over, the project will ensure the mainstreaming of the overall intervention and allocated budget especially for the Operation & Maintenance of the infrastructure as well as communal facility. Communal facility can also be used to socialise issues related to health and hygiene to broader community of different age groups. Since clean water scarcity occur in the affected coastal area, not only caused by damaged water supply infrastructure but also saltwater intrusion affecting community wells, is covered by the communal water supply system, it will also strengthen public ownership of the facility and ensure its sustainability..

~~150-147.~~ Meanw  
 hile for Pekalongan City, these actions and livelihood will increase their GDP from fisheries and tourism sector as well as reduce their expenses in infrastructure repair/rehabilitation due to coastal-related hazard. Seeing how the activities positively affect their GDP, the local government will be driven to maintain the existing activities and further replicate/scale-up the activities in other location within their administration area. Regarding fisheries and tourism sector programmes, the regional government has also allocated a budget for the 2016-2021 midterm development plan. Allocation for the development of aquaculture is set for IDR 6,155,000,000, coastal rehabilitation for IDR 1,075,000,000, conservation for IDR 205,000,000 and the development of a tourism partnership, including ecotourism for IDR 2,625,000,000

### Introduction of circular economy to Pekalongan City

~~151-148.~~ Assistin  
 g the Municipality of Pekalongan City with the establishment of integrated waste management facility provide tangible solution to improve both the city and community's income. While the City owned Enterprise can benefit from the products generated through the facility, a public-people-private partnership model can also develop to engage broader stakeholder generate profit from the facility, not only financially but also in terms of improved living environment of affected community through regular, cost-free waste collection.

### Knowledge Network Establishment and Engagement

~~152-149.~~ Multi-  
 stakeholder involvement and knowledge network engagement within the programme is also designed to allow programme sustainability. It enables knowledge to be disseminated to diverse actors, and not only one single entity. Allowing projects and lessons learned to be disseminated, replicated and even expanded. The existence and operationalization of this network will support the effort in building a sense of ownership to the programme and its benefit. The more people take ownership, the more sustainable the programme will be. Concurrently, the sustainability of this network will be maintained. Facilitating and optimizing the existing network of multistakeholder i.e green forum or sanitation working groups will garner more knowledge.

### City Level

~~153-150.~~ The  
 local knowledge network (PIM) will play a major role at city level in disseminating knowledge product and programme benefit to wider city stakeholders. This role will support in **building a sense of ownership to the actions and alternative livelihood produced under the programme**. During the implementation stage, particularly the workshop series, the programme will build the sense of need and importance of this network as a knowledge sharing media by emphasizing the significance of regular multi-stakeholder discussion in addressing climate change impact in their area. The stakeholders will also be trained to share their relevant achievement and issues in this network. Having built their sense of need and issue/knowledge sharing habit, it is expected that in future time, they will turn to this network if they encounter opportunities and/or threat to the adaptation actions and alternative livelihood.

## National Level

154.151.

Nationa

I knowledge sharing network (ICA) has been established and actively operationalized prior to the programme development. Throughout the course of the programme, an active communication and discussion will be conducted with the network to **advocate lessons learned from local experience in Pekalongan City as well as on common interests**. During the programme period, the programme will apply as the network member. This membership will end after the programme ended, and the advocacy for Pekalongan City lessons learned and interest will be taken over by APEKSI who is also ICA member. APEKSI is the national association for city government in Indonesia, where Pekalongan City is among the member.

## Programme Mainstreaming at City Level

155.152.

Aside

from community, this programme place **government institutions as the core subject**. Hence, other means to ensure programme sustainability relies on government involvement. During the programme period, the adaptation actions will still be conducted under the programme umbrella but in parallel, PMU will advocate the actions to the city government to enhance their awareness on the benefit of the action; driving them to preserve and replicate the action. City government institution that will be the advocacy target might be different for each action, depending on the work area of the said institution. Coastal embankment will be advocated to BAPPEDA, Mangrove restoration, aquaculture and farm pond will be advocated to Agriculture and Marine Agency; sanitation facilities will be advocated to Public Works Agency and Environmental Agency; while eco-tourism will be advocated to BAPPEDA and Tourism Agency.

156.153.

This

advocacy process has one **major aim**, which is to **mainstream the actions into city government's development plan and spatial plan**. This mainstreaming process (including M&E activities and climate risk assessment) is believed as the most effective sustainability strategy at city level. Facilitating the government officials to properly develop and mainstream climate strategy and adaptation action into local development plan is part of the sustainability design. The term mainstreaming here means that climate related context and the adaptation actions are included in the city development plan. In Indonesia governance context, city development plan is the legal and formal direction for city government officials in delivering their works. The plan is developed in deliberative manner by the city government agencies, and its legalization by the City Mayor indicates city government commitment to implement the plan, Programmes and activities included in the plan has their own budget allocation and must be implemented according to the schedule. For the programme case, a successful advocacy and mainstreaming process will see the inclusion of adaptation actions into city government's programmes and activities under the city development plan; automatically provide the adaptation actions (as well as the related M&E and risk assessment updating activities) with budget allocation, especially for Operation & Maintenance (O&M) for the overall infrastructure, not only funding for initial construction in other area (replication), but also regular functional trouble shooting (for actions implemented under the programme and replication). It will also show government commitment to continue and replicate the actions in future time even after the AF-funded programme period ended. This will further ensure the programme sustainability in long term.

## Financial Sustainability

157.154.

Some

Adaptation actions must be profitable, the action that do not pay for themselves are unlikely to be sustainable. Therefore, some adaptation action in this project is **designed to include strong income generation and entrepreneurial aspect** which will make the project outcomes financially sustainable. Selected adaptation actions are locally viable and good profitable such as capture fishery, ecotourism etc. notes for adaptation actions that profit generally require large capital so that it is difficult to do by poor people affected by climate change. Another strategy that will be done is by linking and involving the private sector from the beginning to seek potentiality of link and match between the supply and demand side.



## Sustainability of applied technology

158-155. \_\_\_\_\_ Implem entation of climate change adaptation measures and actions cannot be fully separated from applying technological support. Indeed, application of the supporting technology will be adjusted with local context and the local ability/capacity to maintain and to sustain this. This project will definitely not intended to invent new technology in its innovative approach, but will certainly look at simple and low cost, easy-to-maintain available solution. Based on Kemitraan's national wide connection with universities and academicians, any technological application to be utilized in this project will also be applied in connection and communication with its academic network at municipal and/or provincial, even at national level in order for them to involve in the supervision and monitoring of the adopted technology in the long term. This way, this project does not only increase wider ownership to sustain its overall results element, but also opens opportunities for possible development both at municipal and at provincial level.

159-156. \_\_\_\_\_ The application of the above mentioned technology will also be conducted as early as possible in the respective stage of each project component to allow the users to be sufficiently trained and also to be able to monitor and evaluate users' development during the remaining project timeframe. Therefore, the emphasis on low-cost, simple and available technology become necessary. Moreover, all online application intended to be integrated in this project, such as Climate Smart Agriculture, will be applied in connection with the already existing platform under Pekalongan Smart City Programme (<http://smartcity.pekalongankab.go.id/>).

## Exit Strategy Development

160-157. \_\_\_\_\_ All in all, this programme believed that maintaining the programme sustainability cannot rely solely on funding allocation, but also involving stakeholders to take part in the maintenance and dissemination stage. Pursuing funding allocation is somewhat a futile effort if not complemented by the existence of someone who protects and preserves the results. Combination of the above efforts at different government level will ensure the sustainability of the programme output and outcome in long-term period. These efforts will be combined and translated into an exit strategy plan which will be included in the M&E documents of the programme.

## Sustainability Plan

Key issue	Description	Opportunity	Plan	Remarks
<b>Institutional</b>				
Community Level	<ul style="list-style-type: none"> <li>- Existing and/or new established Fishermen Groups (include women group and vulnerable group) acknowledged, fostered and supported by the municipal govt. through the respective <i>Kelurahan</i>;</li> <li>- Established Farmers Groups (include women group and vulnerable group)acknowledged,</li> </ul>	<p><i>Kelurahan</i> and The Municipal Govt. acknowledge the existence of each community groups and their activity in the municipal CCA strategy policy to sustain coastal protection against CC impact.</p>	<ul style="list-style-type: none"> <li>• Strengthening formation of existing groups, through <i>Kelurahan</i> decrees</li> <li>• Engage <i>Kelurahan</i> and/or the Municipal Govt. in the activities related to the establishment, development and empowerment of each group to strengthen connection and to build mutuality between each other</li> </ul>	<p>To be arranged and conducted throughout the project cycle in order to foster communication and trust between local community, <i>Kelurahan</i> authority and the Municipal Govt.</p>

	<p>fostered and supported by the municipal govt. through the respective Kelurahan;</p> <ul style="list-style-type: none"> <li>- Engaged youth groups (include women group and vulnerable group) and build their capacity to become Agents of Change in climate change adaptation actions of Pekalongan City.</li> </ul> <p>Community groups (include women group and vulnerable group) involved in ecotourism institutionalized, assisted and fostered by the municipal govt.</p>			
<i>Kelurahan</i> Level	Constructed communal facility adopted and maintained by respective <i>Kelurahan</i> as a public facility;	The respective <i>Kelurahan</i> authority acknowledge each constructed communal facility as part of its public infrastructure and adopt it in the maintenance plan	<p>Identification and selection process selecting of the locations for communal facility through Free, Prior and Informed Consent (FPIC) The selected location has to be government or community land free from disputes;</p> <p>Engage the <i>Kelurahan</i> authority and related local government offices (Public Works, Environment and Health) in the development of the facility and communicate the message of the necessity of the facility within CC adaptation action for the welfare of the community</p>	To engage the <i>Kelurahan</i> authority, the Municipal Office of Health and Municipal office of Public Work during preparation, awareness raising and inauguration of the facilities
	Established <i>Kelurahan</i> Climate Working Groups (KCWG) supported and facilitated by <i>Kelurahan</i> to regularly oversee and monitor the community based adaptation actions	Respective <i>Kelurahan</i> adopts the KCWG into its development policy and arranges annual budget to support the activities of the working group	<p>Engage the <i>Kelurahan</i> authority and related local government offices in the dialogue, discussions and communication during the development of KCWG to increase <i>Kelurahan</i> authority's awareness and comprehensive understanding on the importance of a robust and sound community based CCA action;</p> <p>Involving the KCWG in meetings and coordinating the</p>	To communicate with and engage the <i>Kelurahan</i> authority and local government office from the early phase of the development of the Working Group

			preparation of RAN API	
Municipal Level	<ul style="list-style-type: none"> <li>- Municipal Govt. through its Office of Tourism and Office of Environment provides continuous assistance and maintenance of the enhanced mangrove belt as part of the city owned Mangrove Information Centre;</li> <li>- Municipal Govt. take responsibility to maintain the constructed parapet as part of its public infrastructure.</li> <li>- Municipal Govt. take responsibility to maintain the installed geo-tube for enhanced coastal protection</li> </ul>	<p>The Municipal Govt. acknowledge the improved mangrove belt, Mangrove Information Centre and the constructed parapet and installed geo-tube as part of public infrastructure and include these in the maintenance plan of the city.</p> <p>Moreover, the Municipal Govt. also acknowledge the mangrove belt and Mangrove Information Centre as income generating facility not only for the city, but also for its community that need to be well managed and kept sustainable.</p>	<p>Identifying process and selecting locations (demplot and construction) through FPIC, the location has to be government or community land free from disputes;</p> <p>Intensive engagement of the Municipal Govt. (Bappeda and Public Works) in each development phase progress evaluation of the activities.</p> <p>Declare from the beginning that all constructed facilities will be under the responsibility of the Municipal Govt. once those are finally constructed and handed over.</p> <p>Assist the Municipal Govt. in the integration of the constructed facility in its annual maintenance plan.</p>	<p>To engage the Municipal Govt. in the development and/or construction process right from the early phase.</p> <p>Engage the Municipal Govt. to lead the development process in terms of developing sense of ownership of the Municipal Govt. to the project and its results.</p> <p>Maintain intensive communication with the Municipal Government at all stages of the development and/or construction activities.</p>
	Municipal Climate Working Group (MCWG) supported and facilitated by the Municipal Govt. to oversee and monitor the Municipal CC Adaptation Action Plan.	The Municipal Govt. adopts the MCWG into its development policy and arranges annual budget to support the activities of the working group	Engage the Municipal Govt. in the dialogue, discussions and communication during the development of KCWG to increase Municipal Govt. awareness and comprehensive understanding on the importance of a robust and sound CCA action	To communicate with and engage the Municipal Govt. in the reactivation of the MCWG from the early phase
<b>Economic</b>				
Community Level	<ul style="list-style-type: none"> <li>- Community involved in ecotourism acknowledged, supported and continuously facilitated by the Municipal Govt.;</li> <li>- Fishermen groups are supported with fish, crab and shrimp seeds to enrich and/or maintain the health of the mangrove ecosystem for capture fishery and other production means;</li> <li>- Farmers groups are supported with seeds and other production</li> </ul>	The Municipal Govt. acknowledge the importance of sustaining the community based economic activity through intensive assistance and empowerment, and through protecting and supporting policy	Engage the Municipal Govt. (Bappeda, Office of Tourism, Office of Education and Culture) in the development of community based economic empowerment right from the early phase and involved the Municipal Govt. in all events related to community based economic empowerment	Organize a kick-off FGD in the beginning of the process involving the Municipal Govt.

	<p>means to improve productivity;</p> <ul style="list-style-type: none"> <li>- Groups of trained batik makers facilitated by the Municipal Govt. and endorsed in the promotion of modern and innovative batik culture that in return enrich Pekalongan to be the leading city in sustainable batik industry.</li> </ul>			
Municipal Level	<p>Waste management facility become a sustainable municipal business entity that provides jobs and business opportunity to the community of Pekalongan City and replicated in the other <i>Kelurahan</i></p>	<p>The Municipal Govt. run the facility through a municipal business entity and involved surrounding community in the operationalization of the facility applying gender mainstreamed policy</p>	<p>To assist the Municipal Govt. to lead all process of the development of the facilities and discuss on the form of the management entity in charge;</p> <p>Encourage the Pekalongan City Government to improve the planning, operational budgeting and maintenance of sanitation facilities related to climate change adaptation actions</p>	<p>Conduct intensive discussion during planning and development process with the Municipal Govt. and propose options of management entity form</p>
<b>Technological</b>				
<i>Kelurahan</i> Level	<p>Each target <i>Kelurahan</i> maintain sustainably the developed community based CC Information System</p> <p>Establishment of the citizen-data group at each <i>kelurahan</i> to maintain sustainability of CC related knowledge production at the local level.</p>	<p>Each <i>Kelurahan</i> takes over the maintenance of the provided equipment and the sustaining of the system supporting infrastructure, and adopts this in its annual budget line to sustain the provision of CC related information to the community</p>	<p>To intensively engage and provide training to the <i>Kelurahan</i> authority in the development of the system right from the beginning and assist in the planning for the maintenance through <i>Kelurahan's</i> budget arrangement</p> <p>Encourage Pekalongan government to assist and increase the capacity of climate change information system group at <i>kelurahan</i> level</p>	<p>Conduct intensive communication with the community, <i>Kelurahan</i> authority and Municipal Govt. during each development process</p>

**Q.K. Provide an overview of the environmental and social impacts and risks identified as being relevant to the project / programme.**

158. Environmental and Social Impact Assessment has been conducted for the programme to assess potential risks arising from programme implementation. The assessment was carried out by considering nationally applicable standard in risk assessment as well as compliance to AF Environmental and Social Principles. The assessment results are as below.

<u>Checklist of environmental and social principles</u>	<u>No further assessment required for compliance</u>	<u>Potential impacts and risks – further assessment and management required for compliance</u>
<u>Compliance with the Law</u>	-	<p>The programme is designed in compliance with all applicable national, regional and local law, including:</p> <ul style="list-style-type: none"> <li>• <a href="#">Law Number 5 of 1960 concerning Basic Regulations on Agrarian Principles</a></li> <li>• <a href="#">Law Number 18 of 2008 concerning Waste Management</a>;</li> <li>• <a href="#">Law 32/2009 on Environmental Protection and Management.</a></li> <li>• <a href="#">Law Number 2 of 2012 concerning Land Acquisition for Development in the Public Interest;</a></li> <li>• <a href="#">Law Number 27 of 2007 concerning Management of Coastal Areas and Small Islands;</a></li> <li>• <a href="#">Law Number 23 of 2014 concerning Regional Government;</a></li> <li>• <a href="#">Law Number 1 of 2014 concerning Amendments to Law Number 27 of 2007 concerning Management of Coastal Areas and Small Islands;</a></li> <li>• <a href="#">Law Number 6 of 2023 concerning the Stipulation of Government Regulations in Lieu of Law Number 2 of 2022 concerning Job Creation into Law</a></li> <li>• <a href="#">Government Regulation 27/2012 on Environmental Permit and Environmental Impact Assessment</a></li> <li>• <a href="#">Government Regulation Number 18 of 2012 concerning Management of Household Waste and Similar Household Waste;</a></li> <li>• <a href="#">Government Regulation Number 5 of 2021 concerning Implementation of Risk-Based Business Licensing;</a></li> <li>• <a href="#">Government Regulation Number 22 of 2021 concerning the Implementation of Environmental Protection and Management;</a></li> <li>• <a href="#">Government Regulation Number 21 of 2021 concerning the Implementation of Spatial Planning;</a></li> <li>• <a href="#">Government Regulation Number 19 of 2021 concerning Implementation of Land Acquisition for Development in the Public Interest.</a></li> <li>• <a href="#">Minister of Environment Regulation Number 5 of 2014 concerning Waste Water Quality Standards;</a></li> <li>• <a href="#">Ministry of Environment and Forestry Regulations PermenLHK P.38/MENLHK/SETJEN/KUM.1/7/2019 on Types of Activities that Needs to be Equipped with Environmental Impact Assessment</a></li> <li>• <a href="#">Ministry of Environment Regulations 16/2012 on Guidance to Develop Environmental Document (AMDAL, UKL-UPL and SPPL)</a></li> <li>• <a href="#">Ministry of Environment Regulation 8/2013 on Procedure for Assessment and Checking of Environmental</a></li> </ul>

		<p><a href="#">Document, as well as Environmental Permit Issuance.</a></p> <ul style="list-style-type: none"> <li>● <a href="#">Ministry of Environment and Forestry Regulation No. 4 Year 2021 on The List of Bussines and/or Activity that require EIA (AMDAL), UKL-UPL or SPPL</a></li> <li>● <a href="#">Ministry of Public Works Regulation 10/2008 on Types of Activities under Public Works Sector that Require UKL/UPL</a></li> <li>● <a href="#">Minister of Maritime Affairs and Fisheries Regulation Number 31/PERMEN-KP/2020 concerning Conservation Area Management;</a></li> <li>● <a href="#">Minister of Environment and Forestry Regulation Number 4 of 2021 concerning List of Businesses and/or Activities Required to Have Environmental Impact Analysis, Environmental Management Efforts and Environmental Monitoring Efforts or a Statement of Capability for Environmental Management and Monitoring;</a></li> <li>● <a href="#">Minister of Environment and Forestry Regulation Number 5 of 2021 concerning Procedures for Issuing Technical Approvals and Operational Feasibility Documents in the Field of Environmental Pollution Control;</a></li> <li>● <a href="#">Minister of Environment and Forestry Regulation Number 6 of 2021 concerning Procedures and Requirements for Management of Hazardous and Toxic Waste;</a></li> <li>● <a href="#">Regulation of the Minister of Maritime Affairs and Fisheries Number 26 of 2021 concerning Prevention of Pollution, Prevention of Damage, Rehabilitation and Improvement of Fish Resources and the Environment;</a></li> <li>● <a href="#">Minister of Maritime Affairs and Fisheries Regulation Number 28 of 2021 concerning Implementation of Marine Spatial Planning;</a></li> <li>● <a href="#">Minister of Public Works and Public Housing Regulation Number 10 of 2021 concerning Guidelines for Construction Safety Management Systems;</a></li> <li>● <a href="#">Minister of Environment Decree Number Kep-48/MENLH/11/1996 concerning Noise Level Standards.</a></li> <li>● <a href="#">Pekalongan City Regional Regulation (PERDA) Number 7 of 2020 in Amendment to Pekalongan City Regional Regulation Number 16 of 2012 concerning Waste Management;</a></li> <li>● <a href="#">Pekalongan City Regional Regulation Number 3 of 2010 concerning Environmental Protection and Management of Pekalongan City;</a></li> <li>● <a href="#">Pekalongan City Regional Regulation Number 9 of 2015 concerning Waste Water Management;</a></li> <li>● <a href="#">Pekalongan City Regional Spatial Planning for 2018-2038 (Pekalongan City Regional Gazette 2020 Number 9).</a></li> </ul>
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		<p><u>Office, which can only be obtained after approval for the KKPRL license from the Ministry of Marine Affairs and Fisheries. In principle, the UKL-UPL document has been acknowledged and agreed upon by the Province, but since the KKPRL document is still in process, official approval of the UKL-UPL is still pending. In addition, the UKL-UPL is the basis for the preparation of the ESIA document. Given that most of the social and environmental studies have been carried out in the UKL-UPL, the ESIA document complements the UKL-UPL document. The latest status of KKPRL licensing development is that a technical assessment has been carried out on the proposed KKPRL clearance and is currently waiting for the KKPRL license to be issued by the Ministry of Marine and Fishery affairs (KKP).</u></p>
<p><u>Access and Equity</u></p>	<p>=</p>	<p><u>The programme is designed to ensure fair allocation of access to the community, including in information dissemination. To further disseminate knowledge related to the programme, knowledge board will be built in community centre or community office; making it accessible to all community.</u></p> <p><u>Participatory approach employed by the programme will further ensure access and equity principle being undertaken during programme implementation.</u></p> <p><u>One issue being raised during FGD on Gender Issue conducted during the proposal development stage is workshops' and meetings' timing that should be done at night time to ensure women's group participation in the process. This issue will be taken into account when designing the relevant activities to ensure all groups have similar access to programme information and implementation process.</u></p> <p><u>Despite the effort in ensuring access and equity principle being carried out within the programme, there still a minor potential social risk that could arise during programme implementation.</u></p> <p><u>Further there is the potential of the emergence of local community jealousy regarding the utilization of local labor as construction workers. Opening of Business Opportunities and Increasing Community Income</u></p> <p><b><u>Potential risks:</u></b></p> <ol style="list-style-type: none"> <li><u>1. Social conflict arising from selection of community member that will be the implementer of adaptation actions, breakwater construction and alternative livelihood at community and city level implementation.</u></li> <li><u>2. Related to the breakwater construction in the kelurahan Kandang Panjang, potential conflict could arise from the community who are afraid that their land would be taken over because of the construction.</u></li> </ol> <p><u>Requirements and Managements:</u></p>

		<ul style="list-style-type: none"> <li>• <u>Stakeholder mapping as the basis for assessment on implementer selection, fair role and responsibilities among stakeholders, and also activities site location (including knowledge board location) that could benefit wider community</u></li> <li>• <u>Mitigation measures for the impacts are stated in the Environmental and Social Management Plan (Annex 7).</u></li> </ul>
<u>Marginalized and Vulnerable Groups</u>	=	<p><u>Vulnerable groups are the targeted beneficiaries of the programme. They will not only act as the passive actor within the programme, but also actively involved in the programme implementation.</u></p> <p><u>Meanwhile marginalized group was identified as not residing in the programme area. They live in the central and southern part of the city. So that they will not be the main focus under the programme, yet they will be the indirect beneficiaries of the programme.</u></p> <p><u>The proposed programme will employ participatory approach, particularly at local level, by involving women groups, most vulnerable groups and community representative from different socio-economic level during training, discussion forum and risk assessment process. The planned adaptation actions, breakwater construction and alternative livelihood also designed by taking into account their interests.</u></p> <p><u>However, there still a minor potential social risks that could arise during programme implementation.</u></p> <p><u>Potential risks:</u></p> <ul style="list-style-type: none"> <li>• <u>Social conflict arising from selection of priority activities site and design (at community and city level implementation) which could raise envy from other community member that will not directly exposed to the programme</u></li> </ul> <p><u>Requirements:</u></p> <ul style="list-style-type: none"> <li>• <u>Social impact assessment and management plan for the adaptation options will be integrated under UKL-UPL and SPPL document and will be submitted to the city agency.</u></li> <li>• <u>Social impact assessment and management plan will be in coherent with the Programme's ESMP</u></li> <li>• <u>Adaptation action design (the site location and structural design for hard structure) that take account the needs and suitability for elderly, children groups, and disable groups; to ensure they can experience the benefit</u></li> <li>• <u>Mitigation measures for the impacts are stated in the Environmental and Social Management Plan (Annex 7).</u></li> </ul>
<u>Human Rights</u>	<u>The proposed programme is intended to elevate the quality of life of the beneficiaries (including marginalized and vulnerable groups) by creating a better environment for them (physical, social and economic environment).</u>	<u>None</u>

	<p>Furthermore, The Republic of Indonesia has <a href="#">ratified The International Covenant on Economic, Social, and Cultural Rights into Law Number 11/2005 and International Covenant on Civil and Political Rights into Law Number 12/2005. The proposed programme will adhere to these laws and ensure that Human Rights principles are being carried out throughout the course of the programme.</a></p>	
<p><a href="#">Gender Equity and Women's Empowerment</a></p>	<ul style="list-style-type: none"> <li>• <a href="#">The Republic of Indonesia has ratified the Convention on the Elimination of All Forms against Women/CEDAW into Law Number 7/1984. Hence the proposed programme will comply with this law and also other applicable national law on Gender Equity and Justice.</a></li> <li>• <a href="#">Gender analysis had been done during proposal development stage and outlined this particular document</a></li> <li>• <a href="#">Women groups will be an active participant in the programme, where their representative will be selected as Community Working Group member.</a></li> <li>• <a href="#">The programme is designed so that trainings on economic livelihood will involve female participant; to ensure they will receive economic benefits from the actions</a></li> <li>• <a href="#">There is no risk that the husbands will object their wives new livelihood since it will support their household economy</a></li> </ul>	<ul style="list-style-type: none"> <li>• <a href="#">Gender assessment has been conducted independently by KEMITRAAN in 2017 in three provinces: Central Java [ Pekalongan City &amp; Kebumen], Central Kalimantan [Pulang Pisau] and Central Sulawesi [Donggala District].</a></li> <li>• <a href="#">The gender assessment result has been done with the four kabupaten/district in terms of enabling environment for gender equality, Pekalongan has the highest score 6.8 out of 10.</a></li> <li>• <a href="#">Gender score was particularly measured to budget commitment for women's empowerment, women's capacity building programs, and the number of women officials in the local civil service. These aspects are crucial to pursue climate resilience mechanism in the local development plan with gender sensitivity.</a></li> <li>• <a href="#">The programme will mainstream gender specialist to ensure the design and implementation covers all essential elements of gender equality. In the implementation, we will mainstream gender training to all partners to ensure adequate understanding of gender equality in all stages of implementation.</a></li> <li>• <a href="#">In terms of grievances for gender equality, we will establish the grievance mechanism in the program management policy</a></li> </ul>
<p><a href="#">Core Labour Rights</a></p>	<p>Relevant to labour rights, the nationally applicable regulations are as below:</p> <ul style="list-style-type: none"> <li>• <a href="#">Law No. 80 of 1957 concerning Ratification of ILO Convention No. 100 on Equal Remuneration for Men and Women Workers for Work of Equal Value</a></li> <li>• <a href="#">Law No. 7 of 1984 concerning Ratification of the Convention on the Elimination of All Forms of Discrimination Against Women;</a></li> <li>• <a href="#">Law No. 21 of 1999 concerning Ratification of ILO Convention No. 111 regarding Discrimination in Employment and Occupation.</a></li> <li>• <a href="#">Law No. 13 of 2003 on Manpower</a></li> </ul> <p>Accordingly, labour works done under this programme will adhere to the above laws.</p>	<p>Potential risks:</p> <p><a href="#">Related to the breakwater construction, following risk might occur in the surrounding area:</a></p> <ol style="list-style-type: none"> <li>1. <a href="#">Emergence of social conflict between construction workers and the surrounding community.</a></li> <li>2. <a href="#">Emergence of local community jealousy regarding the utilization of local labor as construction workers.</a></li> <li>3. <a href="#">Work Health and Safety Disturbances</a></li> </ol> <p>Requirements and Managements:</p> <ul style="list-style-type: none"> <li>• <a href="#">Prioritize project workforce from local residents</a></li> </ul>

	<p><u>including payment issue. Additionally, the programme will also ensure that it will comply with ILO Convention No. 138 and 182 on Child Labour, by assuring that there will be no child labour involved in the programme.</u></p> <p><u>The programme will not pose any risk on labour rights since it will equip the community member with additional skills.</u></p>	<ul style="list-style-type: none"> <li>• <u>Carry out a social approach to the community in the Kandang Panjang sub-district, North Pekalongan sub-district, Pekalongan City and surrounding areas to accommodate the aspirations and opinions accommodated by representatives of the affected communities</u></li> <li>• <u>Provide Operational Safety and Health (OSH) SOP Construction complies with OSH Construction standards</u></li> <li>• <u>Provide complete and adequate PPE to serve all workers and guests who have an interest in construction activities</u></li> </ul>
<u>Indigenous Peoples</u>	<p><u>Community resides within the geographical scope of the proposed programme came from similar ethnicity, and has a well-established social norm. Accordingly, there is no risk related to indigenous people for this proposed programme</u></p>	None
<u>Involuntary Resettlement</u>	<p><u>Resettlement for community who resides in permanently inundated area is issue that had been raised in the past, but put on hold due to local government budget constraint.</u></p> <p><u>During the full proposal development stage it has been agreed with the city stakeholders (including government and community) that resettlement will not be a part of the proposed adaptation actions. Hence there is no risk of involuntary resettlement for the programme.</u></p>	<p><u>No involuntary resettlements are expected, since the breakwater is far from settlement areas</u></p>
<u>Protection of Natural Habitats</u>	-	<p><u>As a coastal area, protection of natural habitat is essential to be taken throughout the course of the programme. Mangrove, the natural habitat for fish and shell fish, has been the green belt for Pekalongan City shoreline for the past decade, protecting the area to a certain extent from sea-related risk. However, mangrove condition in the area has been degraded in the past years.</u></p> <p><u>Risks posed to natural habitats from the implementation of the breakwater will be among the content of potential impacts outlined in the UKL-UPL and SPPL document of each action.</u></p> <p><u>Maintaining the Preservation of Natural Resources and Sustainability and Protection of Pekalongan City Coastal Areas</u></p> <p><u>Recovery of Coastal Ecosystems and Mangrove Forests</u></p> <p><u>Potential risks:</u>  <u>Minor natural habitat disruption from aquaculture preparation activity, mangrove restoration process, as well as mobilization and construction process of breakwater, eco-tourism site and communal sanitation facilities.</u></p> <p><u>Requirements:</u></p> <ul style="list-style-type: none"> <li>• <u>Submitting the relevant environmental document for each adaptation action to obtain environmental permit for its implementation. The needed documents are:</u> <ul style="list-style-type: none"> <li>○ <u>Individual and communal sanitation facilities (latrine): SPPL document</u></li> </ul> </li> </ul>

		<ul style="list-style-type: none"> <li>○ <a href="#">Aquaculture: UKL-UPL document</a></li> <li>○ <a href="#">Breakwater construction: UKL-UPL document</a></li> <li>○ <a href="#">Eco-tourism: UKL-UPL document</a></li> <li>● <a href="#">The environmental document will be in coherent with the programme's ESMP</a></li> <li>● <a href="#">Prepare the necessary environmental management plan for each activity listed in ESMP.</a></li> <li>● <a href="#">Mitigation measures for the impacts are stated in the Environmental and Social Management Plan (Annex 7).</a></li> <li>● <a href="#">carry out prevention activities against forest disturbances, including theft/illegal logging, forest encroachment, pest and disease control and protection of protected species of natural animals and plants and their habitats</a></li> <li>● <a href="#">Maintaining the amount planted and encouraging the growth of mangrove vegetation</a></li> <li>● <a href="#">Improving the physical properties of the soil by hydrating or loosening the soil.</a></li> <li>● <a href="#">Replant dead plants and replace them with similar plants</a></li> </ul>
<p><a href="#">Conservation of Biological Diversity</a></p>	<p>-</p>	<p><a href="#">Coastal resilience aimed by this proposed programme is not only focusing on human resilience, but also considering the corresponding biodiversity.</a></p> <p><a href="#">Potential risks:</a></p> <ul style="list-style-type: none"> <li>● <a href="#">Minor environmental and ecological disruption from the construction of breakwater, mangrove belt, eco-tourism site and communal sanitation facilities; and alteration of resource management (introduction of shrimp and fish species to body of water and introduction of new mangrove species to the environment)</a></li> </ul> <p><a href="#">Requirements:</a></p> <ul style="list-style-type: none"> <li>● <a href="#">Submitting the relevant environmental document for each adaptation action to obtain environmental permit for its implementation. The needed documents are</a> <ul style="list-style-type: none"> <li>○ <a href="#">Individual and communal sanitation facilities (latrine): SPPL document</a></li> <li>○ <a href="#">Aquaculture: UKL-UPL document.</a> <a href="#">The document content will include the potential impact from the introduction of Bandeng fish to a new environment and how it will interact.</a></li> <li>○ <a href="#">Breakwater construction: UKL-UPL document</a></li> <li>○ <a href="#">Eco-tourism: UKL-UPL document</a></li> </ul> </li> <li>● <a href="#">The environmental document will be in coherent with the programme's ESMP</a></li> <li>● <a href="#">Prepare the necessary environmental management plan for each activity listed in ESMP, including the impact from mangrove restoration activity.</a></li> <li>● <a href="#">Mitigation measures for the impacts are stated in the Environmental and Social Management Plan (Annex 7).</a></li> <li>● <a href="#">The programme will ensure the compliance to applicable laws and regulations on biodiversity conservation, including Ministry of Marine and Fisheries Regulation No. 16</a></li> </ul>

		<p><u>Year 2008 on Management Plan of Coastal Area and Small Islands and other</u></p> <ul style="list-style-type: none"> <li>• <u>Identification of land-ownership in the targeted mangrove restoration site.</u></li> <li>• <u>Involvement of the private land owners in relevant workshops at community level</u></li> </ul>
<u>Climate Change</u>	<u>Activities under the proposed programme will not significantly contribute to the increase of greenhouse gas emission or other climate change drivers</u>	<p>Potential risk:</p> <ul style="list-style-type: none"> <li>• <u>Increased levels of SO<sub>x</sub>, NO<sub>x</sub>, CO, CO<sub>x</sub>, and Pb Emissions and dust particles</u></li> </ul> <p>Requirements:</p> <ul style="list-style-type: none"> <li>• <u>Regularly sprinkling equipment and/or material transportation routes with water, especially during the dry season around residential areas people passing through.</u></li> <li>• <u>Using a vehicle fit for operation:</u></li> <li>• <u>Cover the vehicle bed with a tarpaulin to cover cargo that is at risk of falling when transporting equipment and/or materials</u></li> </ul>
<u>Pollution Prevention and Resource Efficiency</u>	=	<p>Potential risks:</p> <ul style="list-style-type: none"> <li>• <u>Water pollution from the construction and implementation of breakwater, eco-tourism site, mangrove belt and sanitation facilities and sanitation facilities' effluent (both floating and non-floating design)</u></li> <li>• <u>Decreased Ambient Air Quality and increased dust</u></li> <li>• <u>Increased effects of noise exposure from vehicles transporting equipment &amp; materials &gt; 55 dBA</u></li> <li>• <u>Increased Waste Generation</u></li> <li>• <u>Solid waste generation in small/medium cities is estimated at 0.3 -0.4 kg/person/day. Thus, the generation of solid waste during breakwater construction activities is 4 kg/day</u> Benchmark: SNI 19-3964-1995</li> <li>• <u>Generation of hazardous waste</u></li> <li>• <u>Wastewater generation is equal to</u></li> </ul> <p>Requirements:</p> <ul style="list-style-type: none"> <li>• <u>Submitting the relevant environmental document for each adaptation action to obtain environmental permit for its implementation. The needed documents are</u> <ul style="list-style-type: none"> <li>○ <u>Individual and communal sanitation facilities (latrine): SPPL document</u></li> <li>○ <u>Aquaculture: UKL-UPL document</u></li> <li>○ <u>Breakwater construction: UKL-UPL document</u></li> <li>○ <u>Eco-tourism: UKL-UPL document</u></li> </ul> </li> <li>• <u>The environmental document will be in coherent with the programme's ESMP</u></li> <li>• <u>Prepare the necessary environmental management plan for each activity listed in ESMP.</u></li> <li>• <u>Mitigation measures for the impacts are stated in the Measures for Environmental and Social Risk Management (Annex 7).</u></li> <li>• <u>Regularly sprinkling equipment and/or material transportation routes with water, especially during the dry season around residential areas people passing through</u></li> <li>• <u>Providing a place to dispose of waste materials and waste</u></li> </ul>

		<ul style="list-style-type: none"> <li>• <u>equipment so that waste does not scatter and endanger workers</u></li> <li>• <u>Providing adequate and safe containers for hazardous waste;</u></li> <li>• <u>Deposit hazardous waste to third party/vendor for disposal</u></li> <li>• <u>Providing portable toilets at the basecamp location</u></li> <li>• <u>Maintaining the cleanliness of the basecamp environment</u></li> <li>• <u>Suctioning black water waste in collaboration with a third party</u></li> </ul>
<u>Public Health</u>	<u>There is no risk to public health from the programme. The programme activities will continually be ensured for not placing community's health and safety in dangerous state by adhering to the relevant applicable laws and regulations</u>	None
<u>Physical and Cultural Heritage</u>	<u>There is no risk to physical and cultural heritage from the programme since there is no physical and cultural heritage located within the geographical scope of the proposed programme.</u>	None
<u>Lands and Soil Conservation</u>	-	<p><u>Inundation from coastal flooding in the targeted programme area has resulted in adverse impact, transforming productive land into unproductive one. This proposed programme aims to reduce the inundated area, preventing them from turning into unproductive land by implementing diverse adaptation measures.</u></p> <p><u>Potential risks:</u></p> <ul style="list-style-type: none"> <li>• <u>Soil pollution the construction of breakwater, eco-tourism site, and sanitation facilities and effluent of sanitation facilities that apply non-floating design</u></li> <li>• <u>The noise level for the Green Open Space designation is based on Minister of Environment Decree No. KEP-48/MENLH/11/1996 concerning Noise Level Standards does not exceed 55dBA</u></li> </ul> <p><u>Requirements:</u></p> <ul style="list-style-type: none"> <li>• <u>Submitting the relevant environmental document for each adaptation action to obtain environmental permit for its implementation. The needed documents are</u> <ul style="list-style-type: none"> <li>○ <u>Individual and communal sanitation facilities (latrine): SPPL document</u></li> <li>○ <u>Breakwater construction: UKL-UPL document</u></li> <li>○ <u>Eco-tourism: UKL-UPL document</u></li> </ul> </li> <li>• <u>The environmental document will be coherent with the programme's ESMP</u></li> <li>• <u>Prepare the necessary environmental management plan for each activity listed in ESMP.</u></li> <li>• <u>Mitigation measures for the impacts are stated in the Measures for Environmental and Social Risk Management (Annex 7).</u></li> <li>• <u>Equipment and material mobilization vehicles do not use units that produce high noise.</u></li> <li>• <u>The location plan uses land that is already available so there is not much land clearing.</u></li> <li>• <u>Land cleaning does not use units that produce high noise.</u></li> </ul>



		<ul style="list-style-type: none"> <li>Organize and supervise workers so as not to create noise with limited working hours from 08.00 to 16.00.</li> <li>Benchmark: Minister of Environment Decree No. 48 1996 concerning Standard Levels Noise.</li> <li>Quality Standard is 55 dBA</li> </ul>
<p><b>Checklist of environmental and social principles</b></p>	<p><b>No further assessment required for compliance</b></p>	<p><b>Potential impacts and risks – further assessment and management required for compliance</b></p>
<p><i>Compliance with the Law</i></p>	<p>-</p>	<p>The programme is designed in compliance with all applicable national, regional and local law, including:</p> <ul style="list-style-type: none"> <li>Law 32/2009 on Environmental Protection and Management</li> <li>Government Regulation 27/2012 on Environmental Permit and Environmental Impact Assessment</li> <li>Ministry of Environment Regulations 5/2012 on Types of Activities that Needs to be Equipped with Environmental Impact Assessment</li> <li>Ministry of Environment Regulations 16/2012 on Guidance to Develop Environmental Document (AMDAL, UKL-UPL and SPPL)</li> <li>Ministry of Environment Regulation 8/2013 on Procedure for Assessment and Checking of Environmental Document, as well as Environmental Permit Issuance</li> <li>Ministry of Public Works Regulation 10/2008 on Types of Activities under Public Works Sector that Require UKL/UPL</li> </ul> <p>According to the above mentioned regulations, EIA is not compulsory for the selected adaptation actions under the programme; however the following environmental documents should be submitted prior to the implementation of specific adaptation actions so that environmental permit can be issued by the city government:</p> <ul style="list-style-type: none"> <li>Individual and communal sanitation facilities (latrine): SPPL document</li> <li>Aquaculture: UKL-UPL document</li> <li>Breakwater construction: UKL-UPL document</li> <li>Eco-tourism: UKL-UPL document</li> </ul> <p>Every 6 months, regular monitoring will be required for activities that need UKL-UPL, and the report will be submitted to the City's Environmental Agency. The report content itself is outlined in Ministry of Environment Regulation No. 16/2012.</p> <p>Meanwhile based on the abovementioned regulations, mangrove restoration activity does not need to be equipped with environmental document. Yet, the PMU will ensure mangrove restoration activity and other activities under the programme will prevent negative impacts to the surrounding environment by implementing ESMP and adhering to the applicable regulations</p>

		<p><u>Potential risks:</u> Disruption of physical environment from mobilization, construction and implementation of adaptation actions-</p> <p><u>Requirements and Managements:</u></p> <ul style="list-style-type: none"> <li>● Prepare the required environmental documents prior to the implementation of adaptation actions-</li> <li>● The environmental document will be in coherent with the programme's ESMP-</li> <li>● Prepare the necessary environmental management plan for each activity listed in ESMP.-</li> <li>● Mitigation measures for the impacts are stated in the Environmental and Social Management Plan (Annex 7)-</li> </ul>
<p><i>Access and Equity</i></p>	<p>-</p>	<p>The programme is designed to ensure fair allocation of access to the community, including in information dissemination. To further disseminate knowledge related to the programme, knowledge board will be built in community centre or community office; making it accessible to all community.</p> <p>Participatory approach employed by the programme will further ensure access and equity principle being undertaken during programme implementation-</p> <p>One issue being raised during FGD on Gender Issue conducted during the proposal development stage is workshops' and meetings' timing that should be done at night time to ensure women's group participation in the process. This issue will be taken into account when designing the relevant activities to ensure all groups have similar access to programme information and implementation process.</p> <p>Despite the effort in ensuring access and equity principle being carried out within the programme, there still a minor potential social risks that could arise during programme implementation.</p> <p><u>Potential risks:</u> Social conflict arising from selection of community member that will be the implementer of adaptation actions and alternative livelihood at community and city level implementation.</p> <p><u>Requirements and Managements:</u></p> <ul style="list-style-type: none"> <li>● Stakeholder mapping as the basis for assessment on implementer selection, fair role and responsibilities among stakeholders, and also activities site location (including knowledge board location) that could benefit wider community</li> <li>● Mitigation measures for the impacts are stated in the Environmental and Social Management Plan (Annex 7)-</li> </ul> <p>-</p>
<p><i>Marginalized and Vulnerable Groups</i></p>	<p>-</p>	<p>Vulnerable groups are the targeted beneficiaries of the programme. They will not only act as the passive actor within the programme, but also actively involved in the programme implementation.</p> <p>Meanwhile marginalized group was identified as not residing in the programme area. They live in-</p>

		<p>the central and southern part of the city. So that they will not be the main focus under the programme, yet they will be the indirect beneficiaries of the programme.</p> <p>The proposed programme will employ participatory approach, particularly at local level, by involving women groups, most vulnerable groups and community representative from different socio-economic level during training, discussion forum and risk assessment process. The planned adaptation actions and alternative livelihood also designed by taking into account their interests.</p> <p>However, there still a minor potential social risks that could arise during programme implementation.</p> <p><u>Potential risks:</u></p> <ul style="list-style-type: none"> <li>• Social conflict arising from selection of priority activities site and design (at community and city level implementation) which could raise envy from other community member that will not directly exposed to the programme</li> </ul> <p><u>Requirements:</u></p> <ul style="list-style-type: none"> <li>• Social impact assessment and management plan for the adaptation options will be integrated under UKL-UPL and SPPL document and will be submitted to the city agency.</li> <li>• Social impact assessment and management plan will be in coherent with the Programme's ESMP</li> <li>• Adaptation action design (the site location and structural design for hard structure) that take account the needs and suitability for elderly, children groups, and disable groups; to ensure they can experience the benefit</li> <li>• Mitigation measures for the impacts are stated in the Environmental and Social Management Plan (Annex 7).</li> </ul>
<i>Human Rights</i>	<p>The proposed programme is intended to elevate the quality of life of the beneficiaries (including marginalized and vulnerable groups) by creating a better environment for them (physical, social and economic environment).</p> <p>Furthermore, The Republic of Indonesia has ratified The International Covenant on Economic, Social, and Cultural Rights into Law Number 11/2005 and International Covenant on Civil and Political Rights into Law Number 12/2005. The proposed programme will adhere to these laws and ensure that Human Rights principles are being carried out throughout the course of the programme.</p>	None
<i>Gender Equity and Women's Empowerment</i>	<ul style="list-style-type: none"> <li>• The Republic of Indonesia has ratified the Convention on the Elimination of All Forms against Women/CEDAW into Law Number 7/1984. Hence the proposed programme will comply with this law and also other applicable national law on Gender Equity and Justice.</li> </ul>	<ul style="list-style-type: none"> <li>• Gender assessment has been conducted independently by KEMITRAAN in 2017 in three provinces: Central Java [ Pekalongan City &amp; Kebumen], Central Kalimantan [Pulang Pisau] and Central Sulawesi [Donggala District].</li> </ul>

	<ul style="list-style-type: none"> <li>● Gender analysis had been done during proposal development stage and outlined this particular document</li> <li>● Women groups will be an active participant in the programme, where their representative will be selected as Community Working Group member.</li> <li>● The programme is designed so that trainings on economic livelihood will involve female participant; to ensure they will receive economic benefits from the actions</li> <li>● There is no risk that the husbands will object their wives new livelihood since it will support their household economy</li> </ul>	<ul style="list-style-type: none"> <li>● The gender assessment result has been done with the four kabupaten/district in terms of enabling environment for gender equality, Pekalongan has the highest score 6.8 out of 10.</li> <li>● Gender score was particularly measured to budget commitment for women's empowerment, women's capacity building programs, and the number of women officials in the local civil service. These aspects are crucial to pursue climate resilience mechanism in the local development plan with gender sensitivity.</li> <li>● The programme will mainstream gender specialist to ensure the design and implementation covers all essential elements of gender equality. In the implementation, we will mainstream gender training to all partners to ensure adequate understanding of gender equality in all stages of implementation.</li> <li>● In terms of grievances for gender equality, we will establish the grievance mechanism in the program management policy</li> </ul>
<p><i>Core Labour Rights</i></p>	<p>Relevant to labour rights, the nationally applicable regulations are as below:</p> <ul style="list-style-type: none"> <li>● Law No. 80 of 1957 concerning Ratification of ILO Convention No. 100 on Equal Remuneration for Men and Women Workers for Work of Equal Value</li> <li>● Law No. 7 of 1984 concerning Ratification of the Convention on the Elimination of All Forms of Discrimination Against Women;</li> <li>● Law No. 21 of 1999 concerning Ratification of ILO Convention No. 111 regarding Discrimination in Employment and Occupation.</li> <li>● Law No. 13 of 2003 on Manpower</li> </ul> <p>Accordingly, labour works done under this programme will adhere to the above laws, including payment issue. Additionally, the programme will also ensure that it will comply with ILO Convention No. 138 and 182 on Child Labour, by assuring that there will be no child labour involved in the programme.</p> <p>The programme will not pose any risk on labour rights since it will equip the community member with additional skills.</p>	<p>None</p>
<p><i>Indigenous Peoples</i></p>	<p>Community resides within the geographical scope of the proposed programme came from similar ethnicity, and has a well-established social norm. Accordingly, there is no risk related to indigenous people for this proposed programme</p>	<p>None</p>

<p><i>Involuntary Resettlement</i></p>	<p>Resettlement for community who resides in permanently inundated area is issue that had been raised in the past, but put on hold due to local government budget constraint.</p> <p>During the full proposal development stage it has been agreed with the city stakeholders (including government and community) that resettlement will not be a part of the proposed adaptation actions. Hence there is no risk of involuntary resettlement for the programme.</p>	<p>None</p>
<p><i>Protection of Natural Habitats</i></p>	<p>-</p>	<p>As a coastal area, protection of natural habitat is essential to be taken throughout the course of the programme. Mangrove, the natural habitat for fish and shell fish, has been the green belt for Pekalongan City shoreline for the past decade, protecting the area to a certain extent from sea-related risk. However, mangrove condition in the area has been degraded in the past years.</p> <p>Risks posed to natural habitats from the implementation of will be among the content of potential impacts outlined in the UKL-UPL and SPPL document of each action</p> <p><u>Potential risks:</u> Minor natural habitat disruption from aquaculture preparation activity, mangrove restoration process, as well as mobilization and construction process of breakwater, eco-tourism site and communal sanitation facilities</p> <p><u>Requirements:</u></p> <ul style="list-style-type: none"> <li>● Submitting the relevant environmental document for each adaptation action to obtain environmental permit for its implementation. The needed documents are:             <ul style="list-style-type: none"> <li>○ Individual and communal sanitation facilities (latrine): SPPL document</li> <li>○ Aquaculture: UKL-UPL document</li> <li>○ Breakwater construction: UKL-UPL document</li> <li>○ Eco-tourism: UKL-UPL document</li> </ul> </li> <li>● The environmental document will be in coherent with the programme's ESMP.</li> <li>● Prepare the necessary environmental management plan for each activity listed in ESMP.</li> <li>● Mitigation measures for the impacts are stated in the Environmental and Social Management Plan (Annex 7).</li> </ul>
<p><i>Conservation of Biological Diversity</i></p>	<p>-</p>	<p>Coastal resilience aimed by this proposed programme is not only focusing on human resilience, but also considering the corresponding biodiversity.</p> <p><u>Potential risks:</u></p> <ul style="list-style-type: none"> <li>● Minor environmental and ecological disruption from the construction of geo-tube, mangrove belt, eco-tourism site and communal sanitation facilities; and alteration of resource management (introduction of shrimp and fish species to body of water and introduction of new mangrove species to the environment)</li> <li>● The targeted mangrove restoration site might be privately owned, and there is a</li> </ul>

		<p>potential that the land owner reluctant to donate their land for the activity</p> <p><u>Requirements:</u></p> <ul style="list-style-type: none"> <li>● Submitting the relevant environmental document for each adaptation action to obtain environmental permit for its implementation. The needed documents are <ul style="list-style-type: none"> <li>○ Individual and communal sanitation facilities (latrine): SPPL document</li> <li>○ Aquaculture: UKL-UPL document. The document content will include the potential impact from the introduction of Bandeng fish to a new environment and how it will interact.</li> <li>○ Breakwater construction: UKL-UPL document</li> <li>○ Eco-tourism: UKL-UPL document</li> </ul> </li> <li>● The environmental document will be in coherent with the programme's ESMP.</li> <li>● Prepare the necessary environmental management plan for each activity listed in ESMP, including the impact from mangrove restoration activity.</li> <li>● Mitigation measures for the impacts are stated in the Environmental and Social Management Plan (Annex 7).</li> <li>● The programme will ensure the compliance to applicable laws and regulations on biodiversity conservation, including Ministry of Marine and Fisheries Regulation No. 16 Year 2008 on Management Plan of Coastal Area and Small Islands and other.</li> <li>● Identification of land ownership in the targeted mangrove restoration site. Involvement of the private land owners in relevant workshops at community level.</li> </ul>
<p><i>Climate Change</i></p>	<p>Activities under the proposed programme will not significantly contribute to the increase of greenhouse gas emission or other climate change drivers</p>	<p>None</p>
<p><i>Pollution Prevention and Resource Efficiency</i></p>	<p>-</p>	<p><u>Potential risks:</u></p> <ul style="list-style-type: none"> <li>● Water pollution from the construction and implementation of breakwater, eco-tourism site, mangrove belt and sanitation facilities and sanitation facilities' effluent (both floating and non-floating design)</li> </ul> <p><u>Requirements:</u></p> <ul style="list-style-type: none"> <li>● Submitting the relevant environmental document for each adaptation action to obtain environmental permit for its implementation. The needed documents are <ul style="list-style-type: none"> <li>○ Individual and communal sanitation facilities (latrine): SPPL document</li> <li>○ Aquaculture: UKL-UPL document</li> <li>○ Breakwater construction: UKL-UPL document</li> <li>○ Eco-tourism: UKL-UPL document</li> </ul> </li> <li>● The environmental document will be in coherent with the programme's ESMP.</li> <li>● Prepare the necessary environmental management plan for each activity listed in ESMP.</li> </ul>

		<ul style="list-style-type: none"> <li>Mitigation measures for the impacts are stated in the Measures for Environmental and Social Risk Management (Annex 7).</li> </ul>
<i>Public Health</i>	There is no risk to public health from the programme. The programme activities will continually be ensured for not placing community's health and safety in dangerous state by adhering to the relevant applicable laws and regulations	None
<i>Physical and Cultural Heritage</i>	There is no risk to physical and cultural heritage from the programme since there is no physical and cultural heritage located within the geographical scope of the proposed programme.	None-
<i>Lands and Soil Conservation</i>	-	<p>Inundation from coastal flooding in the targeted programme area has resulted in adverse impact, transforming productive land into unproductive one. This proposed programme aims to reduce the inundated area, preventing them from turning into unproductive land by implementing diverse adaptation measures.</p> <p><u>Potential risks:</u></p> <ul style="list-style-type: none"> <li>Soil pollution the construction of geo-tube, eco-tourism site, and sanitation facilities and effluent of sanitation facilities that apply non-floating design-</li> </ul> <p><u>Requirements:</u></p> <ul style="list-style-type: none"> <li>Submitting the relevant environmental document for each adaptation action to obtain environmental permit for its implementation. The needed documents are             <ul style="list-style-type: none"> <li>Individual and communal sanitation facilities (latrine): SPPL document</li> <li>Breakwater construction: UKL-UPL document</li> <li>Eco-tourism: UKL-UPL document</li> </ul> </li> <li>The environmental document will be coherent with the programme's ESMP</li> <li>Prepare the necessary environmental management plan for each activity listed in ESMP.</li> <li>Mitigation measures for the impacts are stated in the Measures for Environmental and Social Risk Management (Annex 7).</li> </ul>

461-159. Based on the assessment above, it can be seen that the programme implementation has several potential risks that are considered as minor, small scale (limited impacts and not widely spread) and easily mitigated. These risks can be avoided by implementing adequate mitigation measures. With regards to Risk Categorization of AF, the programme can be categorized as “**Category B**” where it has potential adverse impacts but in small number, small scale, not widespread and easily mitigated. Annex 7 describes the risk management measures of this project in detail.

462-160. In this proposal, the mitigating measures has been incorporated into Environmental and Social and Management Plan (Annex 1) that will be implemented and utilised by the programme to mitigate the potential risks and also ensure the compliance of programme implementation to AF Environmental and Social Policy.



## Part iii: IMPLEMENTATION ARRANGEMENT

### P.L. Describe the arrangements for project / programme implementation

~~163,161.~~ Institutional structure and arrangement for the program is developed by considering that it will be implemented in an interconnected manner at 4 (four) different government levels (*kelurahan*, municipality, provincial and national). Accordingly, the institutional structure should allow an effective coordination and communication.

~~164. —KEMITRAAN as the National Implementing Entity will act as the Executing Entity in this program, and will be responsible in developing the PMU and assisting them in managing and implementing the program, some parts in partnership with local stakeholders as listed below. To implement the program, adequate arrangements have been made to provide for clear separation of implementing and executing functions and responsibilities through the establishment of a Project Management Unit (PMU), including those of monitoring and evaluation, supervision and reporting. The PMU has the main responsibility of managing and implementing different components under the proposed program and ensuring the implementation is in line with the program frameworks, including its targeted goal and objectives. Accordingly, the PMU will be located under KEMITRAAN. Kemitraan as the National Implementing Entity will act as the Executing Entity in this program, and will be responsible in developing the PMU and assisting them in managing and implementing the program, some parts in partnership with local stakeholders as listed below. To implement the program, a Project Management Unit (PMU) will be established with main responsibility of managing and implementing different component under the proposed program and ensuring the implementation is in line with the program frameworks, including its targeted goal and objectives. Accordingly, the PMU will be located under Kemitraan.~~

~~162.~~

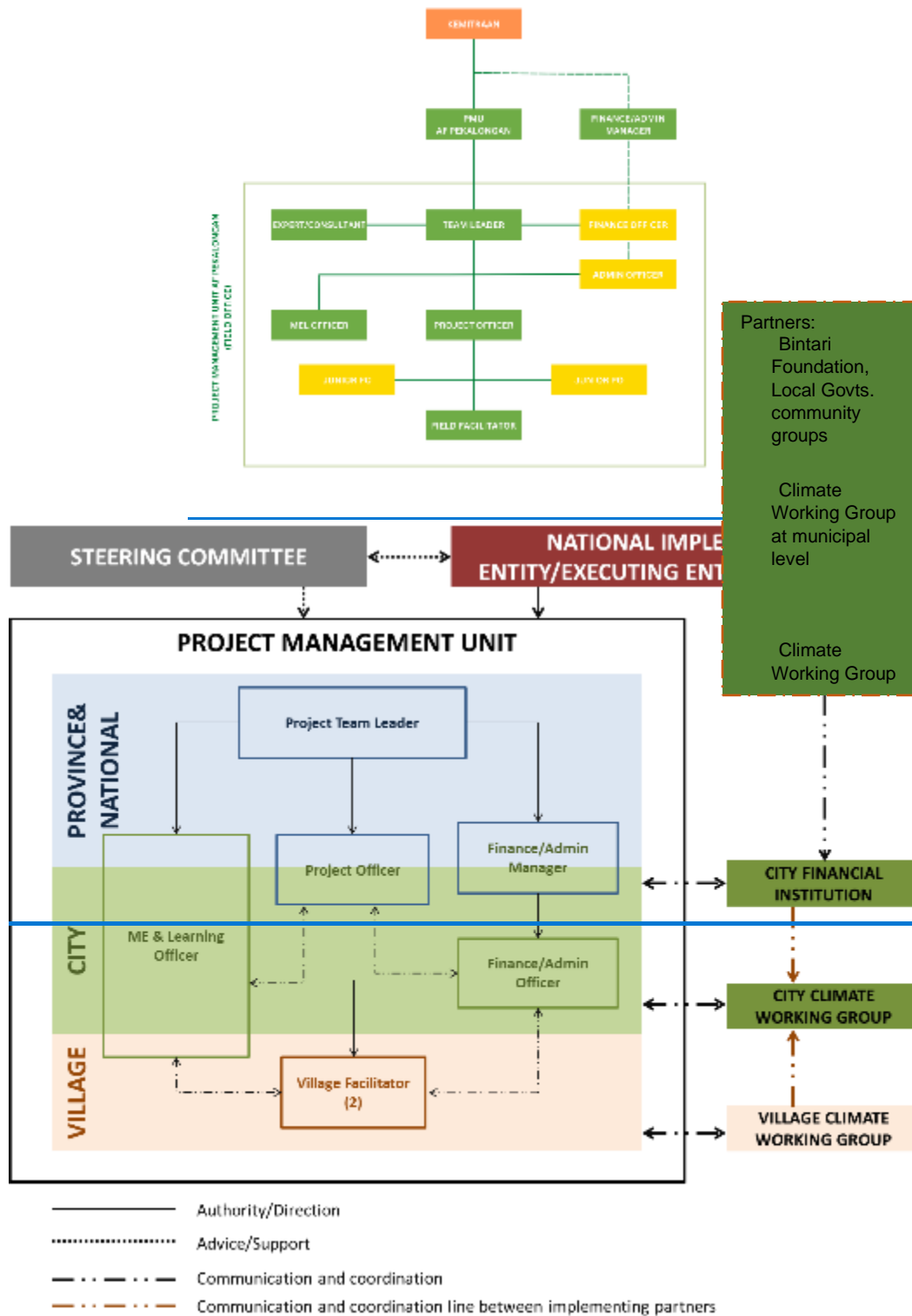
~~163. KEMITRAAN will ensure that detailed and specific steps will be in place to involve Pekalongan City's government as co-executing entities for the execution of the components of the adaptation project to ensure that national ownership is achieved, and that those detailed and specific steps shall be described in the cooperative agreements between KEMITRAAN and related offices (9 municipal offices).~~

~~164. KEMITRAAN demonstrates that it has the capacity to execute all the components of the Pekalongan City project based on its fiduciary eligibility. KEMITRAAN applies robust financial control mechanisms and procedures that are acknowledge by various international organisations.~~

165. The key programme partners to be involved in Pekalongan City include the following:

- Bappeda (Municipal Development Planning Office);
- Municipal Office of Environment;
- Municipal Office of Marine and Fishery;
- Municipal Office of Public Works and Spatial Planning;
- Municipal Office of Sanitary;
- Municipal Office of Tourism;
- Municipal Office of Education and Culture;
- University of Pekalongan;
- Polytechnics of Pekalongan (Batik and Islamic Polytechnics of Pekalongan);
- Various CSOs as listed in the above table 4.

166. Following diagram describe the structure of the PMU for the implementation of the project:



**Figure 4720. Institutional Structure of the Programme**

167. The Steering Committee (SC) will oversee the whole program implementation to ensure that the means and mechanisms are in place to run the program effectively to be able to achieve the desired outcomes, while also representing the voice of stakeholders that do not directly sit on the committee. They will provide high level technical and management guidance to the NIE and PMU for program implementation, including guidance on policy advocacy process at national level. Member of the SC will encompass representatives from National government, Province, Government, City Government, *Kelurahan* Government, Academicians and Civil Society Organizations.
168. The Project Team Leader will have the authority to run the project on a day-to-day basis on behalf of Kemitraan, reporting to the Director and Executive Director, within the constraints laid down by the SC. The Team Leader's prime responsibility will be to ensure that the project produces the results specified in the project document, to the required standard of quality and within the specified constraints of time and cost. The Project Support role includes project officer, finance/admin officer, ME & Learning Officer, and technical support to the Project Leader, as and when required.

### **Q.M. Describe the measures for financial and project / programme risk management**

169. Kemitraan has managed financial measures through on-going refinement of financial management policies. Several financial risks have been anticipated such as misuse of funds in Fraud Anti-Corruption, Fraud and Whistle Blower Policy 2015, Conflict of Interest in the Employee Handbook, and asset lost and damages in Chapter 4.11 SOP General Service Asset lost and Damage, while there is no measures for poor investment since Kemitraan has no investment funds.
170. Our internal control system has used online Project Tracking System through integrated Monitoring & Evaluation Learning system. While at the organization level, the internal control system has been managed through existing Internal Auditor that directly reports to Executive Board that oversees the use of finance and operations.
171. Besides that, all risks in project implementation are analyzed during the design phase with the participation of all relevant stakeholders. A mitigation strategy is established to ensure that the risk is well managed. The table below presents the types of risks, description of risk and risk level and the strategies that have been and will be done to minimize them. Potential risks are identified below, along with proposed countermeasures.

Type of Risk	Description of Risk	Risk category (H/M/L)	Risk Mitigation Strategy
Institutional	Weak commitment built by project implementers with central/provincial/local government due to changes in government structure and lack of coordination and communication.	Medium	This project has a specific work component of community strengthening for groups that have been strengthened by Partnership since 2017 at the city level.  The change of government structure has been anticipated by strong communication with regional secretariat (Sekda) and Planning Agency (Bappeda).  To ensure project achievement will be achieved, the PMU will continue to build active coordination and communication with the provincial and central government.
	Changes in project personnel can affect the availability of qualified staff	Low	In establishing working relationships with the PMU, the Consortium implements a recruitment system with output of work contracts during the project. With this

Type of Risk	Description of Risk	Risk category (H/M/L)	Risk Mitigation Strategy
			mechanism, the personnel is attached with the project goal.
Financial	Delays in disbursement of funds, procurement and institutional efficiency (long approval process and others) that delay project implementation.	Medium	Building active communication with AF and fulfilling all forms of financial procedures in budget disbursement.
Social	Lack of community (direct beneficiaries) support to the project	Medium	<ul style="list-style-type: none"> <li>Building good relationships with local government (<i>kelurahan</i> level), community and the community leaders (direct beneficiaries) before the project starts</li> <li>The formation of groups at the <i>kelurahan</i> level can gather all people/levels that are in target community</li> <li>Utilization of activities in the form of training/workshops/group discussions to provide understanding of the project</li> </ul>
	Communities are less aware of climate change and have lack of enthusiasm to respond to disasters. If beneficiaries are not fully aware of the impacts of climate change, it is difficult to gain their commitment in urban farming development and climate change adaptation	Low	This project will implement and introduce participatory methods to the communities so that they can be provided with understanding on the impacts of climate change. In addition, the mentoring process will be undertaken at the <i>kelurahan</i> level by utilizing field facilitators in each of the project target <i>kelurahan</i> .
	Conflict of community interest in selection of location	Medium	This project will build trust with stakeholders in the utilization of land to be used for urban farming, latrines and eco-tourism.
	Low technical knowledge of urban farming and eco-tourism	Low	This project will provide technical support to project beneficiaries in urban farming and eco-tourism.

**R.N. Describe the measures for environmental and social risk management, in line with the Environmental and Social Policy of the Adaptation Fund**

172. Please refer to Annex 7 of this document, in which a table summarizes the potential environmental and social risks that could arise from the program and the corresponding mitigation measures.

173. From the beginning of the program period, the stakeholders will be informed on the potential risks associated with the program and the corresponding mitigation measures in place. The program's Environmental and Social Management Plan/ESMP (described in a more detailed manner in Annex 1) will be communicated to them; not only during the program preparation phase, but also throughout the course of the program, to ensure all parties involved are aware of the risks and the appropriate mitigation measures.

174. As part of the program implementation, the PMU will also set up grievance mechanism for the stakeholders involved. This mechanism is needed to ensure the program always in line with AF's ESMP that promote environmental and social safeguard and also ensure that it always in line with community's interest and met their expectations. Steps that will be taken for setting up the mechanism are as follow:

- Initial orientation for the PMU will include materials on ESMP and grievance mechanism so that the staff will understand their roles and responsibilities on this matter

- Assign staff/team of staff that will be responsible for receiving and processing the grievance
- Develop procedures for accepting/logged-in grievance, grievance assessment process, providing feedback for the grievance, and monitoring the feedbacks
- Create internal communication procedures for the mechanism
- Communicating the ESMP and grievance mechanism at the beginning of program implementation to the stakeholders

175. The grievance mechanism procedure that will be set up will follow these following general guidelines:

- *Logged-in Grievance*  
Stakeholder should formally communicate grievance in a written manner, and sent it to the appointed staff through email, fax or hand-delivered the text to the PMU office. Once it's being logged, the particular stakeholder will receive receipt that acknowledging the complaint is being accepted and will be processed
- *Grievance Assessment*  
Once the complaint is logged-in and recorded, an assessment process will be done by a specific team by considering the complainants, issues, mitigation measures in place, rating the grievance and exploring options to address the grievance. The team leader will continually updated on the process
- *Providing and Communicating Feedback*  
Once the option is selected, the team will prepare a response for the grievance and communicate the response formally in written text to the complainant
- *Monitoring Feedback*  
To ensure the feedback is well received by the complainant or to maintain in case there will be follow up response, the responsible staff will continually monitor the grievance cases logged-in, its feedback and how it being dealt in practise.

[176. A more detailed grievance mechanism and the responsible staff has been developed at the beginning of program implementation \(see Annex 15 and \[www.kemitraan.or.id/complaint-handling\]\(http://www.kemitraan.or.id/complaint-handling\)\).](#)

~~[176. A more detailed grievance mechanism and the responsible staff will be developed at the beginning of program implementation.](#)~~

## **S.O. Describe the monitoring and evaluation arrangements and provide a budgeted**

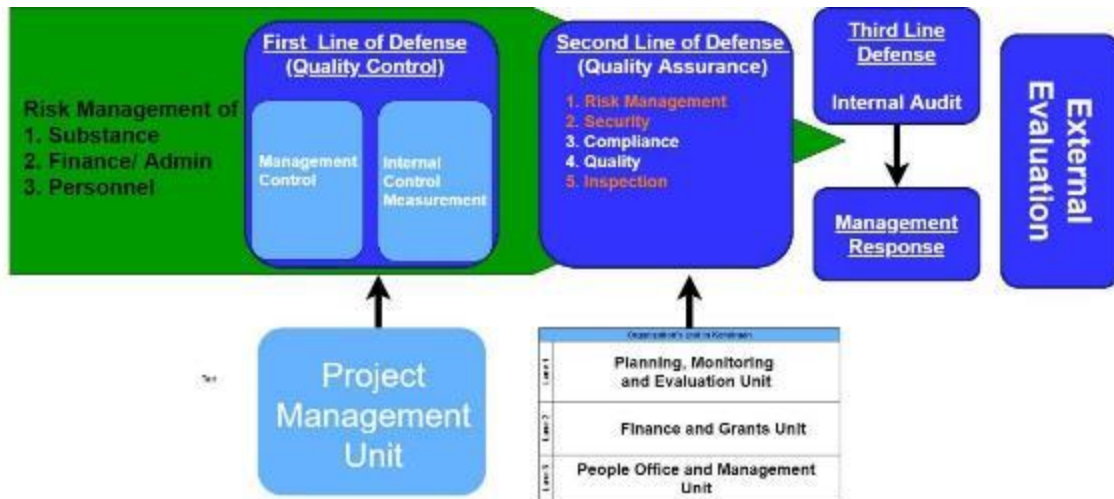
### **M&E plan**

177. Through

h a project management system which blend M&E system and Knowledge Management & Learning, Kemitraan ensures early detection of any changes, both positive and negative throughout project implementation. Hence, knowledge and lessons throughout project implementation are well identified, well responded and documented so that can be learned and widely informed to and by key stakeholders.

178. To

ensure the quality of project deliverables Kemitraan operates an IT based project tracking system (called TRACY) to monitor the programmatic achievement and Sun System to monitor the project financial performance. The TRACY and Sun System work based on the Kemitraan Manual of Policy and Procedure which covers every stages of the project cycles (planning, monitoring and evaluation). All data and project documents are required to be stored in the system and enable the organization to elaborate the lesson learnt into the knowledge. Kemitraan applies project comprehensive quality control system. The quality assurance comprises of 3 tiers, i.e. Programme Unit and Project Management Unit (PMU) as 1st tier of defense, Organization's Planning, Monitoring & Evaluation Unit (PME), Finance & Grants Unit (FG) and People Office Management (POM) as 2nd tier of defense and Internal Auditor as 3rd tier of defense.



Source: Factsheet: 3 Lines of Defence Combined Assurance Model. The Institute of Internal Auditors, Australia, 2018

Figure 4921. Quality Assurance Mechanism in Kemitraan

179. TRACY

system also provides dashboard for easy access of the Management Level to monitor the progress of the project. Any challenges throughout project implementation will be reported and consulted to the Management through a Management Meeting to review project performance and further seek management response for any identified risks.

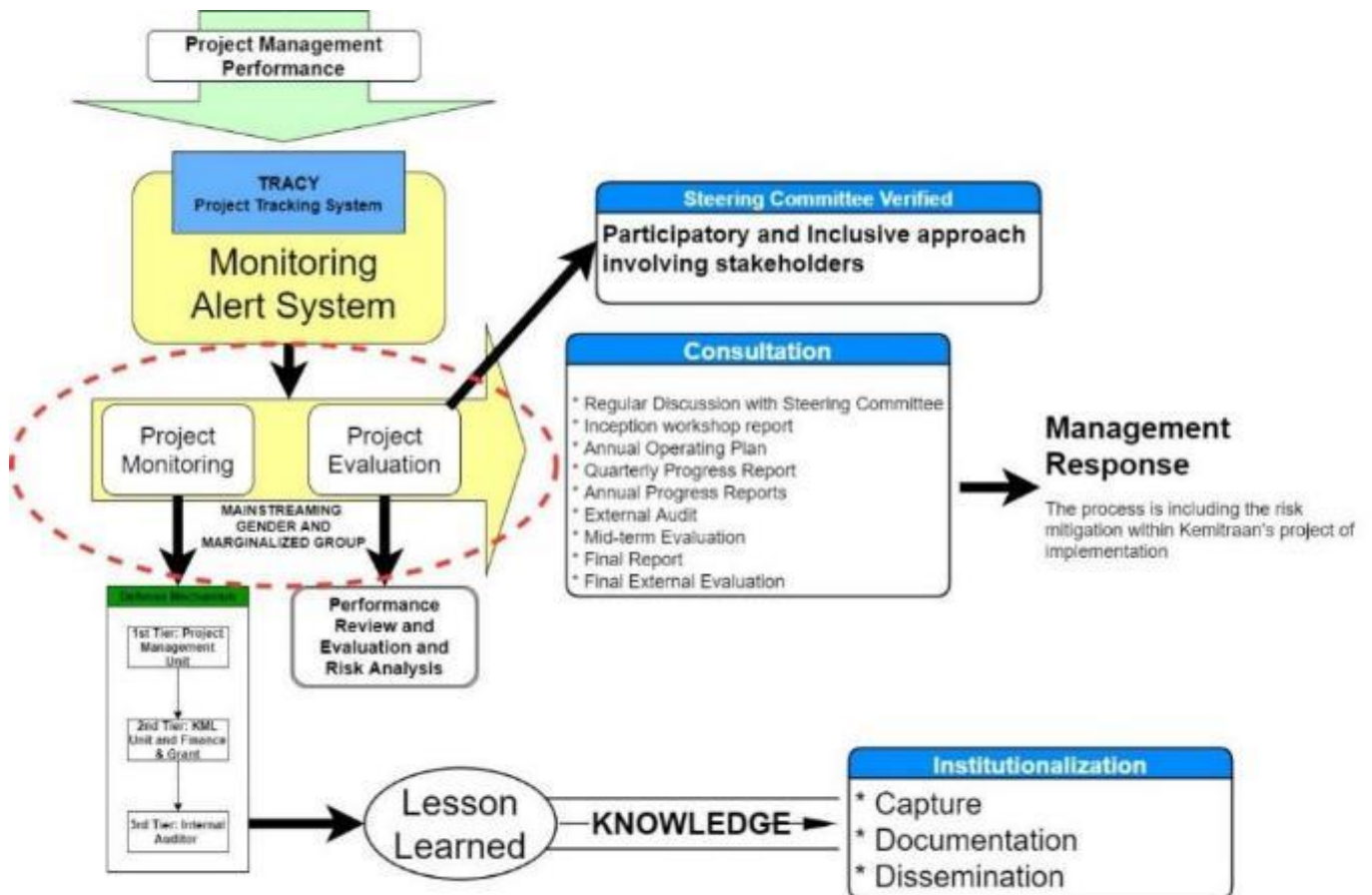


Figure 4922. Project Monitoring Mechanism in Kemitraan



180. In the 1st tier of defense mechanism, PMU is established to implement and ensure the quality of deliveries and conduct project monitoring progress through a tailor-made monitoring tool which will be developed based on an Inception workshop. This workshop is designed to capture as follows:
1. Assist all participants to fully understand the project objectives and activities and take ownership of the project
  2. Discuss the organizational structure of the project
  3. discuss the roles and responsibilities of all agencies involved in the project including decision making, reporting, and lines of communication
  4. Discuss conflict resolution mechanisms.
  5. Review and agree on the indicators, targets and their means of verification, and recheck assumptions and risks.
  6. Ensuring the mainstreaming of gender and marginalized group in each level the implementation of project and output of projects.
  7. Prepare and framework finalize the annual work plan for year one.
  8. Discuss project monitoring, evaluation and reporting requirements
  9. Discuss financial procedures.
181. Progress of project performance is monitored based on the set result framework as stated in the below E section. PMU with the support of PME Unit will be responsible for monitoring the progress guided by Annual Operating Plan (AOP). Annual Operation Plan displays all necessary activities for current year and its milestone of performance indicators based on the set project results framework. The results of the monitoring will be in the form of Quarterly Status Reports presenting monitoring process on executed activities and its progress towards the intended outputs. AOP's will be agreed and scheduled annually during Steering committee meetings.
182. All progresses and results are documented through the below reporting tools:
- **Inception Workshop Report** - will be prepared after inception workshop, which will detail about roles, responsibilities, actions, and functions of all stakeholders. Furthermore, it will include first AOP and monitoring plan for the first year.
  - **Annual Operating Plan (AOP)** - Annual plan should be approved by the steering committee before starting each operating period, and it will detail all activities to be executed, all milestones and goals which will be reached during the year, and dates for each indicator to be executed. AOP will include all the necessary financial activities relevant to the first period.
  - **Quarterly Progress Reports (QPR)** - project management unit should submit QSRs to steering committee at the end of each operating quarter. QSRs will present how the indicators identified in project results framework are executed, what challenges PMU faces during the execution process and identify any constraints. Quarterly Status Reports will present monitoring process on executed activities.
  - **Annual Progress Reports (AMR)** - Annual Progress Report will cover last AOP, it will compare the actual results with the targets and milestones listed in AOP, and if necessary it will come up with improvements and corrective measures for the upcoming AOP.
  - **External Audit Reports** - with the periodic financial statements, external annual audit report will be prepared. Audit reports are made in accordance to Financial Regulations set by the government.



- **Mid-term Evaluation** - Halfway through the project implementation the project will undergo an external mid-term evaluation, which will assess the project's progress of achieving outcomes. Effectiveness and efficiency of the projects will be taken into consideration, and if needed any corrective mechanisms will be applied after the mid-term evaluation.
- **Final Report** - Final report will be presented three months prior to the end of the project. The main focus of the evaluation is to assess project's results with planned results. Moreover, the final evaluation will look to impacts of the projects and to the sustainability of the project.
- **Final External Evaluation** - The main focus of the evaluation is the project impacts, project's sustainability and long-term effects. Final evaluation will also suggest any further actions to be implemented for project's sustainability.

### Monitoring and Evaluation Activities and Budget

Type of M&E Activities	Responsible Parties	Budget (US\$) (does not include staff time)	Time Frame	Year 1	Year 2	Year 3
Inception workshop (30 participants, 2days)	Team Leader	4,000	Y1; 2 <sup>nd</sup> month	4,000		
Inception report	Team Leader	Part of Execution Cost	Y1: 2 <sup>nd</sup> month			
Develop the performance management plan and reported quarterly	Team Leader	Part of Execution Cost	Y1 (quarterly), Y2, Y3			
Develop base line data (4 month, 1 team researcher)	M&E Specialist	35,000	2 <sup>nd</sup> -3 <sup>rd</sup> month Y1	35,000		
Regular monitoring to the field · 1x BImonthly, 4 days, 2 persons	Team Leader	13,500.00 (Travel cost of Steering committee to be charged to IE Fees)	Y1: bimonthly  Y2 and Y3	4,500	4,500	4,500
Spot check monitoring the measure the progress output · 1x/quartile, 4 days, 2 person	PME Unit and Internal Audit	15,000	Y1: quarterly Y2, Y3	5,000	5,000	5,000
Quarterly report	Team Leader	Part of Executon Cost	Y1 (quarterly), Y2, Y3			
Coordination meeting of the project management unit with the steering committee in the national and district level · National level: 10 persons · City level: 10 persons	Team Leader	13,500	Y1, 3 <sup>rd</sup> Year	4,500	4,500	4,500

Annex 5 to OPG\_Amended in October 2016

PMU coordination meeting including the field staff  · 2x/year, 3 days, 10 persons	Team Leader	16,500 (Travel cost of Steering committee to be charged to IE Fees)	Y1, Y2, Y3	5,500	5,500	5,500
End line survey · Team research · 4 month · Field visit	Researcher	35,000		0	35,000	
Documentation of achievements from program's indicators and targets		9,000		3,000	3,000	3,000
Annual Review	External consultant	7,800	Y2 6 <sup>th</sup> month	2600	2,600	2600
Final evaluation	External consultant	10,000	Y3, 3 <sup>rd</sup> quartile	0		10,000
<b>Grand Total</b>		<b>159,300.00</b>		<b>64,100.00</b>	<b>60,100.00</b>	<b>35,100.00</b>

**T.P. Include a results framework for the project proposal, including milestones, targets and indicators.**

Project Objective(s)	Project Objective Indicator(s)	Baseline	Target			Risk & Assumptions	Operational Definition
			1st year	2nd year	3rd year		
<b>Goal.</b> Building coastal City Resilience to Climate Change Impacts and Natural Disasters, with a particular focus on pro-poor adaptation actions that involve and benefit the most vulnerable communities in the City							
<b>Objective 1.</b> Enhancing protection along the coastal line of Pekalongan City	50% of the total households or equal to 12,573 households has gained impact from protection along coast line from sea level rise causing tidal flood and inundation			6.200	6.373		
<b>Outcome 1.1</b> Increased coastal community resilience in Pekalongan City	Approx. 75% of targeted coastal areas is protected through a combination of mangrove ecosystem and breakwater  At least, the coastal areas in 3 <i>kelurahan</i> is protected through mangrove ecosystem			6,3 km <sup>3</sup> ha		Social conflict arising from selection of priority activities site and design	Increasing community's resilience towards CC impact through coastal protection
<b>Output 1.1.1</b> 6 kilometres of Mangrove Ecosystem established	3 hectares of targeted coastal areas is protected through established mangrove ecosystem  At least, the coastal areas in 3 <i>kelurahan</i> is protected through mangrove ecosystem			3 ha		Social conflict arising from selection of priority activities site and design (at community and city level implementation) which could raise envy from other community member that will not directly exposed to the programme	extending coastal mangrove coverage by planting, restoring and maintaining approx. 3 ha mangrove ecosystem, as well as nursery establishment/ext ension
	60 persons are involved in expanding mangrove cover in coastal areas by planting, restoring, and maintaining. Approximately. Male : 36			60 persons			

Project Objective(s)	Project Objective Indicator(s)	Baseline	Target			Risk & Assumptions	Operational Definition
			1st year	2nd year	3rd year		
	persons, Female: 18 Persons and vulnerable : 6 Persons						
<b>Output 1.1.2</b> <u>Breakwater (rubble mound) covering the coast of Kandang Panjang in the area of Mangrove Information Centre (PIM) constructed 300-m-parapet at Slamaran Beach in kelurahan-Degayu-constructed</u>	<u>coastline in Kandang Panjang rehabilitated through the construction of breakwater (rubble mound)</u>  <u>1 of Kelurahan is protected through breakwater construction Kandang Panjang,300-meters-of-coastline-are-rehabilitated-through-the-construction-of-parapet-</u>  <u>1-Kelurahan-is-protected-by-parapet-construction-in-Slamaran-beach-</u>			<b>300-m2</b> <b>1 Kelurahan</b>	<u>300 meter breakwater constructed</u>	Disruption of physical environment from mobilization, construction and implementation of adaptation actions	<u>Improvement of environmental infrastructure of community settlements in climate change adaptation Kelurahan Kandang Panjang through the construction of breakwater</u> Improvement of environmental infrastructure of community settlements in climate change adaptation, in the Degayu village through the construction of additional 300-m-parapet-
	<u>56 local people were socialized about livable and healthy settlements and were involved in the construction of breakwater infrastructure in both kelurahan Kandang Panjang.</u>  <u>Approximately Male : 34 persons, Female: 17 Persons and vulnerable : 5 Persons</u> <u>56-local-people-were-socialized-about-livable-and-healthy-settlements-and-were-involved-in-the-construction-of-a-300-meter-long-parapet-infrastructure-in-Kelurahan-Degayu.</u> <u>Approximately Male : 34 persons, Female: 17 Persons and vulnerable : 5 Persons</u>			<b>56 persons</b>			
<b>Objective 2.</b> Enhancing coastal community capacity in developing and implementing local climate change adaptation actions (RAD	160 community members from 8 <i>kelurahan</i> has targeted to become agent of change in coping better with climate-change through adaptation and actions. The targets will be			<b>60</b>	<b>100</b>	There is support from stakeholders; A forum is initiated and attended by stakeholders and	

Project Objective(s)	Project Objective Indicator(s)	Baseline	Target			Risk & Assumptions	Operational Definition
			1st year	2nd year	3rd year		
API), climate change information system, climate smart initiative	counted from the achievement in each outcome.					the community; Increased public awareness and knowledge, especially on the issues of adaptation to changing environmental condition	
	<p>8 (eight) CCA-specific activities with allocated budget are included in City Development Plan</p> <p><b>Regional Development Planning (Bappeda):</b> Regional Action Plan on CC, Supervising each CC-A specific activities in Municipal Technical Offices</p> <p><b>Office of Marine and Fisheries:</b> Ensuring the sustainability of coastal livelihood, ensuring fisheries infrastructure are maintained</p> <p><b>Office of Environment:</b> Monitoring and implementing the environmental prerequisite</p> <p><b>Public Work and Spatial Planning:</b> Ensuring the sustainability and maintenance of build infrastructure from the Project, increasing access to public facilities in water and sanitation in collaboration with Office of Sanitary and Health</p> <p><b>Office of Tourism:</b> Strengthening community entrepreneurship such as <i>Kelurahan</i>-owned enterprise</p>			4 3	4 4		

Project Objective(s)	Project Objective Indicator(s)	Baseline	Target			Risk & Assumptions	Operational Definition
			1st year	2nd year	3rd year		
	and/or cooperative improvement						
<b>Outcome 2.1</b> Enhanced capacity of local actors in identifying, initiating, strengthening, and escalating community-based actions to address climate risk and natural disaster; including capacity in integrating the actions to sub-district development plan	160 community members from 8 <i>kelurahan</i> become agent of change in coping better with climate-change through adaptation and actions. The targets will be counted from the achievement in each outcome.			60	100	-	Encouraging local community to be Agents of Change in CCA action through capacity building activity
<b>Output 2.1.1</b> Pekalongan City Climate Working Group reactivated	The existing City Climate Working Group reactivated and actively involved in the planning of adaptation action at municipal level, both community based and government led.		1				reactivate existing CCWG through approach to and re-engagement of involved key stakeholders
	80% of the members of the Pekalongan City climate working group, representatives of regional stakeholders and / or program cadres that they are active in FGD forums, workshops and meetings organized by the program				80% of the members of the Pekalongan City climate working group, representative s of regional stakeholders and / or program cadres		
	30% of climate working group members in Pekalongan city, representations of women groups and vulnerable groups			30% of climate working group members in Pekalongan city			
<b>Output 2.1.2</b> Climate working group established and	8 climate working group established in each <i>kelurahan</i>		4	4			Increased awareness and participation of the

Project Objective(s)	Project Objective Indicator(s)	Baseline	Target			Risk & Assumptions	Operational Definition
			1st year	2nd year	3rd year		
functioning in each of the 8 target <i>kelurahan</i>	and actively involved in the development of community based adaptation action plan						community and local governance service through climate working groups, in <i>kelurahan</i> level (8 <i>Kelurahan</i> ) and municipal level
	80% of the members of the Kelurahan climate working group in 8 Kelurahan, representatives of program cadres that they are active in FGD forums, workshops and meetings organized by the program			80% of the members of the Kelurahan climate working group in 8 Kelurahan, representatives of program cadres			
	30% of climate working group members in Kelurahan level, representations of women groups and vulnerable groups			30% of climate working group members in Kelurahan level, representations of women groups and vulnerable groups			
	There is a document of lesson learned or best practice about women and vulnerable groups related to climate change adaptation				1 dokumen lesson learn		
<b>Output 2.1.3</b> Enhancing coastal community capacity in developing <i>kelurahan's</i> information system and implementing the ensuing climate change adaptation actions	Climate change information system (CCIS) developed and ensuing climate change adaptation actions implemented			1			strengthening community based climate information systems (including women groups and vulnerable groups), to help make decision on the ensuing adaptation action



Project Objective(s)	Project Objective Indicator(s)	Baseline	Target			Risk & Assumptions	Operational Definition
			1st year	2nd year	3rd year		
<b>Output 2.1.4</b> Engaging youth groups and building their capacity to become Agents of Change in climate change adaptation actions of Pekalongan City	At least 3 (three) youth groups established across 8 targeted Kelurahan with developed action plan agreed upon		1	2			Establishment of Young Agents of Change the 8 <i>kelurahan</i> that become influential to further the effort of CC adaptation in Pekalongan City
<b>Outcome 2.2</b> Enhanced local government and other city stakeholders' capacity in developing climate risk assessment and utilizing the results to develop local climate change adaptation action plan (RAD API),	Increased capacity of local government and city's key stakeholders in the development of climate risk assessment and utilizing the results to develop local climate change adaptation action plan that is mainstreamed in the <b>Municipal Development Plan</b> with regards to gender equity				1 document of RAD API (CC Adaptation Action Plan) incorporated within annual work-plan or mid-term development plan at <b>municipal level</b>	Changes in government structure and lack of coordination and communication so the mainstreaming budget will take longer than expected	This outcome looks at the improvement of the municipal CCA action plan (RAD API), which development involves the municipal govt. and other key stakeholders. To do this, local capacity needs to be enhanced
<b>Output 2.2.1</b> RAD API developed based on Pekalongan City Climate Risk Assessment and Climate Coastal Impact	Climate change adaptation action plan adopted and developed to RAD API documents and incorporated within annual work-plan or mid-term development plan at <b>municipal level</b>			1 draft document of RAD API incorporated CC-Adaptation within annual work-plan or mid-term development plan at <b>municipal level</b>			Increased awareness and participation of youth groups (including vulnerable groups) and women's groups in supporting climate change adaptation actions through social media, socialization and as an agent for climate change issue

Project Objective(s)	Project Objective Indicator(s)	Baseline	Target			Risk & Assumptions	Operational Definition
			1st year	2nd year	3rd year		
	Mainstreaming gender and marginalized groups adopted and developed to RAD API documents and incorporated within annual work-plan or mid-term development plan at <b>municipal level</b>				1 document on mainstreaming gender and marginalized group incorporated within RAD API and annual work-plan or mid-term development plan at <b>municipal level</b>		Strengthening climate change actions in the regional level through proposing Regional Action Plans for climate change action (RAD API) to the Pekalongan municipal government of Pekalongan City
<b>Output 2.2.2</b> Strategy to integrate CCA into local government planning processes (annual work plan or mid-term development plan of city) is developed	At least, 5 <b>municipal offices</b> (Regional Development Planning (Bappeda), Office of Marine and Fisheries, Office of Environment, Public Work and Spatial Planning in collaboration Office of Sanitary and Health, and Office of Tourism) have actively involved in governing Climate-change adaptation and involved in the development of a strategy to integrate CCA into local government planning			5			Efforts to accelerate climate change adaptation actions to be integrated into local government development planning
<b>Outcome 2.3</b> Enhanced resilience of coastal community through the Implementation of Climate Smart Initiatives, including fostered sustainable utilization of natural resources, with implementation scheme that can be replicated and disseminated to	Improved livelihoods and ecosystem resilience, as well as developed social behavioural changes in community through applied Climate Smart Initiative.  Adoption and application of <u>developed</u> online technology systems <del>were developed</del> in collaboration with local governments				1	Low technical knowledge of internet and technology	Adoption and application of online technology to develop Climate Smart Initiative to encourage social behavioural changes in the community towards CC issues

Project Objective(s)	Project Objective Indicator(s)	Baseline	Target			Risk & Assumptions	Operational Definition
			1st year	2nd year	3rd year		
broader audience							
<b>Output 2.3.1</b> Innovative and collaboration adaptation actions are implemented in collaboration with private sector, Government bodies and NGO ( i.e. technology for main productive sectors, model on collaborative CCA programme across coastal <i>kelurahan</i> 's upstream and downstream, collaborative action to protect the affected coastal area); and also evaluated for future reference	Established community-led climate network, that consists at least 30% of Women			8 <i>kelurahan</i>			Improved multi-stakeholder participation and engagement (local governments, NGOs, academics, Community incl. women groups and vulnerable groups, and the private sector) in the development of new innovations and collaborative actions
	Developed smart-phone based climate warning systems across 8 <i>Kelurahan</i> .						
<b>Outcome 2.4</b> Established knowledge management network at municipality level	The knowledge management network established in each target <i>kelurahan</i> that are actively engage and communicate with each other.			4	4	Lack of community (direct beneficiaries) support to the project	Increase community knowledge on CCA based on own experience and the applied assistance through this project
<b>Output 2.4.1</b> Climate change training and knowledge sharing conducted	Training and knowledge sharing conducted across 8 target <i>kelurahan</i> involving different community groups		1	1	1		Increased capacity, skills and knowledge management as needed by the community (including women groups and vulnerable groups) and government staff (municipal level and

Project Objective(s)	Project Objective Indicator(s)	Baseline	Target			Risk & Assumptions	Operational Definition
			1st year	2nd year	3rd year		
							provincial level)
<b>Output 2.4.2</b> Knowledge product, Advocacy materials (i.e. lessons learned, research paper, newsletter) published and shared	Publications related to climate change adaptation produced by each group during the course of the project		1	3	4		Dissemination and publication of program activities and products (i.e lessons learned, research papers, newsletters) through socialization, seminar, roadshow, mass media, social media, short movie, and research publications.
<b>Output 2.4.3</b> Local knowledge sharing network established	Knowledge management network established and consists at least of 5 different community groups in each target <i>kelurahan</i> (i.e youth group, women group, farmers and fishermen groups, local entrepreneurs, other marginalized group, and academician or urban planners) that are actively engage and communicate with each other.			16	24		Establishment of local knowledge sharing network in level community and government level to enable knowledge exchange amongst stakeholders and Community (including woment groups & vulnerable groups) in Pekalongan City
<b>Objective 3.</b> Strengthening vertical coordination by enhancing provincial government's capacity in mainstreaming climate change adaptation and resilience into Central Java Province development plan	Climate change and adaptation context included in Central Java Province Development Plan (RPJMD/RKP)  The definition is approved by the documents of Regional Regulation on RPJMD and RKP (Regional Development Planning, and Annual Development Plan) at Central				†		

Project Objective(s)	Project Objective Indicator(s)	Baseline	Target			Risk & Assumptions	Operational Definition
			1st year	2nd year	3rd year		
	Java Province. The RPJMD and RKP documents has integrated the climate change and adaptation context into the provincial policy.						
	Increased contribution of the number of women and marginalized community that contribute in policy making and in implementation at municipal level.				30%		
<b>Outcome 3.1</b> Enhanced provincial government's capacity in mainstreaming climate change adaptation and resilience into Central Java Province development plan	Increased capacity of local governments and key city stakeholders (at least 7 municipal offices) in developing climate risk assessments and utilize the results to develop local climate change adaptation action plans that are mainstreamed in the <b>Provincial Development Plans</b> with regards to gender equality (Environmental Office, Bappeda, Maritime and Fisheries Office, agriculture Office, public works Office, women empowerment, Health Office)				7	Weak commitment built by project implementers with central/provincial/local government due to changes in government structure and lack of coordination and communication	This outcome looks at the improvement of the provincial development plan, in which CCA and CC resilience are mainstreamed. To realize this, improvement of prov. Govt. needs to be improved and enhanced
<b>Output 3.1.1</b> Enhanced provincial capacity to develop RAD API	Climate change adaptation action plan adopted and developed to RAD API documents and incorporated within annual work-plan or mid-term development plan at <b>provincial level</b>				1 document of RAD API incorporated CC-Adaptation within annual work-plan or mid-term development plan at <b>provincial level.</b>		Increasing the capacity of the provincial govt. to develop RAD-API involving key-stakeholders in the consultation and development process
	Mainstreaming gender and marginalized groups adopted and developed to RAD API documents and incorporated				1 document on mainstreaming gender and marginalized group		Efforts to accelerate climate change adaptation actions to be integrated into

Project Objective(s)	Project Objective Indicator(s)	Baseline	Target			Risk & Assumptions	Operational Definition
			1st year	2nd year	3rd year		
	within annual work-plan or mid-term development plan at province level				incorporated within RAD API and annual work-plan or mid-term development plan at <b>provincial level</b>		local government development planning in Province level
<b>Output 3.1.2</b> Appropriate strategy to integrate CCA into Provincial government planning processes (annual work plan or mid-term development plan of city) is developed	At least, 5 <b>provincial offices</b> (Regional Development Planning (Bappeda), Office of Marine and Fisheries, Office of Environment, Public Work and Spatial Planning in collaboration Office of Sanitary and Health, and Office of Tourism) have actively involved in governing Climate-change adaptation and involved in the development of a strategy to integrate CCA into local government planning				5		Appointed staff of the 5 offices have good knowledge and understanding on CCA, its strategy and its integration to provincial development plan
<b>Objective 4.</b> Strengthening vertical coordination and collaboration between national and local government in climate adaptation context and Enriching knowledge, toolkits and methodologies coastal resilience for the national government	Establishing knowledge management network between national and local government in climate adaptation context  At least, one knowledge product is produced in each output		5	8	10		
<b>Outcome 4.1</b> SIDIK as risk assessment tools for coastal area based on local experience enriched	SIDIK Handbook developed, introduced and disseminated to broader stakeholder at all governmental level (local, provincial and national) with input from multi-stakeholders (i.e				1	Lack of coordination across ministries due to same level of authority	SIDIK enhancement with risk assessment tools for coastal area. Local experience and

Project Objective(s)	Project Objective Indicator(s)	Baseline	Target			Risk & Assumptions	Operational Definition
			1st year	2nd year	3rd year		
	<p>civic society, local government, private sectors and national government) in the re-formulation of SIDIK indicators.</p> <p>Introducing SIDIK as risk assessment tools for coastal area based on local experience at two ministries which include Ministry of Marine and Fisheries, and Ministry of Environment and Forestry</p> <p>Two technical ministries on forestry and coastal management is actively involved in governing Climate Change Adaptation through SIDIK system.</p>						knowledge from this project will be added into SIDIK documentation
<b>Output 4.1.1</b> Knowledge product in the form Handbook on how to use SIDIK for risk assessment at coastal city is published and shared. This handbook is targeted to be used by local government, NGOs and civil society organizations	Input from multi-stakeholders (i.e civic society, local government, private sectors and national government) in re-formulation of SIDIK indicators collected and integrated in the handbook.		2 (workshops, FGDs)	2 (workshops, FGDs)	4 (workshops, FGDs)		SIDIK operational handbook (manual) for risk assessment in coastal cities is made available, published and distributed, which content is enhanced with knowledge, toolkits and methodologies related to coastal resilience
	SIDIK as risk assessment tools for coastal area based on local experience at two ministries which include Ministry of Marine and Fisheries, and Ministry of Environment and Forestry introduced and disseminated				1 handbook (7000 expl.)		
<b>Output 4.1.2</b> Strengthened vertical coordination and collaboration between national and local government in climate adaptation context	Two technical ministries on forestry and coastal management respectively are actively involved in governing Climate Change Adaptation through SIDIK system.		1	2	2		To develop common knowledge, understanding, and similarities between planning and actions among municipal, provincial and national



Project Objective(s)	Project Objective Indicator(s)	Baseline	Target			Risk & Assumptions	Operational Definition
			1st year	2nd year	3rd year		
							governments. in the context of climate change adaptation (CCA)
<b>Objective 5.</b> Improving community's resilience through initiation of alternative livelihood and improvement of sanitation facility	Established livelihood alternatives and circular economy. The indicator of the objective include: <ol style="list-style-type: none"> <li>1) developed of capture fisheries (number of group developed);</li> <li>2) urban farming introduced and applied by community (yields and number of plots applied urban farming)</li> <li>3) developed and improved community-based ecotourism (number of group developed and improved ;</li> <li>4) constructed integrated-waste management facility (number of facility constructed and number of community members trained and gained service of water and sanitation)</li> </ol>				3		
<b>Outcome 5.1</b> Increased economic income and improved community's health in 8 target kelurahan of	At least 4 (four) sustainable livelihood are adopted and applied as climate change adaptation strategies by communities in each kelurahan			2	2	Communities are less aware of climate change and have lack of enthusiasm to	assistance to community and the municipal govt. of Pekalongan in the development

Project Objective(s)	Project Objective Indicator(s)	Baseline	Target			Risk & Assumptions	Operational Definition
			1st year	2nd year	3rd year		
Pekalongan City	<p>through inclusive approach, by involving women and other marginalized group. The sustainable livelihood includes community fisheries at coastal areas, urban farming strategies, community-based ecotourism and integrated-waste management in communities.</p> <p>Institutionalization of circular economics to improve average income in each <i>Kelurahan</i>, both in normal seasonal condition and in the mid of increasing of climate change consequences (i.e. El-Nino, La-Nina, Long drought, or wet-dry seasons). Furthermore, decreasing the health problems and risk in 8 <i>Kelurahan</i>.</p>					respond to disasters. If beneficiaries are not fully aware of the impacts of climate change, it is difficult to gain their commitment in urban farming development and climate change adaptation	of sustainable alternative livelihood with strong inclusion of women and marginalized groups
	<p>Income or health level of beneficiaries of sustainable economic empowerment as well as improved watsan facilities at the program location,</p> <p>Male = 1.394 persons or 60%</p> <p>Female = 697 persons or 30%, include women headed family</p> <p>Vulnerable = 232 persons or 10%</p>				2.324	There is support from the local government; Beneficiaries depend on their income in the batik sector, eco-tourism, fishermen or as breadwinners in their families;	
<b>Output 5.1.1</b> Aquafarming in mangrove ecosystem developed and implemented by community	Capture fisheries (number of group developed) developed and applied		<b>1 Kelurahan</b>	<b>7 Kelurahan</b>			introduce and apply capture fishery to community (including women groups and vulnerable groups)

Project Objective(s)	Project Objective Indicator(s)	Baseline	Target			Risk & Assumptions	Operational Definition
			1st year	2nd year	3rd year		
							through enrichment of mangrove ecosystem with consumable fish and other sea species, such as shrimps and crabs (integrated aquaculture)
<b>Output 5.1.2</b> Mangrove ecotourism improved and involving wider participation of affected coastal community of Pekalongan City	Community-based ecotourism (number of group developed and improved) developed and/or improved		<b>1 Kelurahan</b>	<b>7 Kelurahan</b>			Development of community based ecotourism, that includes women and vulnerability groups with full support of the municipal govt.
	There is a journal about livelihood women and vulnerable groups related to climate change adaptation				1 Journal		
<b>Output 5.1.3</b> Improved cultural economy through application of ecological batik using mangrove based colouring product	ecological batik using mangrove based colouring product applied and cultural economy improved		<b>1 Kelurahan</b>	<b>7 Kelurahan</b>			Introducing ecological batik colouring technic to the batik craftsmen community incl. women and vulnerability groups, and increase capacity of batik maker to improve designs
<b>Output 5.1.4</b> Improved food security through the application of urban farming as alternative to conventional agriculture practices	urban farming introduced and applied by community (yields and number of plots applied urban farming)		<b>1 Kelurahan</b>	<b>7 Kelurahan</b>			introducing and implementing urban farming based on local seeds to community (including women

Project Objective(s)	Project Objective Indicator(s)	Baseline	Target			Risk & Assumptions	Operational Definition
			1st year	2nd year	3rd year		
							groups and vulnerable groups) as an alternative agriculture practices to strengthen local food security
<b>Output 5.1.5</b> Developed circular economy through initiation integrated waste management system and processing	integrated-waste management facility constructed and running		1 <i>Kelurahan</i>	7 <i>Kelurahan</i>			establishment of a functioning waste management facility that can offer jobs and business opportunities both for the city and for the community that also gender mainstreamed in the development of employment opportunity
<b>Output 5.1.6</b> Improved sanitation facility in 8 target <i>kelurahan</i> to mitigate risks of waterborne disease	Water and sanitation condition in 8 target <i>kelurahan</i> improved through construction of communal facilities		16	8			Improvement of domestic public sanitation and / or waste water facilities in 8 villages by involving the community (including women groups and vulnerable groups) and local governments from the start of planning, development and maintenance
<a href="#">Output 5.1.7 Flood Relief for Pekalongan City</a>							



**U.Q. Demonstrate how the project / programme aligns with the Results Framework of the Adaptation Fund**

Project Objective Components	Expected Outcomes	AF Outcomes
1. Enhancing coastal community capacity in developing and implementing climate change adaptation actions and information system in each of the 8 target <i>kelurahan</i>	Enhanced capacity of local actors in identifying, initiating, strengthening and escalating community-based actions to address climate risk and natural disaster; including capacity in integrating the actions to <i>kelurahan</i> development plan	Outcome 3
	Enhancing local community adaptive capacity, including developing livelihood strategies to face climate change impacts and natural disasters	Outcome 3, Outcome 6
2. Enhancing municipal government and other stakeholders' capacity in developing local climate change adaptation action plan (RAD API) and implementing climate smart initiative	Enhancing local government and other city stakeholders' capacity in developing climate risk assessment and utilizing the results to develop local climate change adaptation action plan (RAD API),	Outcome 2
	Implementing climate smart initiatives, including those fostering sustainable utilization of natural resources and development of circular economy	Outcome 4, Outcome 6
	Establishing knowledge management network at municipal level	Outcome 3
3. Strengthening vertical coordination by enhancing provincial government's capacity in mainstreaming climate change adaptation and resilience into Central Java Province development plan, which in turn could foster better climate-related policy on climate financing and bottom-up planning	Enhancing provincial government's capacity in mainstreaming climate change adaptation and resilience into Central Java Province development plan	Outcome 2
4. Strengthening vertical coordination and collaboration between national and local government in climate adaptation context and Enriching knowledge, toolkits and methodologies coastal resilience for the national government	Enriching SIDIK as risk assessment tools for coastal area based on local experience	Outcome 1
	Strengthening vertical coordination and collaboration between national and local government in climate adaptation context	Outcome 7

**V.R.** Include a detailed budget with budget notes, a budget on the Implementing Entity management fee use, and an explanation and a breakdown of the execution costs

<u>Description Item</u>			<u>MODIFIED BUDGET</u>	<u>BUDGET NOTES</u>
<u>SAFEKEEPING</u>			<u>\$1.329.480</u>	-
<u>1. Enhancing protection along the coastal line of Pekalongan City</u>	<u>1.1</u>	<u>Increased coastal community resilience in Pekalongan City</u>	<u>\$ 1.329.480</u>	
	<u>1.1.1</u>	<u>3 ha of Mangrove Ecosystem established</u>	<u>\$ 37.037</u>	<u>Changing output 1.1.1 to 3 ha of Mangrove Ecosystem established</u>



	<a href="#">1.1.2</a>	<a href="#">Breakwater (rubble mound) covering the coast of Kandang Panjang in the area of Mangrove Information Centre (PIM) constructed</a>	<a href="#">\$ 1.292.443</a>	<a href="#">Changing output 1.1.2 to Breakwater (rubble mound) covering the coast of Kandang Panjang in the area of Mangrove Information Centre (PIM) constructed</a>
<a href="#">SURVIVING</a>			<a href="#">\$1.547.326</a>	
<a href="#">2. Enhancing coastal community capacity in developing and implementing Local Climate Change Adaptation Action Plan (RAD API), climate change information system, Climate Smart Initiative</a>	<a href="#">2.1</a>	<a href="#">Enhanced capacity of local actors in identifying, initiating, strengthening, and escalating community-based actions to address climate risk and natural disaster; including capacity in integrating the actions to community development plan</a>	<a href="#">\$620.511</a>	-

-	<a href="#">2.1.1</a>	<a href="#">Pekalongan City Climate Working Group reactivated</a>	<a href="#">\$102.222</a>	-
-	<a href="#">Activity:</a>			-
-	<a href="#">2.1.1.1</a>	<a href="#">Kick off meeting for city &amp; village working group</a>	<a href="#">\$ 22.222</a>	-
-	<a href="#">2.1.1.2</a>	<a href="#">FGD (CWG &amp; VWG)</a>	<a href="#">\$ 13.333</a>	-
-	<a href="#">2.1.1.3</a>	<a href="#">Workshop (CWG &amp; VWG)</a>	<a href="#">\$ 33.333</a>	-
-	<a href="#">2.1.1.4</a>	<a href="#">Seminar (CWG &amp; VWG)</a>	<a href="#">\$ 33.333</a>	-
-	<a href="#">2.1.2</a>	<a href="#">Climate working group established and functioning in each of the 8 target kelurahan</a>	<a href="#">\$233.474</a>	-

	<u>Activity:</u>			
-	<u>2.1.2.1</u>	<u>Workshop VWG</u>	<u>\$70.511</u>	-
-	<u>2.1.2.2</u>	<u>Workshop CWG</u>	<u>\$ 71.111</u>	-
-	<u>2.1.2.3</u>	<u>Office set up</u>	<u>\$ 14.815</u>	-
-	<u>2.1.2.4</u>	<u>Overhead (office, car rent, utility)</u>	<u>\$66.667</u>	-
	<u>2.1.2.5</u>	<u>Equipment</u>	<u>\$10.370</u>	

-	<a href="#">2.1.3</a>	<a href="#">Enhancing coastal community capacity in developing kelurahan's information system and implementing the ensuing climate change adaptation actions</a>	<a href="#">\$59.630</a>	-
-	<a href="#">Activity:</a>			-
-	<a href="#">2.1.3.1</a>	<a href="#">Infrastructure (computer, internet connection)</a>	<a href="#">\$ 7.407</a>	-
-	<a href="#">2.1.3.2</a>	<a href="#">Maintenance</a>	<a href="#">\$ 3.704</a>	-
-	<a href="#">2.1.3.3</a>	<a href="#">Infosis Development</a>	<a href="#">\$ 5.185</a>	-
-	<a href="#">2.1.3.4</a>	<a href="#">Apps Development</a>	<a href="#">\$ 1.852</a>	-

-	<a href="#">2.1.3.5</a>	<a href="#">Series Training</a>	<a href="#">\$ 35.556</a>	-
	<a href="#">2.1.3.6</a>	<a href="#">Technical Assistant (Data Specialist)</a>	<a href="#">\$5.926</a>	
-	<a href="#">2.1.4</a>	<a href="#">Engaging youth groups and building their capacity to become Agents of Change in climate change adaptation actions of Pekalongan City</a>	<a href="#">\$ 225.185</a>	-
-	<a href="#">Activity:</a>			-
-	<a href="#">2.1.4.1</a>	<a href="#">Youth Camp</a>	<a href="#">\$ 66.667</a>	-
-	<a href="#">2.1.4.2</a>	<a href="#">Essay of climate change and impact at coastal</a>	<a href="#">\$ 13.889</a>	-

-	<a href="#">2.1.4.3</a>	<a href="#">Poster competition</a>	<a href="#">\$ 13.889</a>	-
-	<a href="#">2.1.4.4</a>	<a href="#">Short movie competition</a>	<a href="#">\$ 13.889</a>	-
-	<a href="#">2.1.4.5</a>	<a href="#">Speech of climate change contest</a>	<a href="#">\$ 13.889</a>	-
-	<a href="#">2.1.4.6</a>	<a href="#">Focus group screening 'Semesta' movie</a>	<a href="#">\$ 102.963</a>	<a href="#">Reallocation for emergency response needed</a>
-	<a href="#">2.2</a>	<a href="#">Enhanced capacity of local government and other city stakeholders' in developing climate risk assessment and utilizing the results to develop local climate change adaptation action plan (RAD API)</a>	<a href="#">\$117.222</a>	-

-	<u>2.2.1</u>	<u>RAD API developed based on Pekalongan City Climate Risk Assessment and Climate Coastal Impact</u>	<u>\$58.778</u>	-
-	<u>Activity:</u>			-
-	<u>2.2.1.1</u>	<u>Training RAD API</u>	<u>\$32.111</u>	-
-	<u>2.2.1.2</u>	<u>Workshop</u>	<u>\$ 8.889</u>	-
-	<u>2.2.1.3</u>	<u>Development of RAD API document</u>	<u>\$ 17.778</u>	-



-	<u>2.2.2</u>	<u>Strategy to integrate CCA into local government planning processes (annual work plan or mid-term development plan of city) is developed</u>	<u>\$ 58.444</u>	-
-	<u>Activity:</u>			-
-	<u>2.2.2.1</u>	<u>Assessment on government commitment to the implementation of climate change budget</u>	-	-
-	<u>2.2.2.1.1</u>	<u>Consultant</u>	<u>\$ 11.111</u>	-
-	<u>2.2.2.1.2</u>	<u>Assistant</u>	<u>\$ 6.667</u>	-
-	<u>2.2.2.1.3</u>	<u>Travel</u>	<u>\$ 14.000</u>	-

-	<a href="#">2.2.2.2</a>	<a href="#">FGD</a>	<a href="#">\$ 8.889</a>	-
-	<a href="#">2.2.2.3</a>	<a href="#">Workshop</a>	<a href="#">\$ 17.778</a>	-
-	<a href="#">2.3</a>	<a href="#">Enhanced resilience of coastal community from the Implementing Climate smart initiatives, including those fostering sustainable utilization of natural resources, with implementation and financing scheme that can be replicated and disseminated to broader audience</a>	<a href="#">\$ 68.148</a>	-

-	<u>2.3.1</u>	<u>Innovative and collaboration adaptation actions are implemented in collaboration with private sector, Government bodies and NGO ( i.e. technology for main productive sectors, model on collaborative CCA programme across coastal villages/ upstream and downstream villages); and also evaluated for future reference</u>	<u>\$ 68.148</u>	-
-	<u>Activity:</u>			-
-	<u>2.3.1.1</u>	<u>FGD</u>	<u>\$ 8.889</u>	-

-	<a href="#">2.3.1.2</a>	<a href="#">Workshop</a>	<a href="#">\$ 14.815</a>	-
-	<a href="#">2.3.1.3</a>	<a href="#">National Seminar 2nd year</a>	<a href="#">\$ 22.222</a>	-
-	<a href="#">2.3.1.4</a>	<a href="#">National Seminar 3rd year</a>	<a href="#">\$ 22.222</a>	-
-	<a href="#">2.4</a>	<a href="#">Established knowledge management network at city-level</a>	<a href="#">\$262.259</a>	-
-	<a href="#">2.4.1</a>	<a href="#">Climate change training and knowledge sharing conducted</a>	<a href="#">\$56.778</a>	-
-	<a href="#">Activity:</a>			-
-	<a href="#">2.4.1.1</a>	<a href="#">Community Training</a>	<a href="#">\$23.444</a>	-

-	<a href="#">2.4.1.2</a>	<a href="#">Training for Municipal Staffs</a>	<a href="#">\$ 16.667</a>	-
-	<a href="#">2.4.1.3</a>	<a href="#">Training for Provincial Staffs</a>	<a href="#">\$ 16.667</a>	-
-	<a href="#">2.4.2</a>	<a href="#">Knowledge product, Advocacy materials (i.e. lessons learned, research paper, newsletter) published and shared</a>	<a href="#">\$ 81.481</a>	-
-	<a href="#">Activity:</a>			-
-	<a href="#">2.4.2.1</a>	<a href="#">talkshow &amp; media gathering</a>	<a href="#">\$ 14.815</a>	-
-	<a href="#">2.4.2.2</a>	<a href="#">Media outreach on climate change adaptation</a>	<a href="#">\$ 44.444</a>	-

-	<a href="#">2.4.2.3</a>	<a href="#">Printing of knowledge product (booklets, reports)</a>	<a href="#">\$ 7.407</a>	-
-	<a href="#">2.4.2.4</a>	<a href="#">Short movie production</a>	<a href="#">\$ 14.815</a>	-
-	<a href="#">2.4.3</a>	<a href="#">Local knowledge sharing platform established</a>	<a href="#">\$ 124.000</a>	-
-	<a href="#">Activity:</a>			-
-	<a href="#">2.4.3.1</a>	<a href="#">FGD with all related stakeholders at Kelurahan Level</a>	<a href="#">\$ 64.000</a>	-
-	<a href="#">2.4.3.2</a>	<a href="#">FGD at provincial and municipal level</a>	<a href="#">\$ 26.667</a>	-
-	<a href="#">2.4.3.3</a>	<a href="#">Workshop involving all of level community</a>	<a href="#">\$ 33.333</a>	-

<u>3. Strengthening vertical coordination by enhancing provincial government's capacity in mainstreaming climate change adaptation and resilience into Central Java Province development plan which in turn could foster better climate-related policy on climate financing and bottom-up planning</u>	<u>3.1</u>	<u>Enhancing provincial government's capacity in mainstreaming climate change adaptation and resilience into Central Java Province development plan</u>	<u>\$ 194.815</u>	-
-	<u>3.1.1</u>	<u>Enhanced provincial capacity to develop RAD API</u>	<u>\$ 125.926</u>	-

-	<u>Activity:</u>		-
-	<u>3.1.1.1</u>	<u>Training RAD API</u>	<u>\$ 7.407</u> -
-	<u>3.1.1.2</u>	<u>Refresher course RAD API</u>	<u>\$ 7.407</u> -
-	<u>3.1.1.3</u>	<u>Climate change adaptation RAD API short course '</u>	<u>\$ 111.111</u> -
-	<u>3.1.2</u>	<u>Appropriate strategy to integrate CCA into Provincial government planning processes (annual work plan or mid-term development plan of city) is developed</u>	<u>\$ 68.889</u> -
-	<u>Activity:</u>		-



-	<a href="#">3.1.2.1</a>	<a href="#">Assessment to what extent climate change budget has been committed by city government</a>		-
-	<a href="#">3.1.2.1.1</a>	<a href="#">Consultant</a>	<a href="#">\$ 7.778</a>	-
-	<a href="#">3.1.2.1.2</a>	<a href="#">Assistant</a>	<a href="#">\$ 6.667</a>	-
-	<a href="#">3.1.2.1.3</a>	<a href="#">Travel</a>	<a href="#">\$ 10.000</a>	-
-	<a href="#">3.1.2.2</a>	<a href="#">FGD</a>	<a href="#">\$ 8.889</a>	-
-	<a href="#">3.1.2.3</a>	<a href="#">Workshop</a>	<a href="#">\$ 35.556</a>	-
<a href="#">4.Strengthening vertical coordination and collaboration between national</a>	<a href="#">4.1</a>	<a href="#">Enriching SIDIK as risk assessment tools for coastal area based on local experience</a>	<a href="#">\$ 290.370</a>	-

<p><u>and local government in climate adaptation context and Enriching knowledge, toolkits and methodologies coastal resilience for the national government</u></p> <p>-</p>	<p><u>4.1.1</u></p>	<p><u>Knowledge product in the form Handbook on how to use SIDIK for risk assessment at coastal city is published and shared. This handbook is targeted to be used by local government, NGOs and civil society organizations</u></p>	<p><u>\$ 138.519</u></p>	<p>-</p>
<p>-</p>	<p><u>Activity:</u></p>		<p>-</p>	
<p>-</p>	<p><u>4.1.1.1</u></p>	<p><u>Consultant</u></p>	<p><u>\$ 13.333</u></p>	<p>-</p>
<p>-</p>	<p><u>4.1.1.2</u></p>	<p><u>Travel consultant</u></p>	<p><u>\$ 13.333</u></p> <hr/>	<p>-</p>
<p>-</p>	<p><u>4.1.1.3</u></p>	<p><u>Printing</u></p>	<p><u>\$ 77.778</u></p> <hr/>	<p>-</p>

-	<a href="#">4.1.1.4</a>	<a href="#">Design layout</a>	<u>\$ 2.222</u>	-
-	<a href="#">4.1.1.5</a>	<a href="#">Courier</a>	<u>\$ 5.185</u>	-
-	<a href="#">4.1.1.6</a>	<a href="#">Gender Specialist</a>	<u>\$ 13.333</u>	-
-	<a href="#">4.1.1.7</a>	<a href="#">Adaptation Specialist</a>	<u>\$ 13.333</u>	-
-	<a href="#">4.1.2</a>	<a href="#">Strengthened vertical coordination and collaboration between national and local government in climate adaptation context</a>	<u>\$ 145.852</u>	-
-	<a href="#">Activity:</a>			-

-	<a href="#">4.1.2.1</a>	<a href="#">Workshop with central government agency</a>	<a href="#">\$68.074</a>	-
-	<a href="#">4.1.2.2</a>	<a href="#">Pekalongan adaptation intervention workshop (Musrebang municipal)</a>	<a href="#">\$11.111</a>	-
-	<a href="#">4.1.2.3</a>	<a href="#">Participating in Musrebang (national &amp; provincial)</a>	<a href="#">\$ 7.407</a>	-
-	<a href="#">4.1.2.4</a>	<a href="#">National Level Meeting</a>	<a href="#">\$ 59.259</a>	-
<a href="#">SUSTAINING</a>			<a href="#">\$2.545.388</a>	-

<u>5. Improving community's resilience through initiation of alternative livelihood and improvement of sanitation facility</u> - - - - - - - -	<u>5.1</u>	<u>Increased economic income and improved community's health in 8 target kelurahan of Pekalongan City</u>	<u>\$ 2.545.388</u>	-
	<u>5.1.1</u>	<u>Aquafarming in mangrove ecosystem developed and implemented by community</u>	<u>\$ 409.500</u>	-
	<u>Activity:</u>			-
	<u>5.1.1.1</u>	<u>Consultant (include travel)</u>	<u>\$ 13.333</u>	-
	<u>5.1.1.2</u>	<u>Aquafarming</u>		-
	<u>5.1.1.2.1</u>	<u>Trainings</u>	<u>\$ 20.000</u>	-
	<u>5.1.1.2.2</u>	<u>Net for crab breeding</u>	<u>\$ 20.000</u>	-

-	<a href="#">5.1.1.2.3</a>	<a href="#">Mud crab seedlings</a>	<a href="#">\$ 160.000</a>	-
-	<a href="#">5.1.1.2.4</a>	<a href="#">Crab feed</a>	<a href="#">\$ 53.333</a>	-
-	<a href="#">5.1.1.2.5</a>	<a href="#">Cultivation equipment</a>	<a href="#">\$ 85.333</a>	-
-	<a href="#">5.1.1.2.6</a>	<a href="#">Manpower</a>	<a href="#">\$57.500</a>	-
-	<a href="#">5.1.2</a>	<a href="#">Mangrove ecotourism improved and involving wider participation of affected coastal community of Pekalongan City</a>	<a href="#">\$ 440.876</a>	-
-	<a href="#">Activity:</a>			-
-	<a href="#">5.1.2.1</a>	<a href="#">Mangrove enrichment</a>	<a href="#">\$ 133.333</a>	-

-	<a href="#">5.1.2.2</a>	<a href="#">capacity building untuk enterpreneurship ecotourism</a>		-
-	<a href="#">5.1.2.2.1</a>	<a href="#">TOT for ecotourism</a>	<u>\$ 11.111</u>	-
-	<a href="#">5.1.2.2.2</a>	<a href="#">training bumdes improvement (institutional development)</a>	<u>\$ 11.111</u>	-
-	<a href="#">5.1.2.2.3</a>	<a href="#">Architect</a>	<u>\$ 13.333</u>	-
-	<a href="#">5.1.2.2.4</a>	<a href="#">Establishment of resort facility</a>	<u>\$ 113.926</u>	-
-	<a href="#">5.1.2.2.5</a>	<a href="#">Mangrove tracking construction</a>	<u>\$ 10.654</u>	-
-	<a href="#">5.1.2.2.6</a>	<a href="#">Public toilet &amp; waste disposal</a>	<u>\$ 4.444</u>	-

-	<a href="#">5.1.2.2.7</a>	<a href="#">speedboat</a>	<a href="#">\$ 7.778</a>	-
-	<a href="#">5.1.2.2.8</a>	<a href="#">Speedboat maintenance &amp; fuel</a>	<a href="#">\$ 11.111</a>	-
-	<a href="#">5.1.2.2.9</a>	<a href="#">Resort maintenance</a>	<a href="#">\$ 44.444</a>	-
-	<a href="#">5.1.2.2.10</a>	<a href="#">Resort (staff &amp; maintenance. Ticket , brochure)</a>	<a href="#">\$ 53.333</a>	-
-	<a href="#">5.1.2.2.11</a>	<a href="#">Business development consultant</a>	<a href="#">\$ 3.704</a>	-
-	<a href="#">5.1.2.2.12</a>	<a href="#">Culinary Consultant</a>	<a href="#">\$ 2.222</a>	-
-	<a href="#">5.1.2.2.13</a>	<a href="#">Ecotourism Consultant</a>	<a href="#">\$ 3.704</a>	-
-	<a href="#">5.1.2.2.14</a>	<a href="#">Staff coordination</a>	<a href="#">\$ 5.556</a>	-



	<a href="#">5.1.2.2.15</a>	<a href="#">Resort management &amp; Gender mainstreaming training for community</a>	<a href="#">\$ 11.111</a>	-
	<a href="#">5.1.3</a>	<a href="#">Improved cultural economy through application of ecological batik using mangrove based colouring product</a>	<a href="#">\$ 512.593</a>	-
	<a href="#">Activity:</a>			-
	<a href="#">5.1.3.1</a>	<a href="#">Training for 400 batik makers at Pekalongan</a>	<a href="#">\$117.048</a>	-
	<a href="#">5.1.3.2</a>	<a href="#">Batik Design Expert</a>	<a href="#">\$ 44.444</a>	-
	<a href="#">5.1.3.3</a>	<a href="#">Expert Assistant</a>	<a href="#">\$ 17.778</a>	-

	<a href="#">5.1.3.4</a>	<a href="#">Travel</a>	<a href="#">\$ 26.667</a>	-
	<a href="#">5.1.3.5</a>	<a href="#">Mangrove natural dyes</a>		-
	<a href="#">5.1.3.5.1</a>	<a href="#">Expert</a>	<a href="#">\$ 31.111</a>	-
	<a href="#">5.1.3.5.2</a>	<a href="#">Expert Assistant</a>	<a href="#">\$ 17.778</a>	-
	<a href="#">5.1.3.5.3</a>	<a href="#">Travel</a>	<a href="#">\$ 26.667</a>	-
	<a href="#">5.1.3.6</a>	<a href="#">Batik's equipment</a>	<a href="#">\$ 148.148</a>	-
	<a href="#">5.1.3.7</a>	<a href="#">Revisit expert</a>	<a href="#">\$ 66.667</a>	-
	<a href="#">5.1.3.8</a>	<a href="#">Staff Admin</a>	<a href="#">\$16.285</a>	

	<a href="#">5.1.4</a>	<a href="#">Improved food security through the application of urban farming as alternative to conventional agriculture practices</a>	<a href="#">\$ 245.926</a>	-
	<a href="#">Activity:</a>			-
	<a href="#">5.1.4.1</a>	<a href="#">Application Development</a>	<a href="#">\$ 14.815</a>	-
	<a href="#">5.1.4.2</a>	<a href="#">Survey</a>	<a href="#">\$ 59.259</a>	-
	<a href="#">5.1.4.3</a>	<a href="#">Data input</a>	<a href="#">\$ 17.778</a>	-
	<a href="#">5.1.4.4</a>	<a href="#">Trainings</a>	<a href="#">\$ 35.556</a>	-
	<a href="#">5.1.4.5</a>	<a href="#">Infrastructure (computer, internet connection)</a>	<a href="#">\$ 29.630</a>	-

	<a href="#">5.1.4.6</a>	<a href="#">Maintenance</a>	<a href="#">\$ 88.889</a>	-
	<a href="#">5.1.5</a>	<a href="#">Developed circular economy through initiation integrated waste management system and processing</a>	<a href="#">\$ 330.370</a>	-
	<a href="#">Activity:</a>			-
	<a href="#">5.1.5.1</a>	<a href="#">Survey</a>	<a href="#">\$ 59.259</a>	-
	<a href="#">5.1.5.2</a>	<a href="#">Waste management FGD at Kelurahan level</a>	<a href="#">\$ 17.778</a>	-
	<a href="#">5.1.5.3</a>	<a href="#">Waste management FGD at municipal level</a>	<a href="#">\$ 8.889</a>	-

	<a href="#">5.1.5.4</a>	<a href="#">Waste management infrastructure &amp; equipments</a>	<a href="#">\$ 222.222</a>	-
	<a href="#">5.1.5.5</a>	<a href="#">Institutional Development for waste management business units</a>	<a href="#">\$ 22.222</a>	-
	<a href="#">5.1.6</a>	<a href="#">Improve sanitation and clean water facility in 8 targets Kelurahan to mitigate risk of waterborne diseases</a>	<a href="#">\$606.123</a>	-
-	<a href="#">Activity:</a>			-
-	<a href="#">5.1.6.1</a>	<a href="#">Communal latrine (include maintenance)</a>	<a href="#">\$307.770</a>	<a href="#">Reallocation for emergency response needed</a>
-	<a href="#">5.1.6.2</a>	<a href="#">Local facilitator</a>	<a href="#">\$264.509</a>	-

-	<a href="#">5.1.6.3</a>	<a href="#">Junior Project Officers</a>	<a href="#">\$30.140</a>	-
	<a href="#">5.1.6.4</a>	<a href="#">Flood Relief for Pekalongan City</a>	<a href="#">\$3.704</a>	<a href="#">Emergency response on project location</a>
<a href="#">6. Total Project/Programme Cost</a>			<a href="#">\$ 5.422.194</a>	-
<a href="#">7. Project/Programme Execution cost and ME cost Improved sanitation facility in 8 target <i>kelurahan</i> for better and healthier living condition</a>			<a href="#">\$ 82.571</a>	-
<a href="#">8. Project/Programme Cycle Management Fee charged by the Implementing Entity</a>			<a href="#">\$ 467.905</a>	-
<a href="#">Amount of Financing Requested</a>			<a href="#">\$ 5.972.670</a>	-

**W.S. Include a disbursement schedule with time-bound milestones.**

	Upon signature of Agreement	One Year after Project Start	Two Years after Project Start	TOTAL
Scheduled date				
Project Cost	\$ 2,277,320	\$ 2,027,918	\$ 1,020,147	\$ 5,325,388
Execution Cost	\$ 204,253	\$ 189,883	\$ 164,883	\$ 559,018
Implementing Entity Fee	\$ 37,224	\$ 33,267	\$ 17,775	\$ 88,266
<b>Total</b>	<b>\$ 2,518,797</b>	<b>\$ 2,251,068</b>	<b>\$ 1,202,806</b>	<b>\$ 5,972,670</b>

	Upon Signature of Agreement	One Year after Project Start	Two Years after Project Start	Total
Schedule Date				
Project Cost	2,286,650	2,043,596	1,091,947	5,422,194
Execution Cost	34,822	31,121	16,629	82,571
Implementing Entity Fee	197,325	176,351	94,229	467,905
<b>Total</b>	<b>2,518,797</b>	<b>2,251,068</b>	<b>1,202,805</b>	<b>5,972,670</b>

**part IV: endorsement by government and certification by the Implementing Entity**

- A. Record of endorsement on behalf of the government<sup>28</sup>** *Provide the name and position of the government official and indicate date of endorsement. If this is a regional project/programme, list the endorsing officials all the participating countries. The endorsement letter(s) should be attached as an annex to the project/programme proposal. Please attach the endorsement letter(s) with this template; add as many participating governments if a regional project/programme:*

<b>Dr. Ruandha Agung Sugardiman</b> Director General for Control of Climate Change	Date: January, 17, 2020
---	-------------------------

- B. Implementing Entity certification** *Provide the name and signature of the Implementing Entity Coordinator and the date of signature. Provide also the project/programme contact person's name, telephone number and email address*

I certify that this proposal has been prepared in accordance with guidelines provided by the Adaptation Fund Board, and prevailing National Development and Adaptation Plans (President Decree No. 16 year 2015; P.13/Menlhk/Setjen/OTL.0/1/2016; P.33/Menlhk/Setjen/Kum.1/3/2016; Indonesia Intended Nationally Determined Contribution/INDC; COP 21 Paris Agreement signed by Government of Indonesia; Book and Map of Information System of Vulnerability Index Data (SIDIK); Permen-KP No. 2 year 2013; Climate Change Adaptation National Action Plan) and subject to the approval by the Adaptation Fund Board, commit to implementing the project/programme in compliance with the Environmental and Social Policy of the Adaptation Fund and on the understanding that the Implementing Entity will be fully (legally and financially) responsible for the implementation of this project/programme.

	
<b>Laode M. Syarif</b> <b>Executive Director Kemitraan</b> <b>Implementing Entity Coordinator</b>	
Date: 17th Jan 2020	Tel. and email: +62-21-7279 9566; Inda.Loekman@kemitraan.or.id
Project Contact Person: <b>Dewi Rizki</b>	
Tel. and Email: +62-21-7279 9566; <a href="mailto:Dewi.Rizki@kemitraan.or.id">Dewi.Rizki@kemitraan.or.id</a>	

<sup>28</sup>. Each Party shall designate and communicate to the secretariat the authority that will endorse on behalf of the national government the projects and programmes proposed by the implementing entities.



**ANNEX 1  
ENVIRONMENTAL AND SOCIAL MANAGEMENT PLAN**

**Prepared for the Implementation of the Program “*Building Coastal City Resilience to Climate Change Impacts and Natural Disasters*”**

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## I. INTRODUCTION

### 1.1. Rationale

This document of Environmental and Social Management Plan is developed to ensure that the proposed program implementation will align with the environmental and social safeguard of Adaptation Fund as well as the applicable national, regional and local regulations in area where the program is implemented. This document contains assessment of the required management, mitigation and monitoring activities to manage the relevant environmental and social impacts as identified during the risk identification and assessment process. It expresses how the program will try it utmost to conform to the provisions of Adaptation Fund Environmental and Social Policies by developing a structure that will ensure the program's potential risks will be managed in an effective manner.

### 1.2. Applicability of Plan

The management measures set out within the plan is applicable throughout the program period; from planning until the implementation stage.

### 1.3. Summary of Project Description

Climate change has led to the rise of sea level and changes in rainfall patterns in Pekalongan City. The rainfall pattern in recent years has become more intense and occurs in a shorter period, which then leads to flooding. Flooding in northern part of Pekalongan City, either those caused by increased rainfall or sea level rise, have contributed to many interconnected problems. Extreme climate events like heavy rains, combined with sea-level rise have resulted in more frequent and more unpredictable floods that threaten populations' security and goods. Climate change is thus impeding Pekalongan City development. One example of this impediment is the decrease of agricultural land area in nine villages of Pekalongan city that reaches 73% between the period 2007-2016 due to the land being submerged in sea water and also high salinity level of the irrigation water. This condition has threatened Pekalongan City food security by reducing rice and other agricultural production.

This program is specifically designed to reach a goal of *Building Coastal City Resilience to Climate Change Impacts and Natural Disasters*, with a particular focus economic/livelihood and food livelihood while simultaneously preserving the environment; touching not only practical aspect but also promoting policy. It will foster pro-poor adaptation actions that involve and benefit the most vulnerable communities in the city. Sustainable development principle will be held at core here to ensure efforts being done at one sector will not create negative impact and incremental losses in the other.

In view of this multifaceted issue, the proposed program framework will be instilled by multidisciplinary and iterative process, with a series of assessment, study and activities to be derived from. Accordingly, the program will not only emphasizing on building hard structure, but also strengthen soft structure (institutional realms, including capacity building) in addressing the issue; creating a paradigm shift from the conventional approach that mostly revolving around building infrastructure that could only serve short-term purposes to newer perspective that allow for continual development and evaluation. This approach will try to simultaneously address the issue of physical structure for coastal protection and adaptation, preserving and developing community livelihood in addition to developing and promoting local tourism in coastal area; balancing the objectives in the above sectors without jeopardizing the sustainability of the others.

The proposed and selected adaptation activities being implemented under the umbrella of the program will be based on scientific basis to corroborate and better understand the pattern of current and future of climate risk. This science-based information is essential to create and develop an effective adaptation. Effective adaptation action should also be built on existing actions; adjusting and leveraging practices that are socially- and environmentally-friendly, while leaving practices

that potentially cause adverse impact.

At the core of this framework is collaborative approach by fostering multi-stakeholder involvement, to bring about different interest on the issue and resolve it amicably to achieve common goals. To achieve the goal, the program will be conducted at 4 governance level, with main objectives at each level are as follows:

1. Village Level

- (i). Enhancing coastal community capacity in developing and implementing Climate change adaptation actions and village information system including developing livelihood strategies, by also taking into account relevant local wisdom

**2. City Level:**

- (i). Enhancing local government and other city stakeholders' capacity in developing local climate change adaptation action plan (RAD API) and implement Climate smart actions

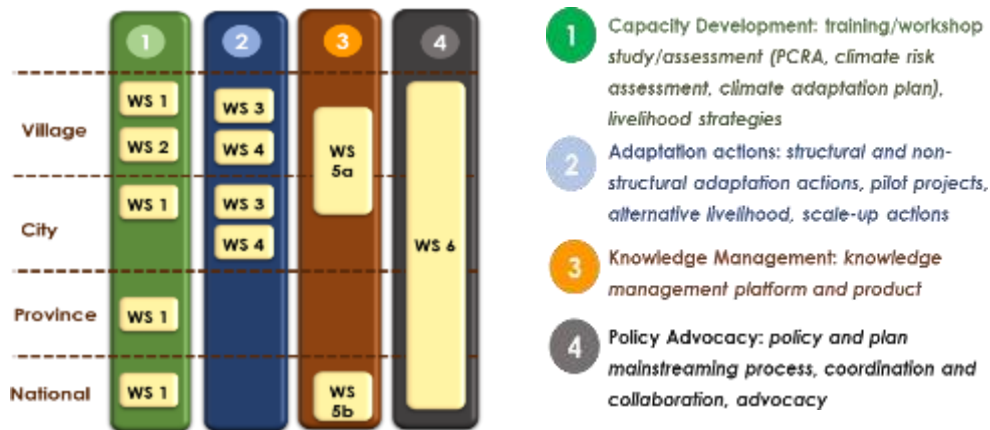
**3. Provincial Level:**

- (i). Strengthening vertical coordination by enhancing provincial government's capacity in mainstreaming climate change adaptation and resilience into Central Java Province development plan, which in turn could foster better climate-related policy on climate financing and bottom-up planning.

**4. National Level**

- (i). Strengthening vertical coordination and collaboration between national and local government in climate adaptation context and enriching knowledge, toolkits and methodologies coastal resilience for the national government

Combination of bottom-up and top-down approach will be implemented within the proposed program to ensure a cohesive climate adaptation plan/program/policy and its implementation at all governance level. In general, the program will focus on 4 aspects, which are capacity development, adaptation action, knowledge management and policy advocacy. Figure 1 below illustrates the interconnection between actions at different governance level within the program, with brief information on each aspect.



- WS 1: Study and Assessment
- WS 2: Livelihood Strategies
- WS 3: Structural Adaptation Actions
- WS 4: Non-structural Adaptation Actions
- WS 5: Knowledge Management
- WS 6: Policy Advocacy

## Figure 1. Interconnection of 4 Aspects at 4 Governance Level

### 1.4. Compliance

The program and plan is complies with the national relevant regulation, standards and principles, as well as Adaptation Fund Environmental and Social Principle.

#### 1.4.1. National Regulation

The applicable National Regulations to the plan are as follow:

- a. Law No. 32 Year 2009 on Environmental Protection and Management
- b. Government Regulation Number 27/2012 on Environmental Permit and Environmental Impact Assessment
- c. Ministry of Environment and Forestry Regulation No. 33 Year 2016 on Guidance for the Development of Climate Change Adaptation Action
- d. Ministry of Environment and Forestry No. P.38/MENLHK/SETJEN/KUM.1/7/2019 year of 2019 concerning Types of Business Plans and/or Activities that Must Have an Analysis of Environmental Impacts
- e. Ministry of Environment Regulation No. 16 Year 2012 on Guidance to Develop Environmental Document (AMDAL, UKL-UPL and SPPL)
- f. Ministry of Environment Regulation No. 8 Year 2013 on Procedure for Assessment and Checking of Environmental Document, as well as Environmental Permit Issuance
- g. Ministry of Public Works Regulation No. 10 Year 2008 on Types of Activities under Public Works Sector that Require UKL/UPL
- h. Indonesia National Standard on Design Procedure for Septic Tank with Infiltration System and Latrine
- i. Housing Construction and Development Standard from Ministry of Public Works

#### 1.4.2. Adaptation Fund Environmental and Social Principles

The applicable Adaptation Fund Environmental and Social Principles are as follow:

- a. Compliance with the Law
- b. Access and equity
- c. Marginalized and vulnerable groups
- d. Human rights
- e. Gender equity and women´s empowerment
- f. Core labour rights
- g. Indigenous people
- h. Involuntary resettlement
- i. Protection of natural habitats
- j. Conservation of biological diversity
- k. Climate change
- l. Pollution prevention and resource efficiency
- m. Public health
- n. Physical and cultural heritage
- o. Land and soil conservation

Compliance to the abovementioned principles will be outlined in further detail on section 1.6 ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT

### 1.5. SCOPE

The management plan presented within the document considers risks being identified and assessed that outlined in section I.6 ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT.

**1.6. ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT**

Environmental and social impact assessment for this proposed program is being done by following the chart below.

**ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT PROCESS**

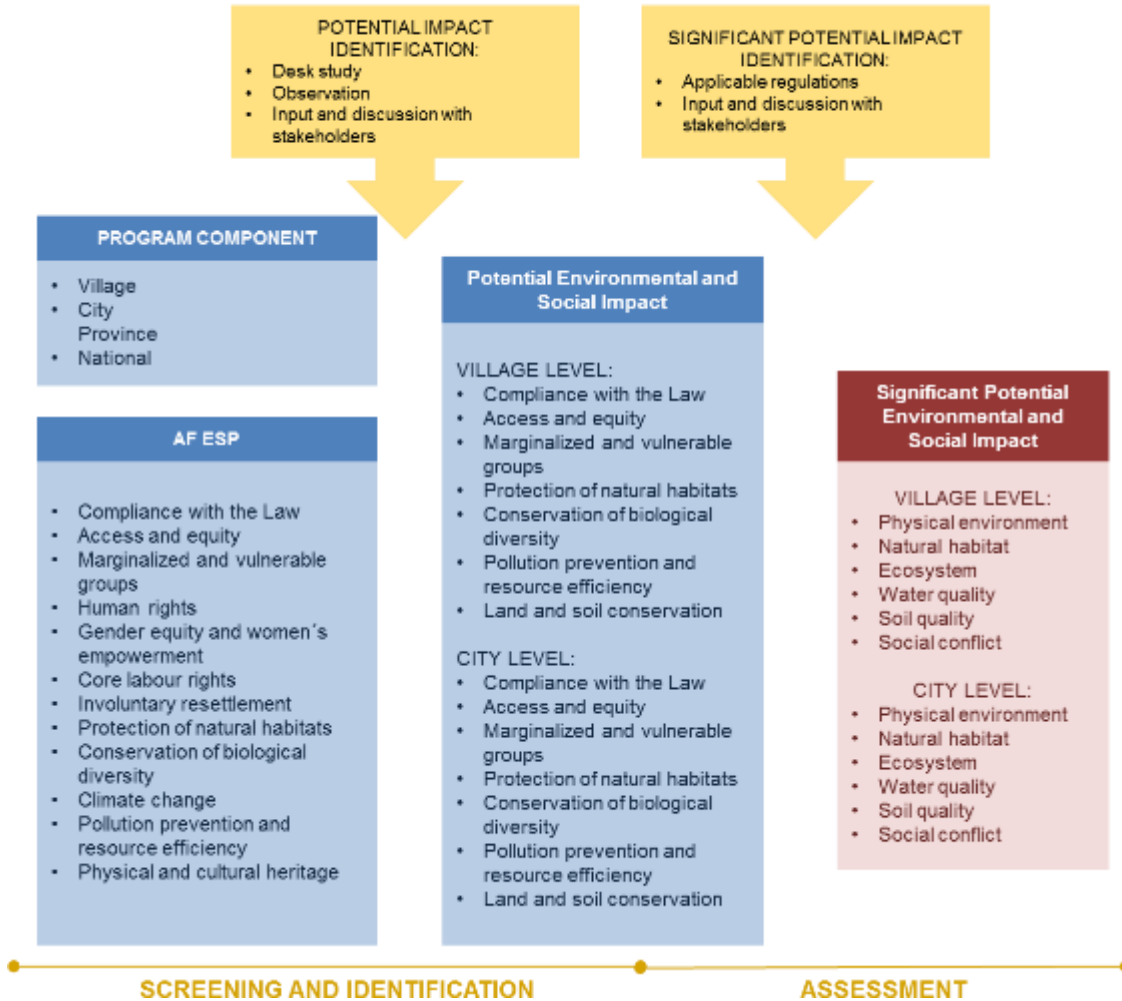


Figure 2. Environmental and Social Impact Assessment Process

**1.6.1. Environmental and Social Impact Screening and Identification**

The screening and identification process is being undertaken at the initial stage of assessment to identify at which program component that potential environmental and social impacts associated with AF ESP could arise. The screening and identification result is presented at table 1 below. The process shows that no potential impacts can be identified for program implementation at province and national level. Potential impacts only identified at village and city level; and the program has no environmental and social impacts associated with 8 out of 15 AF ESP Principles.



Table 1. Screening Result against AF ESP Principles

No	ESP	Program Component (Level)			
		Village	City	Province	National
1	Compliance with the Law	√	√	-	-
2	Access and equity	√	√	-	-
3	Marginalized and Vulnerable Groups	√	√	-	-
4	Human Rights	-	-	-	-
5	Gender Equity and Women's Empowerment	-	-	-	-
6	Core Labour Rights	√	√	-	-
7	Indigenous People	-	-	-	-
8	Involuntary Resettlement	-	-	-	-
9	Protection of Natural Habitats	√	√	-	-
10	Conservation of Biological Diversity	√	√	-	-
11	Climate Change	√	√	-	-
12	Pollution Prevention and Resource Efficiency	√	√	-	-
13	Public Health	-	-	-	-
14	Physical and Cultural Heritage	-	-	-	-
15	Land and Soil Conservation	√	√	-	-

### 1.6.2. Environmental and Social Impact Assessment

From the screening and identification process, it was identified that potential environmental and social impacts only associated with 7 ESP principles, which are:

- Compliance with law
- Access and equity
- Marginalized and vulnerable groups
- Protection of natural habitats
- Conservation of biological diversity
- Pollution prevention and resource efficiency
- Land and soil conservation

Based on the preceding screening and identification process, the next step is to assess significant potential environmental and social impact at each component that associated with the abovementioned AF ESP Principle, and what output that could potentially resulting in the impacts. The impacts themselves are divided into two categories (environmental and social), which then further divided into a total of 6 (six) sub- categories depending on the receptor of the impacts. The sub categories are:

- a. Physical environment
- b. Natural habitat
- c. Ecosystem
- d. Water quality
- e. Soil quality
- f. Social conflict

The environmental and social impact assessment results are shown in Table 2 below.

Table 2. Significant Potential Environmental and Social Impact from Program Implementation

No	ESP	Program Component	Program Output/Activity	Environmental Component					
				Environmental					Social
				Physical Environment	Natural Habitat	Ecosystem	Water Quality	Soil Quality	Social Conflict
1	Compliance with the Law	Enhancing protection along the coastal line of Pekalongan City	Output 1.1.1 Multilevel stakeholder engagement in the establishment of 3 ha Mangrove Ecosystem	-	-	-	-	-	-
			Output 1.1.2 Breakwater (rubble mound) covering the coast of Kandang Panjang in the area of Mangrove Information Centre (PIM) constructed	<del>Physical environment disruption from mobilization and construction process</del> Physical environment disruption from mobilization and construction process	-	-	-	-	-
		Enhancing coastal community capacity in developing and implementing Local Climate Change Adaptation Action Plan (RAD API), climate	Output 2.3.1 Pilot innovative adaptation measures are implemented in collaboration with other stakeholders and evaluated for future reference	-	-	-	-	-	-

		change information system, Climate Smart Initiative							
		Improving community's resilience through initiation of alternative livelihood and improvement of sanitation facility	Output 5.1.1 Aquafarming in mangrove ecosystem developed and implemented by community	-	Minor <del>disturban</del> <del>disturban</del> <del>ce-ee</del> to marine habitat through introduction of capture fishery in mangrove ecosystem	Minor disturbance to mangrove ecosystem through introduction of capture fishery	-	-	-
	Output 5.1.2 Mangrove ecotourism improved and involving wider participation of affected coastal community of Pekalongan City		Minor physical environment disruption from mobilization and development process	-	-	-	-	-	
	Output 5.1.3 Improved cultural economy through application of ecological batik using mangrove based colouring product		-	-	Minor disturbance to mangrove ecosystem	-	-	-	

			Output 5.1.4 Improved food security through the application of urban farming as alternative to conventional agriculture practices	Minor physical environment disruption from mobilization and development process	-	-	-	-	-
			Output 5.1.5 Developed circular economy through initiation integrated waste management system and processing	Physical environment disruption from mobilization and construction process	-	-	-	-	-
			Output 5.1.6 Communal latrines constructed to improved water & sanitation in 8 target <i>kelurahan</i> to mitigate risks of waterborne disease	Minor physical environment disruption from mobilization and construction process such as minor damage to road access from construction material	-	-	-	-	-

2	Access and equity	<a href="#">Enhancing protection along the coastal line of Pekalongan City</a>	<a href="#">Output 1.1.2 Breakwater (rubble mound) covering the coast of Kandang Panjang in the area of Mangrove Information Centre (PIM) constructed</a>	-	-	-	-	-	<ul style="list-style-type: none"> <li>• <a href="#">Empowering communities who work the land is a top priority within the Breakwater Construction of Pekalongan City Coast (BCPCC) to act as a workforce or business partner for BCPCC Development Plan activities</a></li> <li>• <a href="#">Negotiating to create agreements and conflict solutions</a></li> <li>• <a href="#">Cooperate and/or coordinate with relevant stakeholders (sub-district, subdistrict government, etc.) to reduce conflict</a></li> </ul>
		Enhancing coastal community capacity in developing	Output 2.3.1 Pilot innovative adaptation measures are implemented in	-	-	-	-	-	<ul style="list-style-type: none"> <li>• Social conflict might arise from selection of community member that will</li> </ul>

		and implementing Local Climate Change Adaptation Action Plan (RAD API), climate change information system, Climate Smart Initiative	collaboration with other stakeholders and evaluated for future reference						<p>be the implementer and beneficiaries of adaptation actions</p> <ul style="list-style-type: none"> <li>• <a href="#">Create boundaries in the field by involving elements of the local community/fishermen and relevant policy makers (KSOP, Maritime Affairs and Fisheries Service) who understand the boundaries and coastal areas.</a></li> <li>• <a href="#">Make boundaries in the field properly and correctly in accordance with guidelines for coastal area boundaries in Pekalongan City in accordance with Central Java Province Regional Regulation (PERDA) Number 13 of 2018</a></li> <li>• <a href="#">Zoning Plan for Coastal Areas and Small Islands Central Java Province 2018-2038</a></li> </ul>
--	--	---	--	--	--	--	--	--	--

		Improving community's resilience through initiation of alternative livelihood and improvement of sanitation facility	Output 5.1.4 Improved food security through the application of urban farming as alternative to conventional agriculture practices	-	-	-	-	-	Social conflict might arise from selection of community member that will be the implementer and beneficiaries of adaptation actions
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3	Marginalized and Vulnerable Groups	Enhancing coastal community capacity in developing and implementing Local Climate Change Adaptation Action Plan (RAD API), climate change information system, Climate Smart Initiative	Output 2.3.1 Pilot innovative adaptation measures are implemented in collaboration with other stakeholders and evaluated for future reference	-	-	-	-	-	Social conflict might arise from selection of community member that will be the implementer and beneficiaries of adaptation actions
		Improving community's resilience through initiation of alternative livelihood and improvement of sanitation facility	Output 5.1.4 Improved food security through the application of urban farming as alternative to conventional agriculture practices	-	-	-	-	-	Social conflict might arise from selection of community member that will be the implementer and beneficiaries of adaptation actions



4	Protection of Natural Habitats	Enhancing protection along the coastal line of Pekalongan City	Output 1.1.1 Multilevel stakeholder engagement in the establishment of 3 ha Mangrove Ecosystem	-	Mobilization and planting process of mangrove belt could potentially impact the surrounding ecosystem	Minor disturbance to mangrove ecosystem through introduction of capture fishery	-	-	-
		Improving community's resilience through initiation of alternative livelihood and improvement of sanitation facility	Output 5.1.1 Aquafarming in mangrove ecosystem developed and implemented by community	-	Minor disturbance to marine habitat through development/enhancement of diverse organisms and other marine species	-	-	-	-
			Output 5.1.2 Mangrove ecotourism improved and involving wider participation of affected coastal community of Pekalongan City	-	Mobilization and planting process of mangrove belt could potentially impact the	-	-	-	-

					surrounding ecosystem				
			Output 5.1.3 Improved cultural economy through application of ecological batik using mangrove based colouring product	-	-	-	-	-	-
			Output 5.1.4 Improved food security through the application of urban farming as alternative to conventional agriculture practices	-	Minor disturbance to existing micro habitat at selected farming sites	-	-	-	-
			Output 5.1.5 Developed circular economy through initiation integrated waste management system and processing	-	Disturbance to existing micro habitat at selected pilot site might occur	-	-	-	-

					through applied physical construction				
			Output 5.1.6 Communal latrines constructed to improved water & sanitation in 8 target <i>kelurahan</i> to mitigate risks of waterborne disease	-	Minor disturbance to existing micro habitat at selected construction sites	-	-	-	-
5	Conservation of Biological Diversity	Enhancing protection along the coastal line of Pekalongan City	Output 1.1.1 Multilevel stakeholder engagement in the establishment of 3 ha mangrove ecosystem	-	-	Minor environmental and ecological disruption from alteration of resource management from introduction of new mangrove species to the environment	-	-	Potential social conflict (resistance) with land-owner to allocate their unproductive private land for mangrove restoration site
			Output 1.1.2 Breakwater (rubble mound) covering the coast of Kandang	-	-	Disturbance to surrounding coastal ecosystem might occur	-	-	-

			Panjang in the area of Mangrove Information Centre (PIM) constructed			during material mobilization and construction process			
		Improving community's resilience through initiation of alternative livelihood and improvement of sanitation facility	Output 5.1.2 Mangrove ecotourism improved and involving wider participation of affected coastal community of Pekalongan City	-	-	<ul style="list-style-type: none"> <li>Waste generation and water pollution from ecotourism site preparation, development and operational activities could disrupt natural habitat and ecosystem balance</li> <li>Large number of human presence and noise could disturb natural fauna in the area</li> </ul>	-	-	-

6	Pollution Prevention and Resource Efficiency	Enhancing protection along the coastal line of Pekalongan City	Output 1.1.1 Multilevel stakeholder engagement in the establishment of 3 ha Mangrove Ecosystem	<ul style="list-style-type: none"> <li>• <u>Reduced Waste Generation Solid waste generation in small/medium cities is estimated at 0.3 -0.4 kg/person/day. Thus, the generation of solid waste during breakwater construction activities is 4 kg/day. Benchmark: SNI 19-3964-1995:</u></li> <li>a. <u>Providing a place to dispose of waste materials and waste equipment so that waste does not scatter and endanger workers.</u></li> <li>b. <u>Manage the waste produced up to the TPS and sort organic and inorganic waste.</u></li> <li>c. <u>Do not burn rubbish/solid waste in the</u></li> </ul>	-	-	Water pollution from mangrove belt planting process -	-	<ul style="list-style-type: none"> <li>• <u>Regularly sprinkling equipment and/or material transportation routes with water, especially during the dry season around residential areas</u></li> <li>• <u>people passing through,</u></li> <li>• <u>Using a vehicle fit for operation;</u></li> <li>• <u>Cover the vehicle bed with a tarpaulin to cover cargo that is at risk of falling when transporting equipment and/or materials.</u></li> <li>• <u>Not transport equipment and/or materials exceeding the dimensional capacity specified according to the type of vehicle (not ODOL)</u></li> <li>• <u>Carry out maintenance and replace components on the vehicle regularly.</u></li> <li>• <u>Limiting the speed of transport vehicles when passing through residential areas and dirt roads that have the potential to generate dust.</u></li> <li>• <u>Installation of operational vehicle stickers for transporting</u></li> </ul>
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				<p><u>project/activity area.</u>  <u>d. Transporting waste to the landfill is carried out once a month or if the collection site is full</u></p> <ul style="list-style-type: none"> <li>• <u>Reduced levels of SOx, NOx, CO, COx, and Pb</u></li> <li>• <u>Emissions and dust particles originating from loading &amp; unloading rock material activities at rock material stockpile locations using heavy equipment (excavators):</u> <ol style="list-style-type: none"> <li>a. <u>The stockpile location is as close as possible to the loading to the construction site location</u></li> <li>b. <u>Land cleaning uses equipment that meets low emission standards.</u></li> </ol> </li> </ul>					<p><u>construction materials for the Pekalongan City Breakwater Construction-</u></p> <ul style="list-style-type: none"> <li>• <u>Reduced effects of noise exposure from vehicles transporting equipment &amp; materials &gt; 55 dBA-:</u> <ol style="list-style-type: none"> <li>a. <u>The maximum vehicle speed limit is 40 km/hour.</u></li> <li>b. <u>Do not sound the vehicle horn when entering residential areas at residents</u></li> <li>c. <u>Carry out maintenance and replace components on the vehicle regularly.</u></li> <li>d. <u>Limiting the speed of transport vehicles when traveling on dirt roads that have the potential to generate dust.</u></li> <li>a-e. <u>Do not carry out equipment and material mobilization activities during peak hours of population activity.</u></li> </ol> </li> </ul>
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				<p><u>c. Providing regulations and agreements regarding working hours for construction activities-</u></p> <ul style="list-style-type: none"><li><u>• Reduced Rates of Erosion and Sedimentation:</u></li></ul> <p><u>a. Preparing the work area by excavating the soil includes digging and removing all types of weathering products. This material can be moved with heavy equipment without raking and then leveled and tidied up.</u></p> <p><u>b. Prepare the work area with strong and durable materials ability to support the load of heavy equipment and rock materials.</u></p> <p><u>c. Reinforcing the topsoil structure to</u></p>					
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				<p><a href="#">provide support ergonomics of heavy equipment work and material piles equipped with adequate drainage arrangements (Addition of drainage channels/Waterways) on the edge of the coast.</a></p> <p><a href="#">d. Timing of activities by reducing the intensity of activities during the rainy season.</a></p>					
		Improving community's resilience through initiation of alternative livelihood and improvement of sanitation facility	Output 5.1.6 Communal latrines constructed to improved water & sanitation in 8 target <i>kelurahan</i> to mitigate risks of waterborne disease	-	-	-	Ground water or sea water pollution from construction process of the facilities and the effluent of sanitation facilities (during its operational phase)	-	-



7	Land and Soil Conservation	Enhancing protection along the coastal line of Pekalongan City	Output 1.1.2 Breakwater (rubble mound) covering the coast of Kandang Panjang in the area of Mangrove Information Centre (PIM) constructed	-	-	-	-	Soil pollution from solid waste, oil-based waste and waste water during mobilization and construction process of breakwater	-
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		Improving community's resilience through initiation of alternative livelihood and improvement of sanitation facility	Output 5.1.2 Mangrove ecotourism improved and involving wider participation of affected coastal community of Pekalongan City	-	-	-	-	Soil pollution from waste generation and waste water contamination during operational activities in the eco-tourism site	-
			Output 5.1.6 Communal latrines constructed to improved water & sanitation in 8 target <i>kelurahan</i> to mitigate risks of waterborne disease	-	-	-	-	Soil pollution from construction process of the facilities and potential soil contamination from effluent of sanitation facilities (during its operational phase), and potential leakage from the facilities	-
8.	<a href="#">Core Labour Rights</a>	<a href="#">Enhancing protection along the coastal line of Pekalongan City</a>	<a href="#">Output 1.1.2 Breakwater (rubble mound) covering the coast of Kandang Panjang in the</a>	=	=	=	=	=	<a href="#">1. Emergence of social conflict between construction workers and the</a>

			<a href="#">area of Mangrove Information Centre (PIM) constructed</a>						<a href="#">surrounding community.</a> <a href="#">2. Emergence of local community jealousy regarding the utilization of local labor as construction workers.</a> <a href="#">3. Prioritize project workforce from local residents.</a> <a href="#">4. Carry out a social approach to the community in the Kandang Panjang sub-district, North Pekalongan sub-district, Pekalongan City and surrounding areas to accommodate the aspirations and opinions accommodated by representatives of the affected communities</a>
<a href="#">9.</a>	<a href="#">Climate Change</a>	<a href="#">Enhancing protection along the coastal line of Pekalongan City</a>	<a href="#">Output 1.1.2 Breakwater (rubble mound) covering the coast of</a>	<a href="#">Physical environment disruption from mobilization and construction</a>	<a href="#">=</a>	<a href="#">=</a>	<a href="#">=</a>	<a href="#">=</a>	<a href="#">=</a>

			<a href="#">Kandang Panjang in the area of Mangrove Information Centre (PIM) constructed</a>	<a href="#">process</a>					
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Significant potential environmental and social impacts based on the assessment above will be managed accordingly throughout the program by referring to the environmental and social management plan that will be presented in section 1.7 ENVIRONMENTAL AND SOCIAL MANAGEMENT PLAN.

### 1.6.3. Compliance to AF ESP

The following section presents the program compliance to AF ESP Principles.

#### a. *Compliance with the Law*

The program is designed in compliance with all applicable national, regional and local law, including:

- [Law Number 5 of 1960 concerning Basic Regulations on Agrarian Principles](#)
- [Law Number 18 of 2008 concerning Waste Management;](#)
- [Law 32/2009 on Environmental Protection and Management.](#)
- [Law Number 2 of 2012 concerning Land Acquisition for Development in the Public Interest;](#)
- [Law Number 27 of 2007 concerning Management of Coastal Areas and Small Islands;](#)
- [Law Number 23 of 2014 concerning Regional Government;](#)
- [Law Number 1 of 2014 concerning Amendments to Law Number 27 of 2007 concerning Management of Coastal Areas and Small Islands;](#)
- [Law Number 6 of 2023 concerning the Stipulation of Government Regulations in Lieu of Law Number 2 of 2022 concerning Job Creation into Law](#)
- [Government Regulation 27/2012 on Environmental Permit and Environmental Impact Assessment](#)
- [Government Regulation Number 18 of 2012 concerning Management of Household Waste and Similar Household Waste;](#)
- [Government Regulation Number 5 of 2021 concerning Implementation of Risk-Based Business Licensing;](#)
- [Government Regulation Number 22 of 2021 concerning the Implementation of Environmental Protection and Management;](#)
- [Government Regulation Number 21 of 2021 concerning the Implementation of Spatial Planning;](#)
- [Government Regulation Number 19 of 2021 concerning Implementation of Land Acquisition for Development in the Public Interest.](#)
- [Minister of Environment Regulation Number 5 of 2014 concerning Waste Water Quality Standards;](#)
- [Ministry of Environment and Forestry Regulations PermenLHK P.38/MENLHK/SETJEN/KUM.1/7/2019 on Types of Activities that Needs to be Equipped with Environmental Impact Assessment](#)
- [Ministry of Environment Regulations 16/2012 on Guidance to Develop Environmental Document \(AMDAL, UKL-UPL and SPPL\)](#)
- [Ministry of Environment Regulation 8/2013 on Procedure for Assessment and Checking of Environmental Document, as well as Environmental Permit Issuance](#)
- [Ministry of Environment and Forestry Regulation No. 4 Year 2021 on The List of Bussines and/or Activity that require EIA \(AMDAL\), UKL-UPL or SPPL](#)
- [Ministry of Public Works Regulation 10/2008 on Types of Activities under Public Works Sector that Require UKL/UPL](#)
- [Minister of Maritime Affairs and Fisheries Regulation Number 31/PERMEN-KP/2020 concerning Conservation Area Management;](#)
- [Minister of Environment and Forestry Regulation Number 4 of 2021 concerning List of Businesses and/or Activities Required to Have Environmental Impact Analysis, Environmental Management Efforts and Environmental Monitoring Efforts or a Statement of Capability for Environmental Management and Monitoring;](#)
- [Minister of Environment and Forestry Regulation Number 5 of 2021 concerning Procedures for Issuing Technical Approvals and Operational Feasibility Documents in the](#)

- Field of Environmental Pollution Control:
- Minister of Environment and Forestry Regulation Number 6 of 2021 concerning Procedures and Requirements for Management of Hazardous and Toxic Waste;
  - Regulation of the Minister of Maritime Affairs and Fisheries Number 26 of 2021 concerning Prevention of Pollution, Prevention of Damage, Rehabilitation and Improvement of Fish Resources and the Environment;
  - Minister of Maritime Affairs and Fisheries Regulation Number 28 of 2021 concerning Implementation of Marine Spatial Planning;
  - Minister of Public Works and Public Housing Regulation Number 10 of 2021 concerning Guidelines for Construction Safety Management Systems;
  - Minister of Environment Decree Number Kep-48/MENLH/11/1996 concerning Noise Level Standards.
  - Pekalongan City Regional Regulation (PERDA) Number 7 of 2020 in Amendment to Pekalongan City Regional Regulation Number 16 of 2012 concerning Waste Management;
  - Pekalongan City Regional Regulation Number 3 of 2010 concerning Environmental Protection and Management of Pekalongan City;
  - Pekalongan City Regional Regulation Number 9 of 2015 concerning Waste Water Management;
  - Pekalongan City Regional Spatial Planning for 2018-2038 (Pekalongan City Regional Gazette 2020 Number 9).
  - Pekalongan City Regional Regulation 13 of 2022 Concerning Boundary Lines (Pekalongan City Regional Gazette 2022 Number 13, Supplement to Pekalongan City Regional Gazette Number 13)
  - Pekalongan City Regional Regulation Number 17 of 2017 concerning Amendments to Pekalongan City Regional Regulation Number 3 of 2010 concerning Protection and Management of the Environment of Pekalongan City.
  - ~~Law Number 32/2009 on Environmental Protection and Management.~~
  - ~~Government Regulation Number 27/2012 on Environmental Permit and Environmental Impact Assessment~~
  - ~~Law 32/2009 on Environmental Protection and Management.~~
  - ~~Government Regulation 27/2012 on Environmental Permit and Environmental Impact Assessment~~
  - ~~Ministry of Environment and Forestry No. P.38/MENLHK/SETJEN/KUM.1/7/2019 year of 2019 concerning Types of Business Plans and/or Activities that Must Have an Analysis of Environmental Impacts~~
  - ~~Ministry of Environment Regulations 16/2012 on Guidance to Develop Environmental Document (AMDAL, UKL-UPL and SPPL)~~
  - ~~Ministry of Environment Regulation 8/2013 on Procedure for Assessment and Checking of Environmental Document, as well as Environmental Permit Issuance~~
  - ~~Ministry of Public Works Regulation 10/2008 on Types of Activities under Public Works Sector that Require UKL/UPL~~

According to the abovementioned regulations, EIA is not compulsory for the selected adaptation actions under the program; however the following environmental documents should be submitted prior to the implementation of specific adaptation actions so that environmental permit can be issued by the city government:

- Individual and communal sanitation facilities (latrine): SPPL document
- Aquaculture: UKL-UPL document
- Breakwater construction: UKL-UPL document
- Eco-tourism: UKL-UPL document

Every 6 months, regular monitoring will be required for activities that need UKL-UPL, and the report will be submitted to the City's Environmental Agency. The report content itself is outlined in Ministry of Environment Regulation No. 16/2012.

Meanwhile based on the abovementioned regulations, mangrove restoration activity does

not need to be equipped with environmental document However, additional permit and compulsory assessment still need to be obtained and undertaken for specific adaptation actions that will be implemented in future time within the program timeframe; particularly for actions listed in the Ministry of Environment and Forestry No. P.38/MENLHK/SETJEN/KUM.1/7/2019 year of 2019. For the proposed program, the selected adaptation actions do not fall under the category of activities that need to be equipped with Environment Impact Assessment. Yet, the PMU will ensure mangrove restoration activity and other activities under the program that all activities implemented, particularly those related to structural construction (sanitation facilities, coastal embankment, will prevent negative impacts to the surrounding environment by implementing is ESMP and adhering to the applicable regulations Law 32/2009 and also Housing Construction

Based on the current status, the UKL-UPL study has been completed and is awaiting approval from the Central Java Provincial Environment Office, which can only be obtained after approval for of the KKPRL license from the Ministry of Marine Affairs and Fisheries. In principle, the UKL-UPL document has been approved, but the previous explanation is the cause of the non-issuance of the ~~ukl-upl~~UKL-UPL licensing document. In addition, the UKL-UPL is the basis for the preparation of the ESIA document. Given that most of the social and environmental studies have been carried out in the UKL-UPL, the ESIA document complements the UKL-UPL document. The latest status of KKPRL licensing development is that a ~~technical~~ ~~textical~~ assessment has been carried out on the proposal submitted to the KKP and is currently waiting for the KKPRL license to be issued by the KKP.

Potential risks:

Disruption of physical environment from mobilization, construction and implementation process of adaptation actions.

Requirements and Managements:

- Prepare the required environmental documents prior to the implementation of adaptation actions

- The environmental document will be in coherent with the program's ESMP
- Prepare the necessary environmental management plan for each activity listed in ESMP.
- Mitigation measures for the impacts are stated in the Environmental and Social Management Plan (Annex 1).—

b. *Access and Equity*

The program is designed to ensure fair allocation of access to the community, including in information dissemination. To further disseminate knowledge related to the program, knowledge board will be built in community centre or village office; making it accessible to all community.

Participatory approach employed by the program will further ensure access and equity principle being undertaken during program implementation.

One issue being raised during FGD on Gender Issue conducted during the proposal development stage is workshops and meetings timing that should be done at night time to ensure women's group participation in the process. This issue will be taken into account when designing the relevant activities to ensure all groups have similar access to program information and implementation process.

Despite the effort in ensuring access and equity principle being carried out within the program, there still a minor potential social risks that could arise during program implementation.

During the socialization for the breakwater construction, there has been some concerns from the affected community in the *kelurahan* Kandang Panjang that their land would be taken over for the construction. If not appropriately addressed, this concerns could develop to be a potential social conflict.

Potential risks:

- Social conflict arising from selection of community member that will be the implementer and beneficiaries of adaptation actions and alternative livelihood at village and city level implementation.
- Potential conflict could arise from the community who are afraid that their land would be taken over for the construction.

Requirements and Managements:

Stakeholder mapping as the basis for assessment on implementer selection, fair role and responsibilities among stakeholders, equitable distribution of project beneficiaries and also activities site location (including knowledge board location) that could benefit wider community.

In terms of mitigating the potential conflict related to the breakwater construction, it is necessary to empower communities who work the land. It is also a top priority within the Breakwater Construction of Pekalongan City Coast (agreements BCPCC) to involve the targeted community as a workforce or business partner for BCPCC Development Plan activities. Further, negotiations and discussions are essentials to reach a mutual consent. Cooperation and/or coordination with relevant stakeholders (sub-district, subdistrict government, etc.) are important to help reduce potential conflict.

c. *Marginalized and Vulnerable Groups*

Marginalized and vulnerable groups are the targeted beneficiaries of the program. They will not only act as the passive actor within the program, but also actively involved in the program implementation.



The proposed program will employ participatory approach, particularly at local level, by involving women groups, most vulnerable groups and community representative from different socio- economic level during training, discussion forum and risk assessment process. The planned adaptation actions and alternative livelihood also designed by taking into account their interests.

However, there still a minor potential social risks that could arise during program implementation. Potential risks: Social conflict arising from selection of priority activities site and design (at village and city level implementation) which could raise envy from other community member that will not directly exposed to the program

Requirements and Managements:

- Social impact assessment and management plan for the adaptation options will be integrated under UKL-UPL and SPPL document and will be submitted to the city agency. on potential adaptation actions during prioritization process. Pro-poor actions (action that could benefit those who have the least economic adaptive capacity but has a high exposure to climate risk) should be among the priority
- Social impact assessment and management plan will be in coherent with the Program's ESMP
- Adaptation action design (the site location and structural design for hard structure) that take account the needs and suitability for elderly, children groups, and disable groups; to ensure they can experience the benefit

d. *Human Rights*

The proposed program is intended to elevate the quality of life of the beneficiaries (including marginalized and vulnerable groups) by creating a better environment for them (physical, social and economic environment).

Furthermore, The Republic of Indonesia has ratified the following International Covenant:

- The International Covenant on Economic, Social, and Cultural Rights into Law Number 11/2005
- International Covenant on Civil and Political Rights into Law Number 12/2005.

The proposed program will adhere to these laws and ensure that Human Rights principles are being carried out throughout the course of the program.

e. *Gender Equity and Women's Empowerment*

The Republic of Indonesia has ratified the Convention on the Elimination of All Forms Against Women/CEDAW into Law Number 7/1984. Hence the proposed program will comply with this law and also other applicable national law on Gender Equity and Justice. Gender analysis had been done during proposal development stage and outlined this particular document.

Women groups will be an active participant in the program, where their representative will be selected as Village Working Group member. Furthermore, the program is designed so that trainings on economic livelihood will involve female participant; to ensure they will receive economic benefits from the actions. There is no risk that the husbands will object their wives new livelihood since it will support their household economy.

f. *Core Labour Rights*

Relevant to labour rights, the nationally applicable regulations are as below:

- Law No. 80 of 1957 concerning Ratification of ILO Convention No. 100 on Equal Remuneration for Men and Women Workers for Work of Equal Value
- Law No. 7 of 1984 concerning Ratification of the Convention on the Elimination of All Forms of
- Discrimination Against Women;
- Law No. 21 of 1999 concerning Ratification of ILO Convention No. 111 regarding

- Discrimination in Employment and Occupation.
  - Law No. 13 of 2003 on Manpower

Accordingly, labour works done under this program will adhere to the above laws, including payment issue. Additionally, the program will also ensure that it will comply with ILO Convention No. 138 and 182 on Child Labour, by assuring that there will be no child labour involved in the program. The program will not pose any risk on labour rights since it will ~~equip~~equip the community member with additional skills.

*g. Indigenous People*

Community resides within the geographical scope of the proposed program came from similar ethnicity, and has a well-established social norm. Accordingly, there is no risk related to indigenous people for this proposed program

*h. Involuntary Resettlement*

Resettlement for community who resides in permanently inundated area is issue that had been raised in the past, but put on hold due to local government budget constraint.

During the full proposal development stage it has been agreed with the city stakeholders (including government and community) that resettlement will not be a part of the proposed adaptation actions. Hence there is no risk of involuntary resettlement for the program.

*i. Protection of Natural Habitats*

As a coastal area, protection of natural habitat is essential to be taken throughout the course of the program. Mangrove, the natural habitat for fish and shell fish, has been the green belt for Pekalongan City shoreline for the past decade, protecting the area to a certain extent from sea-related risk. However, mangrove condition in the area has been degraded in the past years. Risks

posed to natural habitats from the implementation of adaptation actions will be among the content of potential impacts outlined in the UKL-UPL and SPPL document of each action

Potential risks:

Minor natural habitat disruption from aquaculture preparation activity, mangrove restoration process, as well as mobilization and construction process of breakwater, eco-tourism site and communal sanitation facilities

Requirements and Managements:

- Submitting the relevant environmental document for each adaptation action to obtain environmental permit for its implementation. The needed documents are:
    - Individual and communal sanitation facilities (latrine): SPPL document
    - Aquaculture: UKL-UPL document
    - Breakwater construction: UKL-UPL document
    - Eco-tourism: UKL-UPL document
  - The environmental document will be in coherent with the program's ESMP
  - Prepare the necessary environmental management plan for each activity listed in ESMP.
- j. Mitigation measures for the impacts are stated in the Environmental and Social Management Plan (Annex 1).

k. Conservation of Biological Diversity

~~Conservation of Biological Diversity~~

Coastal resilience aimed by this proposed program is not only focusing on human resilience, but also considering the corresponding biodiversity.

Potential risks:

- Minor environmental and ecological disruption from the construction of breakwater, mangrove belt, eco-tourism site and communal sanitation facilities; and alteration of resource management (introduction of shrimp and fish species to body of water, and introduction of new mangrove species to the environment)
- The targeted mangrove restoration site might be privately owned, and there is a potential that the land-owner reluctant to 'donate' their land for the activity

Requirements and Managements:

- Submitting the relevant environmental document for each adaptation action to obtain environmental permit for its implementation. The needed documents are
    - Individual and communal sanitation facilities (latrine): SPPL document
    - Aquaculture: UKL-UPL document. The document content will include the potential impact from the introduction of Bandeng fish to a new environment and how it will interact.
    - Breakwater construction: UKL-UPL document
    - Eco-tourism: UKL-UPL document
  - The environmental document will be in coherent with the program's ESMP
  - Prepare the necessary environmental management plan for each activity listed in ESMP, including the impact from mangrove restoration activity.
  - Mitigation measures for the impacts are stated in the Environmental and Social Management Plan (Annex 1). Environmental Management and Monitoring Plan for hard structure construction or activity that potentially create adverse impacts, that does not falls under the category that needs EIA; including for activities that are related to the introduction of foreign and invasive species; how the said species will survive and interact in a new environment (e.g. Vennamei shrimp)
  - The program will be ensured as will adhere to applicable laws and regulations on biodiversity conservation, including Ministry of Marine and Fisheries Regulation No. 16 Year 2008 on Management Plan of Coastal Area and Small Islands and other
- k.l. Identification of land-ownership in the targeted mangrove restoration site. Involvement of the private land owners in relevant workshops at village level.

m. Climate Change

~~Climate Change~~

Activities conducted within the program have the potential to cause pollution if not being managed carefully.

~~Activities under the proposed program will not significantly contribute to the increase of greenhouse gas emission or other climate change drivers.~~

Potential risks:

- Physical environment disruption from mobilization and construction process of embankment breakwater

Requirements and Managements:

- Submitting the relevant environmental document for each adaptation action to obtain environmental permit for its implementation. The needed documents are
  - Breakwater construction: K K P R L & UKL-UPL document
- The environmental document will be in coherent with the program's ESMP
- Prepare the necessary environmental management plan for each activity listed in ESMP.
- Mitigation measures for the impacts are stated in the Environmental and Social Management Plan (Annex 1).

n. Pollution Prevention and Resource Efficiency

Activities conducted within the program have the potential to cause pollution if not being managed carefully.

Potential risks:

- Water pollution from the construction and implementation of hard and soft structure construction (coastal embankment breakwater, eco-tourism site, mangrove belt and sanitation facilities);, implementation of aquaculture farming; existing agriculture and farming practices, alteration of resource management (introduction of shrim and fish species to body of water), and also by by-product from aquaculture farming and alternative livelihood and sanitation facilities' effluent (both floating and non-floating design),
- Sedimentation due to accumulation of bandeng/vennamei fish feedstock in aquaculture farm,
- Noise pollution from mobilization for breakwater construction.

Requirements and Managements:

- Submitting the relevant environmental document for each adaptation action to obtain environmental permit for its implementation. The needed documents are
  - Individual and communal sanitation facilities (latrine): SPPL document
  - Aquaculture: UKL-UPL document
  - Breakwater construction: UKL-UPL document
  - Eco-tourism: UKL-UPL document
- The environmental document will be in coherent with the program's ESMP
- Prepare the necessary environmental management plan for each activity listed in ESMP.
- Mitigation measures for the impacts are stated in the Environmental and Social Management Plan (Annex 1).
- Assessment on a more environmentally friendly aquaculture farming methods/practices.
- Reduced effects of noise exposure from vehicles transporting equipment & materials > 55 dBA :

- a. The maximum vehicle speed limit is 40 km/hour.
- b. Do not sound the vehicle horn when entering residential areas at residents
- c. Carry out maintenance and replace components on the vehicle regularly.
- d. Limiting the speed of transport vehicles when traveling on dirt roads that have the potential to generate dust.

- Do not carry out equipment and material mobilization activities during peak hours of population activity.

*m.o. Public Health*

There is no risk to public health from the program. The program activities will continually be ensured for not placing community's health and safety in dangerous state by adhering to the relevant applicable laws and regulations.

*n.p. Physical and Cultural Heritage*

There is no risk to physical and cultural heritage from the program since there is no physical and cultural heritage located within the geographical scope of the proposed program.

*o.g. Land and Soil Conservation*

Inundation from coastal flooding in the targeted program area has resulted in adverse impact, transforming productive land into unproductive one. This proposed program aims to reduce the inundated area, preventing them from turning into unproductive land by implementing diverse adaptation measures.

Potential risks:

- Soil pollution from hard and soft structure construction of breakwater, (coastal embankment, eco-tourism site, and sanitation facilities); by product from aquaculture farming and effluent of sanitation facilities that apply non-floating design

Requirements and Managements:

- Submitting the relevant environmental document for each adaptation action to obtain environmental permit for its implementation. The needed documents are
  - Individual and communal sanitation facilities (latrine): SPPL document
  - Aquaculture: UKL-UPL document
  - Breakwater construction: UKL-UPL document
  - Eco-tourism: UKL-UPL document
  - The environmental document will be coherent with the program's ESMP
- Prepare the necessary environmental management plan for each activity listed in ESMP.

*r. Core Labor Rights*

The breakwater construction will be labor intensive, thus it will involve quite a number of workers onsite. Once the construction company introduce construction labors from other areas, this might rise jealousy from the local community on the target site. This needs to be mitigated to avoid potential conflict with the community.

Potential risks:

- Emergence of social conflict between construction workers and the surrounding community.
- Emergence of local community jealousy regarding the utilization of local labor as construction workers.

Requirements and Managements:

Conduct stakeholders mapping during project planning stage as the basis for determining the appropriate project implementer and beneficiaries, allocating fair roles and responsibilities among stakeholders, and selecting the appropriate activities site location (including knowledge board location) that could benefit wider community.

Mitigation measures for the impacts are stated in the Environmental and Social Management Plan (Annex 1)

#### 1.6.4. Categorization

In view of the above environmental and social impact assessment process, can be seen that the program implementation has several potential risks that are considered as minor, small scale (limited impacts and not widely spread) and easily mitigated. These risks can be avoided by implementing adequate mitigation measures. With regards to Risk Categorization of AF, the program can be categorized as “**Category B**” where it has potential adverse impacts but in small number, small scale, not widespread and easily mitigated.

### 1.4.1.2. ENVIRONMENTAL AND SOCIAL MITIGATION PLAN

#### 1.7.1. Environmental and Social Impact Mitigation Plan

Mitigating measures for the assessed significant potential environmental and social impacts is presented in table 3 below. The measures will be implemented and utilised by the program to mitigate the potential risks and also ensure the compliance of program implementation to AF Environmental and Social Policy. From the beginning of the program period, the stakeholders will be informed on the potential risks associated with the program and the corresponding mitigation measures in place. This Environmental and Social Management Plan document will be communicated to them; not only during the program preparation phase, but also throughout the course of the program, to ensure all parties involved are aware of the risks and the appropriate mitigation measures.

Table 3. Environmental and Social Impact Mitigation Plan

No	ESP	Type of Impacts	Activity	Impacts Description	Mitigation Measures	PIC	Relevant Stakeholders
1	Compliance with the Law	Environmental	Breakwater construction	Physical environment disruption from mobilization and construction process	<ul style="list-style-type: none"> <li>• Prepare and submit the required environmental documents prior to the implementation of adaptation actions, where this environmental document will be in coherent with the program's ESMP</li> <li>• The required environmental documents are:               <ul style="list-style-type: none"> <li>o Individual and communal sanitation facilities (latrine): SPPL document</li> <li>o Aquaculture: UKL-UPL document</li> <li>o Breakwater construction: UKL-UPL document</li> <li>o Eco-tourism: UKL-UPL document</li> </ul> </li> <li>• Report the implementation and monitoring of UKP-UPL to the City's Environmental</li> </ul>	Construction company and PMU	NIE, Environmental Agency, Public Works Agency and Local Development Planning Board of Pekalongan City
			Ecotourism	Physical environment disruption from mobilization and construction process		Tourism Agency, PMU, and local community	
			Construction of communal sanitation facilities	Minor physical environment disruption from mobilization and construction process such as minor damage to road access from construction material		Construction company and PMU	

					Agent in six-monthly basis		
2	Access and equity	Social	Pilot innovative adaptation measures are implemented in collaboration with other stakeholders and evaluated for future reference	<p>Social conflict arising from selection of community member that will be the implementer and beneficiaries of adaptation actions and alternative livelihood at city level</p> <p><a href="#">Related to the breakwater construction in the kelurahan Kandang Panjang, potential conflict could arise from the community who are afraid that their land would be taken over because of the construction.</a></p> <p><a href="#">Further there is the potential of the emergence of local community jealousy regarding the utilization of local labor as construction workers. Opening of Business Opportunities.</a></p>	<ul style="list-style-type: none"> <li>• Conduct stakeholders mapping during project planning stage as the basis for determining the appropriate project implementer and beneficiaries, allocating fair roles and responsibilities among stakeholders, and selecting the appropriate activities site location (including knowledge board location) that could benefit wider community</li> <li>• Assign village working groups and city working group (which members include community representative) to lead the selection process at village and city level respectively. The beneficiaries' criteria include: affected communities, poor and vulnerable people, farmer</li> </ul>	<a href="#">PMU and Construction Company</a>	City Working Group



				<p><u>Increasing Community Income</u></p>	<p><u>groups.</u>  <u>Specifically for individual latrine, the beneficiaries will be women-headed households</u>  <ul style="list-style-type: none"> <li>•<u>Coordination between village working group, city working group and financial institution to assess and select the most appropriate beneficiaries for the revolving fund</u></li> <li>• <u>Select working group member that could really represent the voice and interest of all layers of community and city stakeholder</u></li> <li>- <u>Empowering communities who work the land is a top priority within the Breakwater Construction of Pekalongan City Coast (agreements BCPCC) to act as a workforce or business partner for BCPCC</u></li> </ul> </p>		
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					<p><u>Development Plan activities</u></p> <ul style="list-style-type: none"><li>• <u>Negotiating to create and conflict solutions</u></li><li>• <u>Cooperate and/or coordinate with relevant stakeholders (sub-district, subdistrict government, etc.) to reduce conflict</u></li><li>• <u>Ten people are accepted for work, 70% of them from the local community</u></li><li>• <u>Creating opportunities for the community to work on breakwater construction</u></li></ul>		
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					<p>people, farmer groups. Specifically for individual latrine, the beneficiaries will be women-headed households •Coordination between village working group, city working group and financial institution to assess and select the most appropriate beneficiaries for the revolving fund Select working group member that could really represent the voice and interest of all layers of community and city stakeholder Empowering communities who work the land is a top priority within the Breakwater Construction of Pekalongan City Coast (agreements BCPCC) to act as a workforce or business partner for BCPCC Development Plan activities</p>		
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					<p><del>Negotiating to create and conflict solutions</del></p> <p><del>Cooperate and/or coordinate with relevant stakeholders (sub-district, subdistrict government, etc.) to reduce conflict</del></p>		
3	Marginalized and Vulnerable Groups	Social	Pilot innovative adaptation measures are implemented in collaboration with other stakeholders and evaluated for future reference	Social conflict arising from selection of priority activities site and design at village level which could raise envy from other community member that will not directly	<ul style="list-style-type: none"> <li>• Conduct social impact assessment and develop the corresponding management plan on potential adaptation actions during prioritization process. This impact assessment and management plan</li> </ul>	PMU	City Working Group

				<p>exposed to the program</p>	<p>will be in coherent with Program's ESMP</p> <ul style="list-style-type: none"> <li>• Social impact assessment and management plan for the adaptation options will be integrated under UKL-UPL and SPPL document and will be submitted to the city agency.</li> <li>• Put priority on pro-poor adaptation actions (action that could benefit those who have the least economic adaptive capacity but has a high exposure to climate risk)</li> <li>• Adaptation action design (the site location and structural design) will take account of the needs and suitability for elderly, children groups, and disable groups</li> <li>• Develop visibility materials that outlines background from the selection and communicate the</li> </ul>		
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					<p>materials to wider community</p> <ul style="list-style-type: none"> <li>• Involving village working groups (which members are community representative) in the selection process</li> <li>• Select working group member that could really represent the voice and interest of all layers of community and city stakeholder</li> </ul>		
4	Protection of Natural Habitats	Environmental	Mangrove restoration	Mobilization and planting process of mangrove belt could potentially impact the surrounding ecosystem	<ul style="list-style-type: none"> <li>• Develop environmental procedure that cover steps under for mangrove restoration activity</li> <li>• Activities conducted in the natural habitat area will follow Law 32 Year 2009 on Environmental Protection and Management and its derivative regulations, particularly section on natural habitat protection</li> </ul>	Local community and PMU	

			Construction of communal sanitation facilities	Potential impact to the surrounding ecosystem during construction and operational process of floating sanitation facilities	<ul style="list-style-type: none"> <li>• Implement impact mitigation measures outline in the SPPL document of the said facilities</li> <li>• Design the floating facilities so that its construction phase will not adversely impact the water body and surrounding ecosystem</li> <li>• Activities conducted in the natural habitat area will follow Law 32 Year 2009 on Environmental Protection and Management and its derivative regulations, particularly section on natural habitat protection</li> <li>• Build temporary sediment and oil trap during facilities construction to prevent sedimentation and inflow of oil-based material to body of water (for floating design)</li> </ul>	Construction company and PMU	
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			Breakwater construction	<p>The impact of breakwater mobilization and construction process to the existing surrounding coastal ecosystem</p> <p><a href="#">Maintaining the Preservation of Natural Resources and Sustainability and Protection of Pekalongan City Coastal Areas</a></p> <p><a href="#">Recovery of Coastal Ecosystems and Mangrove Forests</a></p>	<ul style="list-style-type: none"> <li>• Implement impact mitigation measures outline in the UKL-UPL document of the said structure</li> <li>• Activities conducted in the natural habitat area will follow Law 32 Year 2009 on Environmental Protection and Management and its derivative regulations, particularly section on natural habitat protection</li> <li>• Build temporary sediment and oil trap during breakwater construction process to control abrasion, sedimentation, oil-based material flow to ecosystem</li> <li>• <a href="#">carry out prevention activities against forest disturbances, including theft/illegal logging, forest encroachment, pest and disease control and protection of</a></li> </ul>	Construction company and PMU	
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					<p><a href="#">protected species of natural animals and plants and their habitats</a></p> <ul style="list-style-type: none"> <li>• <a href="#">Maintaining the amount planted and encouraging the growth of mangrove vegetation</a></li> <li>• <a href="#">Improving the physical properties of the soil by hydrating or loosening the soil.</a></li> <li>• <a href="#">Replant dead plants and replace them with similar plants</a></li> </ul>		
			Ecotourism	Waste generation and water pollution from ecotourism site preparation, development and operational activities could pollute the water and	<ul style="list-style-type: none"> <li>• Implement impact mitigation measures outline in the UKL-UPL document of the said structure</li> <li>• Develop sound and applicable environmental procedures for day</li> </ul>	Tourism Agency, Local community and PMU	

				subsequently disrupt natural habitat	to day operations of the eco-tourism site that comply with local regulation for ecotourism site, including waste management plan • Activities conducted in the natural habitat area will follow Law 32 Year 2009 on Environmental Protection and Management and its derivative regulations, particularly section on natural habitat protection • Build temporary sediment trap during ecotourism site development to control abrasion and sedimentation within mangrove ecosystem		
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5	Conservation of Biological Diversity	Environmental	Mangrove restoration	Minor environmental and ecological disruption from alteration of resource management from introduction of new mangrove species to the environment	<ul style="list-style-type: none"> <li>• The program will be ensured as will adhere to applicable laws and regulations on biodiversity conservation, including Ministry of Marine and Fisheries Regulation No. 16 Year 2008 on Management Plan of Coastal Area and Small Islands and other</li> <li>• Primary assessment to see how the new mangrove species will interact in a new environment</li> <li>• Assess the most appropriate location to introduce the new mangrove species</li> </ul>	Academician, local community and PMU	
				Potential social conflict (resistance) with land-owner to allocate their unproductive private land for mangrove restoration site	<ul style="list-style-type: none"> <li>• Identification of targeted mangrove restoration site that are privately owned and their respective owner</li> <li>• Series of workshop to build community awareness on the benefit of turning unproductive land</li> </ul>	Academician, local community and PMU	

					into mangrove restoration site by involving the identified land owner		
			Construction of communal sanitation facilities	Potential impact to the surrounding ecosystem during construction and operational process of floating sanitation facilities	<ul style="list-style-type: none"> <li>• Implement impact mitigation measures outline in the UKL-UPL document of the said facilities</li> <li>• Design the floating facilities so that its construction phase will not adversely impact the water body and surrounding ecosystem</li> <li>• Activities conducted in the natural habitat area will follow Law 32 Year 2009 on Environmental Protection and Management and its derivative regulations, particularly section on natural habitat protection</li> <li>• Build temporary sediment and oil trap during facilities construction to prevent</li> </ul>	Construction company and PMU	Environmental Agency, Tourism Agency, Public Works Agency and Local Development Planning Board of Pekalongan City, Local community

					sedimentation and inflow of oil-based material to body of water (for floating design)		
			Breakwater construction	Ecosystem disruption from mobilization and construction process of breakwater	<ul style="list-style-type: none"> <li>• Implement impact mitigation measures outline in the UKL-UPL document of the said structure</li> <li>• The program will be ensured as will adhere to applicable laws and regulations on biodiversity conservation, including Ministry of Marine and Fisheries Regulation No. 16 Year 2008 on Management Plan of Coastal Area and Small Islands and other</li> <li>• Build temporary sediment and oil trap during breakwater construction process to control abrasion, sedimentation, oil-</li> </ul>	Construction company and PMU	

					based material flow to ecosystem		
			Ecotourism	<ul style="list-style-type: none"> <li>• Waste generation and water pollution from ecotourism site preparation, development and operational activities could disrupt natural habitat and ecosystem balance</li> <li>• Large number of human presence and noise could disturb natural fauna in the area</li> </ul>	<ul style="list-style-type: none"> <li>• Implement impact mitigation measures outline in the UKL-UPL document of the said structure</li> <li>• Develop sound and applicable environmental procedures for day to day operations of the eco-tourism site that comply with local regulation for ecotourism site, including waste management plan</li> <li>• The program will be ensured as will adhere to applicable laws and regulations on biodiversity conservation, including Ministry of Marine and Fisheries Regulation No. 16 Year 2008 on Management Plan of Coastal Area and Small Islands</li> </ul>	Tourism Agency, Local community and PMU	

					and other • Build temporary sediment trap during ecotourism site development to control abrasion and sedimentation within mangrove ecosystem		
67	Pollution Prevention and Resource Efficiency	Environmental	Breakwater construction	<ul style="list-style-type: none"> <li>• Water pollution from mobilization and construction process of breakwater</li> <li>• Sedimentation from mobilization and construction process of breakwater</li> <li>• <u>Noise pollution from mobilization for breakwater construction</u></li> <li>• <u>Decreased Ambient Air Quality and increased dust</u></li> <li>• <u>Increased effects of noise exposure from vehicles transporting equipment &amp; materials &gt; 55 dBA</u></li> </ul>	<ul style="list-style-type: none"> <li>• Implement impact mitigation measures outline in the UKL-UPL document of the said structure</li> <li>• <u>Build temporary sediment and oil trap during breakwater construction process to control abrasion, sedimentation, oil-based material flow to ecosystem</u></li> <li>• <u>Reduced effects of noise exposure from vehicles transporting equipment &amp; materials &gt; 55 dBA :</u> <ul style="list-style-type: none"> <li>a. <u>The maximum vehicle speed limit is 40 km/hour.</u></li> </ul> </li> </ul>	Construction company and PMU	Environmental Agency, Public Works Agency and Local Development Planning Board of Pekalongan City

				<ul style="list-style-type: none"> <li>• <u>Increased Waste Generation</u> Solid waste generation in small/medium cities is estimated at 0.3 -0.4 kg/person/day. Thus, the generation of solid waste during breakwater construction activities is 4 kg/day</li> </ul> <p><u>Benchmark: SNI 19-3964-1995</u></p> <ul style="list-style-type: none"> <li>• <u>Generation of hazardous waste</u></li> <li>• <u>Wastewater generation is equal to</u></li> </ul>	<ul style="list-style-type: none"> <li>b. <u>Do not sound the vehicle horn when entering residential areas at residents</u></li> <li>c. <u>Carry out maintenance and replace components on the vehicle regularly.</u></li> <li>d. <u>Limiting the speed of transport vehicles when traveling on dirt roads that have the potential to generate dust.</u></li> </ul> <ul style="list-style-type: none"> <li>• <u>Do not carry out equipment and material mobilization activities during peak hours of population activity.</u></li> <li>• <u>Regularly sprinkling equipment and/or material transportation routes with water.</u></li> </ul>		
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					<p><u>especially during the dry season around residential areas people passing through</u></p> <ul style="list-style-type: none"><li><u>• Providing a place to dispose of waste materials and waste equipment so that waste does not scatter and endanger workers</u></li><li><u>• Providing adequate and safe containers for hazardous waste;</u></li><li><u>• Deposit hazardous waste to third party/vendor for disposal</u></li><li><u>• Providing portable toilets at the basecamp location</u></li><li><u>• Maintaining the cleanliness of the basecamp environment</u></li><li><u>• Suctioning black water waste in collaboration with a third party</u></li></ul>		
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			Mangrove restoration	Increase in water turbidity during mangrove restoration process	<ul style="list-style-type: none"> <li>• Develop sound environmental procedure that cover steps under for mangrove restoration activity, including temporary waste management plan</li> </ul>	Local community and PMU	Marine and Fisheries Agency and Local Development Planning Board of Pekalongan City, Local community
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			Ecotourism	Water pollution due to solid waste generation and effluent from the site's toilet facilities, and other operational activities in the eco-tourism site	<ul style="list-style-type: none"> <li>• Develop UKL-UPL for ecotourism activities, implement impact mitigation measures outline in the said document, and submit the relevant monitoring report to City Agency every 6 months</li> <li>• Develop sound and applicable environmental procedures that comply with local regulation for ecotourism site, including waste management plan; in which the procedure is an integrated part to the submitted UKL-UPL</li> <li>• Provide training on the environmental procedures to community member that are involved in managing the eco-tourism site</li> </ul> <p>Equipped the site with adequate signage regarding environmentally</p>	Local community, Tourism Agency and PMU	Environmental Agency, Cleanliness Agency, and Local Development Planning Board of Pekalongan City, Local community
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					<p>friendly practices in the area</p> <ul style="list-style-type: none"><li>• Coordinate with Cleanliness Agency of Pekalongan City in the waste management activities</li><li>• As a community-based ecotourism, involve the community in the waste management process, including train them to be able to utilize the waste as additional income; either by creating added value to the waste (compost, recycling) from the waste or collect waste that has monetary value (plastic, paper, metal)</li></ul>		
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			Construction of communal sanitation facilities	Ground water or sea water pollution from construction process of the facilities, effluent from sanitation facilities (during its operational phase), and potential leakage from the facilities	<ul style="list-style-type: none"> <li>• Submit SPPL document for communal sanitation facilities to obtain environmental permit for its implementation</li> <li>• Design the sanitation facilities in accordance with SNI 03-2398-2002 and SNI 03-2399-2002</li> <li>• Rigorous assessment on the most appropriate sanitation facilities for the area's characteristics (including geographical and soil characteristics), to minimize potential risks of pollution</li> <li>• Regular water quality monitoring on the body of water where the sanitation facilities effluent is being conveyed</li> <li>• Together with the community develop utilization and maintenance procedure for the facilities, where the said procedures</li> </ul>	Local community and PMU	Environmental Agency and Local Development Planning Board of Pekalongan City, Local community
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					will be undertaken by them <ul style="list-style-type: none"> <li>• Educate the community on good sanitation behaviour</li> </ul>		
744	Land and Soil Conservation	Environmental	Breakwater construction	Soil pollution from solid waste, oil-based waste and waste water during mobilization and construction process of breakwater  <a href="#">The noise level for the Green Open Space designation is based on Minister of Environment Decree No. KEP-48/MENLH/11/1996 concerning Noise Level Standards does not exceed 55dBA</a>	<ul style="list-style-type: none"> <li>• Develop and submit UKL-UPL document for breakwater construction to obtain environmental permit for its implementation, and subsequently implement impact mitigation measures outline in the said document</li> <li>• Build temporary sediment and oil trap during coastal embankment construction process, to control oil infiltration to the soil layer, and also to prevent abrasion and sedimentation</li> <li>• <a href="#">Equipment and material mobilization vehicles do not</a></li> </ul>	Construction company and PMU	Environmental Agency, Public Works Agency and Local Development Planning Board of Pekalongan City

					<ul style="list-style-type: none"><li><a href="#">use units that produce high noise.</a></li><li><a href="#">• The location plan uses land that is already available so there is not much land clearing.</a></li><li><a href="#">• Land cleaning does not use units that produce high noise.</a></li><li><a href="#">• Organize and supervise workers so as not to create noise</a></li><li><a href="#">• with limited working hours from 08.00 to 16.00.</a></li><li><a href="#">• Benchmark: Minister of Environment Decree No. 48 1996 concerning Standard Levels Noise. Quality Standard is 55 dBA</a></li></ul>		
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			Ecotourism	Soil pollution from waste generation and waste water contamination during operational activities in the eco-tourism site	<ul style="list-style-type: none"> <li>• Develop and submit UKL-UPL for ecotourism activities and implement impact mitigation measures outline in the said document</li> <li>• Submit monitoring report of UKL-UPL to the City Agency every 6 months</li> <li>• Develop sound and applicable environmental procedures that comply with local regulation for ecotourism site, including waste management plan; in which the procedure is an integrated part to the submitted UKL-UPL</li> <li>• Provide training on the environmental procedures to community member that are involved in managing the eco-tourism site</li> <li>• Equipped the site with adequate signage regarding</li> </ul>	Local community, Tourism Agency and PMU	Environmental Agency, Tourism Agency, and Local Development Planning Board of Pekalongan City, Local community
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					<p>environmentally friendly practices in the area</p> <ul style="list-style-type: none"><li>• Coordinate with Cleanliness Agency of Pekalongan City in the waste management activities</li><li>• As a community-based ecotourism, involve the community in the waste management process, including train them to be able to utilize the waste as additional income; either by creating added value to the waste (compost, recycling) from the waste or collect waste that has monetary value (plastic, paper, metal)</li></ul>		
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			Construction of communal sanitation facilities	Soil pollution from construction process of the facilities and potential soil contamination from effluent of sanitation facilities (during its operational phase), and potential leakage from the facilities (if the facilities are not floating design)	<ul style="list-style-type: none"> <li>• Submit SPPL document for communal sanitation facilities to obtain environmental permit for its implementation</li> <li>• Design the sanitation facilities in accordance with SNI 03-2398-2002 and SNI 03-2399-2002</li> <li>• Develop Environmental Management and Monitoring Plan for coastal sanitation facilities' construction process</li> <li>• Together with the community develop utilization and maintenance procedure for the facilities, where the said procedures will be undertaken by them</li> <li>• Rigorous assessment on the most appropriate sanitation facilities for the area's characteristics (including geographical and Soil_ <a href="#">characteristics</a>), to</li> </ul>	Construction company and PMU	Environmental Agency, Public Works Agency, and Local Development Planning Board of Pekalongan City, Local community
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					<p><u>minimize potential risks of pollution</u></p> <ul style="list-style-type: none"> <li>• <u>Regular water quality monitoring on the body of water (including community's ground water source and sea water) where the sanitation facilities effluent is being conveyed</u></li> <li>• <u>Water tight construction for the sanitation facilities (particularly the waste water management installation) to minimize potential leakage to the soil</u></li> </ul> <p><u>Educate the community on good sanitation behavior</u></p>		
8	<u>Core Labour Right</u>	<u>Social Conflict</u>	<u>Breakwater construction</u>	<ol style="list-style-type: none"> <li>1. <u>Emergence of social conflict between construction workers and the surrounding community.</u></li> <li>2. <u>Work Health and Safety Disturbances</u></li> </ol>	<p><u>Conduct stakeholders mapping during project planning stage as the basis for determining the appropriate project implementer and beneficiaries, allocating fair roles and responsibilities among stakeholders, and selecting the appropriate activities site location (including</u></p>	<u>Construction Company and PMU</u>	<p><u>NIE, Environmental Agency, Public Works Agency and Local Development Planning Board of Pekalongan City</u></p>

					<p><a href="#">knowledge board location) that could benefit wider community</a></p> <p><a href="#">Provide OSH SOP Construction complies with OSH Construction standards</a></p> <p><a href="#">Provide complete and adequate PPE to serve all workers and guests who have an interest in construction activities</a></p> <p><a href="#">Place a guard post at the entrance to the area via the river. Close some roads that allow access to activities that could disturb forest security.</a></p>		
9	<a href="#">Climate Change</a>	<a href="#">Environmental</a>	<a href="#">Breakwater construction</a>	<p><a href="#">Physical environment disruption from mobilization and construction process</a></p> <p><a href="#">Increased levels of SOx, NOx, CO, COx, and Pb Emissions and dust particles</a></p>	<p><a href="#">Develop and submit UKL-UPL document for breakwater construction to obtain environmental permit for its implementation, and subsequently implement impact mitigation measures outline in the said document</a></p>	<a href="#">PMU</a>	<p><a href="#">NIE, Environmental Agency, Public Works Agency and Local Development Planning Board of Pekalongan City</a></p>

					<ul style="list-style-type: none"><li>• <u>Regularly sprinkling equipment and/or material transportation routes with water, especially during the dry season around residential areas people passing through,</u></li><li>• <u>Using a vehicle fit for operation;</u></li><li>• <u>Cover the vehicle bed with a tarpaulin to cover cargo that is at risk of falling when transporting equipment and/or materials</u></li></ul>		
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					<p>characteristics), to minimize potential risks of pollution</p> <ul style="list-style-type: none"><li>• Regular water quality monitoring on the body of water (including community's ground water source and sea water) where the sanitation facilities effluent is being conveyed</li><li>• Water tight construction for the sanitation facilities (particularly the waste water management installation) to minimize potential leakage to the soil</li><li>• Educate the community on good sanitation behaviour</li></ul>		
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### ~~1.7.15.1.7.2.~~ 1.7.2. Grievance Mechanism Guidance

As part of the program implementation, the PMU will also set up grievance mechanism for the stakeholders involved. This mechanism is needed to ensure the program always in line with AF's ESP that promote environmental and social safeguard and also ensure that it always in line with community's interest and met their expectations. Steps that will be taken for setting up the mechanism are as follow:

- Initial orientation for the PMU will include materials on ESMP and grievance mechanism so that the staff will understand their roles and responsibilities on this matter
- Assign -team of staff that comprises of M&E learning officer and village facilitator that will be responsible for receiving and processing the grievance
- Develop procedures for accepting/logged-in grievance, grievance assessment process, providing feedback for the grievance, and monitoring the feedbacks
- Create internal communication procedures for the mechanism
- Communicating the ESMP and grievance mechanism at the beginning of program implementation to the stakeholders

The grievance mechanism procedure that will be set up will follow these following general guidelines:

- *Logged-in Grievance*  
Stakeholder should formally communicate grievance in a written manner, and sent it to the assigned team through email, fax or hand-delivered and submit the text to grievance box that will be set up at the PMU office. Once it's being logged, the particular stakeholder will receive receipt (by email, fax or printed receipt; depending on how the stakeholder submit the grievance text) that acknowledging the complaint is being accepted and will be processed. A specific email for grievance submission will be set up in the beginning of the program period. For complainant that hand-deliver the text to PMU office, the assigned team will document their phone number. In doing so, the complainant can be informed by the team when the grievance assessment is completed.
- *Grievance Assessment*  
Once the complaint is logged-in and recorded, an assessment process will be done by the assigned team by considering the complainants, raised issues and mitigation measures in place. Having considered those aspects, the team will then rate the grievance on a scale 1-5, where rate 1 considered the grievance as low impact/negligible and 5 as critical to be addressed. The next step will be exploring options to address the grievance; assessing whether the measures in place is adequate to address the issue or further actions are need to be taken. Throughout the process, project officer and team leader will be continually updated and consulted if needed; particularly when the grievance rating is above 3.
- *Providing and Communicating Feedback*  
Once the option is selected, the team will prepare a response for the grievance and communicate the response formally in written text to the complainant by email, fax or inform the complainant by phone.
- *Monitoring Feedback*

To ensure the feedback is well received by the complainant or to maintain in case there will be follow up response, the responsible staff will continually monitor the grievance cases logged-in, its feedback and how it being dealt in practise.

The aforementioned procedures will be communicated to all stakeholders during initial workshops at city and village level, and also continually during any training or workshop conducted by PMU. The printed procedures will be made available at village office and PMU office to ensure stakeholders that are unable to attend the initial workshop understand the grievance mechanism of the program. This step is taken to show that the program tries its best to provide benefit for the wider community by always taking into account their interest and concerns in program

implementation.

### **1.2.1.3. MONITORING AND EVALUATION ARRANGEMENT**

#### **1.8.1. Monitoring and Evaluation Plan**

Monitoring and evaluation process for the environmental and social impact will be an integral part of program's monitoring and evaluation process. For activities that categorized as need to undergone EIA process in future time, an individual monitoring and evaluation plan will be made accordingly.



Specific aspects to be monitored in relation to the environmental and social impacts are presented in table

4. This table does not provide a specific monitoring and evaluation, but only the general guidance. A more detailed monitoring and evaluation plan for the whole program will be developed during the development process of project implementation plan, in which the content of Table 4 and its detailed derivation will be an inseparable part of the said monitoring and evaluation plan.

Table 4. Monitoring and Evaluation Plan

No	ESP	Type of Impacts	Activity	Impacts Description	Aspects to be Monitored	Indicator	Means of Verification	Monitoring period	PIC
1	Compliance with the Law	Environmental	Breakwater construction	Physical environment disruption from mobilization and construction process	Issuance of environmental permit for implementation of adaptation action	Number of Issued Environmental Permit	SPPL document for sanitation facilities	Once	Construction company and PMU
			Eco-tourism	Physical environment disruption from mobilization and construction process			UKL-UPL document for breakwater construction and ecotourism site	Once	
			Construction of communal sanitation facilities	Minor physical environment disruption from mobilization and construction process such as minor damage to road access from construction material			Number of monitoring report for breakwater and eco-tourism site	Document submission and approval report	Once
							Monitoring report for breakwater and ecotourism site	Six-monthly	PMU
2	Access and equity	Social	Pilot innovative adaptation measures are implemented in collaboration with other stakeholders and evaluated for	Social conflict arising from selection of community member that will be the implementer of adaptation actions and alternative livelihood at city level	<ul style="list-style-type: none"> <li>Ensure the selection of appropriate project implementer and site location, fair allocation of roles and responsibilities</li> <li>Ensure that working group member represent the voice and interest of all <u>layers of community and</u></li> </ul>	Background of working group member  % of women representative in working group % of women representative <u>in working group meeting</u>  <u>Number of stakeholder mapping</u>	Record of representation of working group member  Minutes of meetings for working groups meetings  <u>Documentation of stakeholders mapping process and results</u>	Once  Every three months  <u>Once</u>	PMU  Working Group and PMU  <u>Working Group and PMU</u>

			future reference		<a href="#">city stakeholder</a>	<a href="#">document</a>			
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3	<u>Marginalized and Vulnerable Groups</u>	<u>Social</u>	<u>Pilot innovative adaptation measures are implemented in collaboration with other stakeholders and evaluated for future reference</u>	<u>Social conflict arising from selection of priority activities site and design at city level which could raise envy from other community member that will not directly exposed to the program</u>	<ul style="list-style-type: none"> <li>• <u>The development of social impact assessment and management plan</u></li> <li>• <u>Communication of project selection process through visibility materials</u></li> <li><u>Ensure that working group member represent the voice and interest of all layers of community and city stakeholder</u></li> </ul>	<u>Number of Social Impact Assessment and Management Plan</u>  <u>Background of working group member</u>  <u>Number of input on technical details and site selection for the adaptation actions</u>  <u>Number of produced visibility materials</u>  <u>Number of people received</u> <u>The visibility materials have attendance in working group meeting</u>  <u>Number of stakeholder mapping document</u>	<u>Availability of Social impact assessment and management plan document</u>  <u>Record of representation of working group member</u>  <u>Minutes of meetings of working group meetings</u>  <u>Visibility materials and its dissemination records</u>  <u>Documentation of stakeholders mapping process and results</u>	<u>Once</u>  <u>Once</u>  <u>Every three months</u>  <u>Every six months</u>  <u>Once</u>	<u>PMU</u>  <u>Working Group and PMU</u>  <u>Working Group and PMU</u>  <u>Working Group and PMU</u>  <u>Working Group and PMU</u>
3	<u>Marginalized and Vulnerable Groups</u>	<u>Social</u>	<u>Pilot innovative adaptation measures are implemented in collaboration with</u>	<u>Social conflict arising from selection of priority activities site and design at city level which could raise envy from other community member that will not directly exposed to the program</u>	<ul style="list-style-type: none"> <li>• <u>The development of social impact assessment and management plan</u></li> <li>• <u>Communication of project selection process through visibility</u></li> </ul>	<u>Number of Social Impact Assessment and Management Plan</u>  <u>Background of working group member</u>  <u>Number of input on</u>	<u>Availability of Social impact assessment and management plan document</u>  <u>Record of representation of</u>	<u>Once</u>  <u>Once</u>	<u>PMU</u>  <u>Working Group</u>

			other stakeholders and evaluated for future reference		materials ↳Ensure that working group member represent the voice and interest of all layers of community and city stakeholder	technical details and site selection for the adaptation actions  Number of produced visibility materials  Number of people received the	working group member  Minutes of meetings of working group meetings  Visibility materials and its dissemination records	Every three months  Every six months	and PMU  Working Group and PMU  Working Group and PMU
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						visibility materials			
4	Protection of Natural Habitats	Environmental	Mangrove restoration	Mobilization and planting process of mangrove belt could potentially impact the surrounding ecosystem	The availability of environmental procedure for mangrove restoration activity	Number of environmental procedure for mangrove restoration activity	Environmental procedure for mangrove restoration activity	Once	PMU
			Construction of communal sanitation facilities	Potential impact to the surrounding ecosystem during construction and operational process of floating sanitation facilities	Availability of SPPL document  Availability of sediment and oil trap facilities	Number of SPPL document  Number of operating sediment and oil trap facilities during construction phase	SPPL document  Documentation of sediment trap and oil trap construction and operations	Once  Once	Construction company and PMU
			Breakwater construction	The impact of breakwater mobilization and construction process to the existing surrounding coastal ecosystem	Availability of UKL-UPL document that outline mitigation measures for potential risks associated with the activity  Sediment trap and oil trap construction to control	Number of UKL-UPL document  Number of operating sediment and oil trap facilities during construction phase	UKL-UPL document  Documentation of sediment trap construction and operations	Once  Once	Construction company and PMU

					abrasion and sedimentation within mangrove ecosystem				
			Ecotourism	Waste generation and water pollution from ecotourism site preparation, development and operational activities could pollute the water and subsequently disrupt natural habitat	<ul style="list-style-type: none"> <li>• Sediment trap construction to control abrasion and sedimentation within mangrove ecosystem</li> <li>• Availability of environmental procedures that comply with local regulation for ecotourism site, including waste management plan</li> </ul>	<p>Number of UKL-UPL document</p> <p>Number of operating sediment and oil trap facilities during construction phase</p> <p>Number of environmental procedures for eco-tourism site operations</p> <p>Number of UKL-UPL monitoring report</p>	<p>UKL-UPL document</p> <p>Documentation of sediment trap construction and operations</p> <p>Environmental procedures (including waste management plan) for eco-tourism site</p> <p>Monitoring report of UKL-UPL document</p>	<p>Once</p> <p>Once</p> <p>Once</p> <p>Six-monthly</p>	<p>Cleanlines s Agency, Local community and PMU</p> <p>Cleanlines s Agency, Local community and PMU</p>
			Mangrove restoration	Minor environmental and ecological disruption from alteration of resource management from introduction of new mangrove species to the environment	<ul style="list-style-type: none"> <li>• The availability of environmental procedures for mangrove restoration activity that outline mitigation measures for potential risks associated</li> </ul>	<p>Number of environmental procedure for mangrove restoration activity</p> <p>Number of assessment on</p>	<p>Environmental procedure for mangrove restoration activity</p> <p>Assessment on appropriateness of the proposed</p>	<p>Once</p> <p>Once</p>	<p>Academician, working group and PMU</p>

					with the activity • Ensure that the proposed mangrove species is appropriate for the location	appropriateness of the proposed mangrove species for mangrove belt planting activity in the proposed location	mangrove species for mangrove belt planting activity in the proposed location		
			Potential social conflict (resistance) with land-owner to allocate their unproductive private land for mangrove restoration site	• Targeted mangrove restoration site and information on land ownership of the targeted site • Attendance and response from the landowner during related village workshops	Number of map  Number of land-owner attending the workshops	• Map of mangrove restoration site with information on the ownership of the land  • Attendance sheet and minutes of meetings during related village workshops	Once  Every three months	PMU and academici an  PMU and working group	
		Construction of communal sanitation facilities	Potential impact to the surrounding ecosystem during construction and operational process of floating sanitation facilities	Availability of SPPL document Availability of sediment and oil trap facilities Design of floating sanitation facilities	Number of SPPL document  Number of operating sediment and oil trap facilities during construction phase  Availability of	SPPL document  Documentation of sediment trap and oil trap construction and operations  Document on	Once  Once  Once	Construction company and PMU	



						document on floating facilities design	floating facilities design		
			Breakwater construction	Ecosystem disruption from mobilization and construction process of breakwater	Availability of UKL-UPL document that outline mitigation measures for potential risks associated with the activity  Sediment trap and oil trap construction to control abrasion and sedimentation within mangrove ecosystem	Number of UKL-UPL document  Number of operating sediment and oil trap facilities during construction phase	UKL-UPL document  Documentation of sediment trap construction and operations	Once  Once	Construction company and PMU
			Ecotourism	<ul style="list-style-type: none"> <li>Waste generation and water pollution from ecotourism site preparation, development and operational activities could disrupt natural habitat and ecosystem balance</li> <li>Large number of human presence and noise could</li> </ul>	Availability of UKL-UPL document that outline mitigation measures for potential risks associated with the activity  Sediment trap construction to control abrasion and sedimentation	Number of UKL-UPL document  Number of operating sediment and oil trap facilities during construction phase  Number of environmental	UKL-UPL document  Documentation of sediment trap construction and operations  Environmental procedures (including waste	Once  Once  Once	Cleanlines Agency, Local community and PMU

				disturb natural fauna in the area	within mangrove ecosystem  Availability of environmental procedures that comply with local regulation for ecotourism site, including waste management plan	procedures for eco-tourism site operations  Number of UKL-UPL monitoring report	management plan) for eco-tourism site  Monitoring report of UKL-UPL document	Six-monthly	
<a href="#">75</a>	Pollution Prevention and Resource Efficiency	Environmental	Breakwater construction	<ul style="list-style-type: none"> <li>• Water pollution from mobilization and construction process of breakwater</li> <li>• Sedimentation from mobilization and construction process of breakwater</li> </ul>	<p>Availability of UKL-UPL document that outline mitigation measures for potential risks associated with the activity and its monitoring report</p> <p>Sediment trap and oil trap construction to control abrasion and sedimentation within mangrove ecosystem</p>	<p>Number of UKL-UPL document</p> <p>Number of operating sediment and oil trap facilities during construction phase</p> <p>Number of UKL-UPL monitoring report for breakwater</p>	<p>UKL-UPL document</p> <p>Documentation of sediment trap construction and operations</p> <p>Monitoring document and submission report to the City Government</p>	<p>Once</p> <p>Once</p> <p>Every six months</p>	<p>Construction company and PMU</p> <p>Environmental Agency, Construction Company and PMU</p>

			Mangrove restoration	Increase in water turbidity during mangrove restoration process	<ul style="list-style-type: none"> <li>The availability of environmental procedures for mangrove restoration activity that outline mitigation measures for potential risks associated with the activity</li> </ul>	Number of environmental procedure for mangrove restoration activity	Environmental procedure for mangrove restoration activity	Once	Academician, working group and PMU
			Ecotourism	Water pollution due to solid waste generation and effluent from the site's toilet facilities, and other operational activities in the eco-tourism site	Availability of UKL-UPL document that outline mitigation measures for potential risks associated with the activity	Number of UKL-UPL document	UKL-UPL document	Once	Cleanlines Agency, Local community and PMU
		Sediment trap construction to control abrasion and sedimentation within mangrove ecosystem			Number of operating sediment and oil trap facilities during construction phase	Documentation of sediment trap construction and operations	Once	Working Group and PMU	
		Availability of environmental procedures that comply with local regulation for ecotourism site, including waste management			Number of environmental procedures for eco-tourism site operations	Environmental procedures (including waste management plan) for eco-tourism site	Once		Working Group, Local community and PMU
				Number of community member involved in the ecotourism management being			Six-monthly		

					plan, and implemented by the involved community	trained for environmental procedures			
					Waste management activity in ecotourism site that involves local agency and local community	Number of UKL-UPL monitoring report	Monitoring report of UKL-UPL document	Six-monthly	PMU
						Number of community member involved in waste management activity	Community-based waste management activity implemented in the surrounding ecotourism area	Six-monthly	Working Group, Local community and PMU
			Construction of communal sanitation facilities	Ground water or sea water pollution from construction process of the facilities, effluent from sanitation facilities (during its operational phase), and potential leakage from the facilities	Availability of SPPL document Availability of sediment and oil trap facilities  Design of floating sanitation facilities  Water quality of the surrounding area  Facilities properly utilized and maintained by the community Community implement good	Number of SPPL document  Number of operating sediment and oil trap facilities during construction phase  Availability of document on floating facilities design  Number of surface water quality monitoring report	SPPL document  Documentation of sediment trap and oil trap construction and operations  Document on floating facilities design  Record on regular surface water quality monitoring (ground water and sea water)	Once  Once  Once  Every six months	Construction company and PMU        PMU

					sanitation behaviour	Number of utilization and maintenance procedure for the facilities	Availability of utilization and maintenance procedure	Once	Working group and PMU
						Number of trainings and visibility materials on good sanitation behaviour	Records of trainings with training material that contain good sanitation behaviour aspect	Every three months	Working group and PMU
							Documentation of visibility materials on good sanitation behaviour	Every six months	Working group and PMU
44 6	Land and Soil Conservation	Environmental	Breakwater construction	Soil pollution from solid waste, oil-based waste and waste water during mobilization and construction process of breakwater	Availability of UKL-UPL document that outline mitigation measures for potential risks associated with the activity and its monitoring report  Sediment trap and oil trap construction to control abrasion and sedimentation within mangrove ecosystem	Number of UKL-UPL document  Number of operating sediment and oil trap facilities during construction phase  Number of UKL-UPL monitoring report for breakwater	UKL-UPL document  Documentation of sediment trap construction and operations  Monitoring document and submission report to the City Government	Once  Once  Every six months	Construction on company and PMU   Environmental Agency, Construction Company and PMU

			Ecotourism	Soil pollution from waste generation and waste water contamination during operational activities in the eco-tourism site	<p>Availability of UKL-UPL document that outline mitigation measures for potential risks associated with the activity</p> <p>Sediment trap construction to control abrasion and sedimentation within mangrove ecosystem</p> <p>Availability of environmental procedures that comply with local regulation for ecotourism site, including waste management plan, and implemented by the involved community</p> <p>Waste management activity in ecotourism site that involves local agency and <a href="#">local community</a></p>	<p>Number of UKL-UPL document</p> <p>Number of operating sediment and oil trap facilities during construction phase</p> <p>Number of environmental procedures for eco-tourism site operations</p> <p>Number of community member involved in the ecotourism management being trained for environmental procedures</p> <p>Number of UKL-UPL monitoring report</p> <p>Number of community member involved in <a href="#">Waste management activity</a></p>	<p>UKL-UPL document</p> <p>Documentation of sediment trap construction and operations</p> <p>Environmental procedures (including waste management plan) for eco-tourism site</p> <p>Monitoring report of UKL-UPL document</p> <p>Community-based waste management</p>	<p>Once</p> <p>Once</p> <p>Once</p> <p>Six-monthly</p> <p>Six-monthly</p>	<p>Cleanlines Agency, Local community and PMU</p> <p>Working Group and PMU</p> <p>PMU</p> <p>Working Group, Local Community and <a href="#">PMU</a></p>
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							<a href="#">activity implemented in the surrounding ecotourism area</a>		
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					local community	management activity	implemented in the surrounding ecotourism area		y and PMU

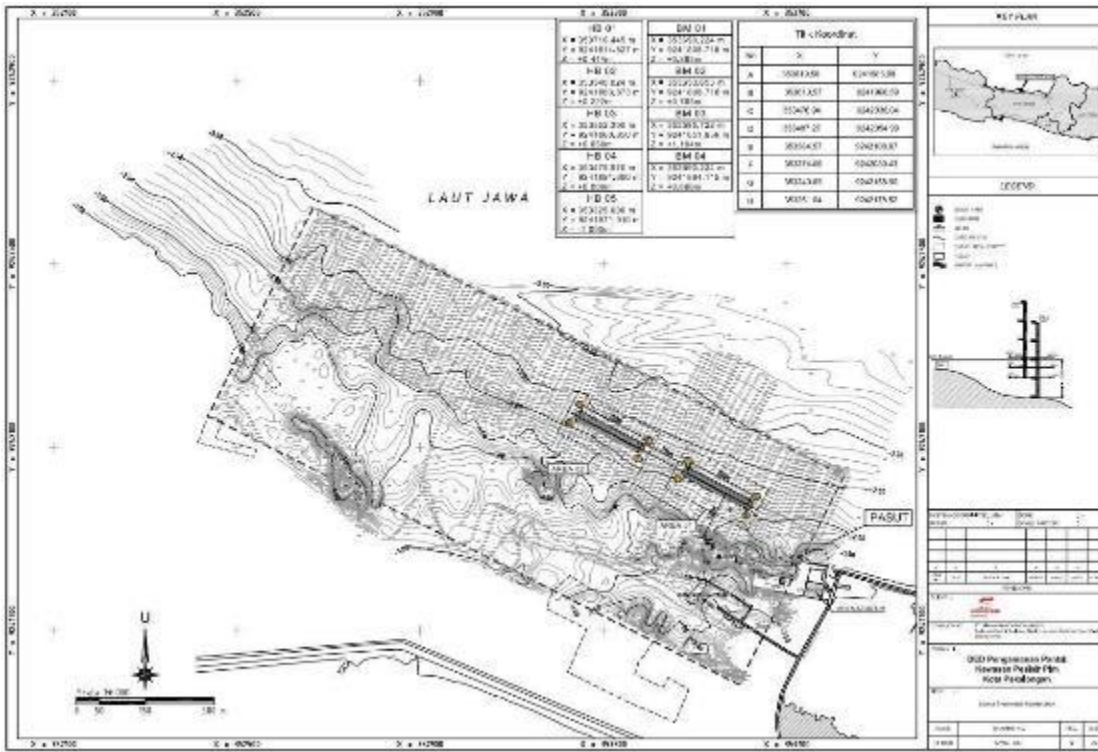


			Constructi o n of communal sanitation facilities	Soil pollution from construction process of the facilities and potential soil contamination from effluent of sanitation facilities (during its operational phase), and potential leakage from the facilities (if the facilities are not floating design)	Availability of SPPL document Availability of sediment and oil trap facilities  Water tight design of sanitaiton facilities  Water quality of the surrounding area  Community implement good sanitation behaviour	Number of SPPL document  Number of operating sediment and oil trap facilities during constructio n phase  Availiability of document on facilities design  Number of surface water quality monitoring report  Number of trainings and visibility materials on good sanitation behaviour	SPPL document  Documentation of sediment trap and oil trap construction and operations  Document on facilities design  Record on regular surface water quality monitoring (ground water and sea water)  Records of trainings with training material that contain good sanitation behaviour aspect  Documentation of visibility materials on good sanitation behaviour	Once  Once  Once  Every six months  Every three months  Every six months	Constructi on company and PMU  PMU  PMU  Working group and PMU  Working group and PMU
7	<a href="#">Core Labour Right</a>	<a href="#">Social</a>	<a href="#">Breakwater r constructio n</a>	<a href="#">1. Emergence of social conflict between construction workers and the</a>	<a href="#">Conduct stakeholders mapping during project planning stage as the</a>	<a href="#">Number of stakeholder mapping document</a>	<a href="#">Stakeholder mapping document</a>	<a href="#">Once</a>	<a href="#">PMU</a>

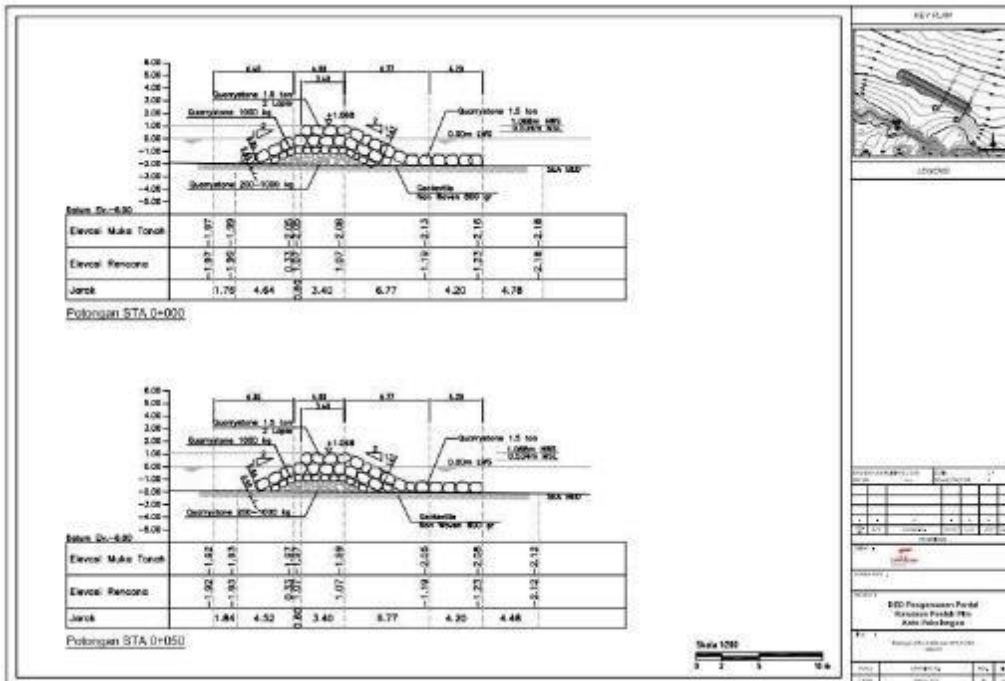
				<p><u>surrounding community.</u>  <u>2. Emergence of local community jealousy regarding the utilization of local labor as construction workers.</u></p>	<p><u>basis for determining the appropriate project implementer and beneficiaries, allocating fair roles and responsibilities among stakeholders, and selecting the appropriate activities site location (including knowledge board location) that could benefit wider community</u></p>				
8	<u>Climate change</u>	<u>Environmental</u>	<u>Breakwater construction</u>	<p><u>Physical environment disruption from mobilization and construction process</u></p>	<p><u>Availability of UKL-UPL document that outline mitigation measures for potential risks associated with the activity and its monitoring report</u></p>	<p><u>Number of Environmental Permit (UKL-UPL)</u></p>	<u>UKL-UPL document</u>	<u>Once</u>	<u>PMU</u>

Annex 13: Plan for breakwater Construction

A. Site Plan for 2 breakwater in Kandang Panjang (PIM AREA)



B. Design for breakwater construction



Annex 18: Consultations held

Timestamp	Nama	Email	Gender	Lembaga	Telepon	Provider Telepon
8/5/2021 8:13:28	Yudha Utama	yudha.utama@kemitraan.or.id	Pria	KEMITRAAN	08111734466	halo
8/5/2021 8:15:58	Ribka Pauline B	ribka.pauline@kemitraan.or.id	Wanita	Kemitraan	081370900430	Simpati
8/5/2021 8:21:29	Suci Maisyarah	suci.maisyarah@kemitraan.or.id	Wanita	KEMITRAAN	085263259312	Telkomsel
8/5/2021 9:14:07	Abimanyu Sasongko Aji	abimanyu.aji@kemitraan.or.id	Pria	Kemitraan	082165120204	Simpati - Telkomsel
8/5/2021 9:20:18	DIONE ASTERIA	dioneasteria@gmail.com	Wanita	Dinperkim Kota Pekalongan	085642612999	im3
8/5/2021 9:21:20	Dr.Pi. Ir. M. Bahrus Syakirin, M.Si.	pirin_220164@yahoo.co.id	Pria	Fakultas Perikanan Universitas Pekalongan	085742200900	IM3
8/5/2021 9:22:47	Nyoto Santoso	ns.bagindo@yahoo.co.id	Pria	Dept.KSHE - Fakultas Kehutanan dan Lingkungan IPB	08111190043	Simpati
8/5/2021 9:24:48	Ir. Anita Heru Kusumorini, Msc	pekalongankota.bappeda@gmail.com	Wanita	BAPPEDA Kota Pekalongan	08156932403	Indosat
8/5/2021 9:34:39	Suwartono	wartono.st36@gmail.com	Pria	obwspj	082328172103	As
8/5/2021 9:38:27	BENOVITA DWI SARASWATI, S.P	benovita_2009@yahoo.com	Wanita	DINAS KELAUTAN DAN PERIKANAN PROV JAWA TENGAH	087832241947	XL pascabayar
8/5/2021 9:42:21	Pipin Widyawati, S.Sos	pipinwidyawati@gmail.com	Wanita	BPBD Kota Pekalongan	085234311447	Telkomsel
8/5/2021 9:43:10	Ir. SR. Eko Yunianto, Sp.1	eko.okesmg@gmail.com	Pria	Dinas PUSDATARU Provinsi Jawa Tengah	089624418197	Three
8/5/2021 9:43:48	Hendra Agustian	agustian.hendra@gmail.com	Pria	Dinas PUSDATARU Jateng	08123369048	Simpati
8/5/2021 9:44:24	Nathan Setyawan ST MEng	nathansetyawan2@gmail.com	Pria	BAPPEDA Provinsi Jawa Tengah	081226777200	simpati
8/5/2021 9:44:35	Mirta Indriastuti	mirta.pusdataru@gmail.com	Wanita	Dinas PUSDATARU Provinsi Jawa Tengah	081326656996	Telkomsel
8/5/2021 9:44:52	Widi Artanti	widi.artanti@kemitraan.or.id	Wanita	Kemitraan	08113864797	Telkomsel
8/5/2021 9:45:16	Rien Dam	rien.dam@rvo.nl	Pria	RVO - Netherlands Enterprise Agency	081357850260	NASA
8/5/2021 9:46:20	Ahmad Husni	a_husni@yahoo.com	Pria	Dinas Pendidikan Kota Pekalongan	085867648615	Indosat
8/5/2021 9:48:39	Andrianto	andriantosuratman@gmail.com	Pria	Dinas perkim Kota Perkim Kota Pekalongan	085876441121	Mentari
8/5/2021 9:50:56	Dr. Muhammad Helmi, S.Si., M.Si.	muhammadhelmi69@gmail.com	Pria	Universitas Diponegoro	0818108129	XL
8/5/2021 10:01:05	Teguh Prabowo Agung	teguhprabowoagung@gmail.com	Pria	Dinas Lingkungan Hidup Kota Pekalongan	(0285) 421370	08156624473
8/5/2021 10:12:32	sugiarti	ugiee84@gmail.com	Wanita	bappeda jateng	082157773432	simpati
8/5/2021 10:28:56	RIA ERLANI	ria.erlanii@gmail.com	Wanita	BAPPEDA JATENG	082195259317	SIMPATI
8/5/2021 10:47:45	Prana Pramudya, S.Hut, M.Si	prana.dmi@gmail.com	Pria	Cabang Dinas Kehutanan Wilayah IV, DLHK Prov. Jateng	081280794125	Simpati
8/5/2021 10:47:52	Ninik Damiyati	ninikdamiyati@gmail.com	Wanita	DLHK Jateng	081315789596	Simpati
8/5/2021 10:48:08	Hari Adi Agus S	hariadiagus@gmail.com	Pria	Dinas PUSDATARU Prov Jateng	08156669056	Indosat
8/5/2021 10:48:45	Prof. Denny Nugroho Sugianto	dennysugianto@live.undip.ac.id	Pria	UNDIP	08157649229	Matrik INDOSAT
8/5/2021 10:55:04	Ghufron	moch.ghufron@kemitraan.or.id	Pria	KEMITRAAN	08158091972	IM3
8/5/2021 10:59:14	Mohamad yusup	mohamadyusup817@gmail.com	Pria	DKP Kota pekalongan	081567682672	Im3
8/5/2021 11:01:35	Nasekhah	nasekhah.perikanan@gmail.com	Wanita	Dinas Kelautan dan Perikanan kota Pekalongan	081542192680	Indosat
8/5/2021 11:01:53	TRIWAHYUDI	yuudi03@gmail.com	Pria	Dinas Kelautan dan Perikanan Kota Pekalongan	082133359680	Simpati
8/5/2021 11:10:52	Mahendratama Arisandi	mahendratama.arisandi@pu.go.id	Pria	BBWS PEMALI JUANA	081390062634	Simpati
8/5/2021 11:12:55	Betman Eduard	laloboruku@yahoo.co.id	Pria	DKP Kota Pekalongan	0818457901	XL
8/5/2021 11:37:54	Dani Prasetyo	daniunnes@pu.go.id	Pria	BBWS Pemali Juana	082243870436	As
8/5/2021 11:39:52	Trigandi Imamudin	dinparbudpora.pki@gmail.com	Pria	Jinas pariwisata kebudayaan kepemudaan dan olahraga kota	085326999963	As
8/5/2021 11:57:16	Ir.Radito, M.T	radito_66@yahoo.co.id	Wanita	Kepala Balai PSDA Pemali Comal Dinas PUSDATARU Prov	085227028900	Simpati
8/5/2021 12:47:39	Asianti Rosita Adhi	asianti.rosita@gmail.com	Wanita	DLHK Prov. Jateng	081904114587	081904114587
8/5/2021 12:56:37	Eka Oktariyanto Nugroho	nugrohoeka@ftsl.itb.ac.id	Pria	ITB	08112209122	halo
8/5/2021 13:01:44	D. Hilman	dadang.hilman@kemitraan.or.id	Pria	Kemitraan	081290817192	simpati



Event : Lokakarya Risa Bakar  
Lokasi : Kota Pekalongan  
Tanggal/Waktu : 12 Agustus 2022

No	Nama	Organisasi	Telp/Hp	Email	Tanda Tangan
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2	ANITA HERU K.	Bappenas	08156932403	anita_heru@hotmail.com	
3	KUMARU	INSIDATARI HT	08122510027	kumaruto66@gmail.com	
4	AGUS P	IBANS. P J	087716261806	aguspriyanto99@gmail.com	
5	Slamet M. Paluhra	Bappenas	08226445102	mitra.paluhra2013@gmail.com	
6	Lazim Suf	Dinparbudpar	08226726182	lazim-hungry@gmail.com	
7	Ariqanur NS	Dinparbudpar	087837448744	ariqanurwilda@gmail.com	
8	Nur Slamet	Dinparbudpar	085853239111	ns.nurslameta@gmail.com	
9	Sulfandari Hersandini	DLH	085866199692	s.hersandini@gmail.com	
10	M. Sobirin	Dinparbudpar	085786290465	muhannadsobirin923@gmail.com	
11	Harmanan Ahas	Bappenas	085200003339	Bowo141222@gmail.com	





Event :  
Lokasi :  
Tanggal/Waktu : 12 Agustus 2021

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Event :  
Lokasi :  
Tanggal/Waktu : 12 Agustus 2021

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Event :  
Lokasi :  
Tanggal/Waktu : 12 Agustus 2021

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Event :  
Lokasi :  
Tanggal/Waktu : 02 Agustus 2021

No	Nama	Organisasi	Telp/Hp	Email	Tanda Tangan
45	Jayudha	B. umum			



Event : Pertemuan Pakar (Penanganan Dampak Perubahan Iklim dan Bencana Alam Pekalongan)  
 Lokasi : BAPPEDA PEKALONGAN R. Amarta  
 Tanggal/Waktu : 13 Agus 2021

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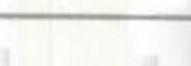
Event : Pertemuan Pakar (Perangan Dampak Perubahan Iklim dan Bencana Alam Kota Pekalongan)  
 Lokasi : R. Amarta BAPPEDA  
 Tanggal/Waktu : 13 Agustus 2021

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Event :  
Lokasi :  
Tanggal/Waktu : 15 Agustus 2021

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33	✓ Nikita Rosidi	Kominfo	085290088885		
34	✓ Roesadi	Bag. Umur			
35	✓ Wilowu	Umur			
36	✓ Hermawan Adi W	Pappers	08520003339		

















Event : Lokakarya 3, Rangkaian Pertemuan Pakar  
 Lokasi : HOTEL DAFAM - RONDI Meeting ROOM  
 Tanggal/Waktu : Selasa, 31 Agustus 2021

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**Minutes**  
**Workshop on “Handling the Impacts of Climate Change and Natural Disasters in**  
**Pekalongan City” – Improving Protection Along the Shoreline**  
**Pekalongan city**  
**Thursday, August 5, 2021**

1st workshop:

1. There was a presentation from Mr. Nyoto Santoso from IPB explaining the design of Mangrove rehabilitation that can strengthen efforts to control abrasion in the Pekalongan coastal area:
  - There is Presidential Decree No. 51 of 2016 which explains that the border of the beach is a mangrove plant
  - The impact of climate change on mangroves causes changes in species dominance, changes in mangrove zoning, shifts in growing space and loss of mangrove communities
  - There are several approaches to Mangrove Rehabilitation, namely:
    - Approach to the status and function of protected area ecosystems
    - Approach to the status and function of forest cultivation
    - Approach to the status and function of aquaculture
    - Ecotourism status and function approach
    - Approach to the status and function of Environmental Services
  - Because currently the rob embankment has been made by BBWS behind the PIM location, it is necessary to study 10 parameters in carrying out mangrove rehabilitation, namely: Tides, Current Patterns, Waves, Rob/Puddles, Salinity, Substrate (muddy sand, sandy mud ), Soil chemistry (acid sulphate), Land subsidence and groundwater extraction, Human activities (settlements, offices, public facilities and infrastructure
  - After these 10 parameters have been studied, only then can the proposed mangrove or other rehabilitation designs in front of the embankment be confirmed, such as: 1). Mangrove Rehabilitation 2). Sylvofishery 3). Agrofisheory 4). Pasture-fisheory 5). Ecotourism 6). Fisheory (ponds).
2. There was a presentation from Mr. Adek Rizaldi as the Head of BBWS Pamali Juana regarding support for Flood & Rob control activities in Pekalongan Regency/City:
  - One of the impacts of climate change is rising sea levels. Based on data from 1). LAPAN (2014): 3-4 cm/year, 2). Dr. Hery Andreas ITB (2018): 10-20 cm/year, 3) Geological Agency: 1.7 – 1.8 cm (March – August 2020).
  - Land subsidence and Rob floods generally occur in the City of Semarang, City of Demak and Regency/City of Pekalongan.
  - Apart from land subsidence and rising sea levels, the problem on the north coast of Central Java is beach abrasion and accretion.

- The form of BBWS support in handling Rob floods in Pekalongan is building zoning boundary embankments, parapets, pumps, retention ponds and city embankments.
3. There was a presentation from the Department of Public Works, Water Resources and Spatial Planning on spatial planning and flood control systems in Pekalongan City.
- The impacts of land subsidence and sea level rise are damage to buildings and infrastructure, tidal floods in coastal areas, reducing the quality of life and the environment
  - Pekalongan City is located in the downstream part of each watershed, so that in general the tendency of Pekalongan City is to be a recipient of positive benefits as well as negative impacts in accordance with conditions in the upstream part of the watershed.
  - There are 2 methods used in flood control, namely structural methods and non-structural methods.
  - Flood control can be carried out if there is joint cooperation with stakeholders, namely: government, academia, private sector, civil society and the media (Pentahelix component).
  - There is Presidential Decree No. 79 of 2019 concerning flood and Rob control in Pekalongan City.
4. There was discussion in the expert workshop 1:

Questions from Workshop Participants:

- Have the impacts of climate change been taken into account?
- Has mangrove rehabilitation been started or is it just at the planning stage?
- Are mangroves included in the development plan that will be carried out by BBWS?
- In terms of the timeline at BBWS, is it according to the schedule? Does the dynamics on the beach affect?
- Do parapets still need to be built? if not what to do?

Response:

Mr Nyoto:

- Currently mangrove rehabilitation in the northern coastal area of Pekalongan city is still in the planning stage, this has not yet reached the implementation stage because of the need for a mangrove rehabilitation approach plan by building protective structures for mangroves so they do not die quickly when hit by waves
- It should be noted that mangroves do not prevent tsunamis but prevent tidal waves, but it is necessary to choose the right type of mangrove and the position of the mangroves will support the design of the structural buildings that will be made

Mr. Adek BBWS:

- From the results of the identification of floods and Rob caused by climate change. Sea levels rise and land subsidence occurs.
- Considering land subsidence on the beach, parapets or other coastal protection structures still need to be built.

Mr. Eko (PUSDATARU):

- The structural approach is important in dealing with Flood and Rob problems

Mr. Denny (UNDIP):

- The structural approach has been carried out together with BBWS and Pusdataru but has not focused on protecting mangroves
- According to Mr. Nyoto's input, it is impossible to plant mangroves when faced with sea waves.

Conclusion:

- The mangrove rehabilitation plan must be aligned with the coastal protection structure development plan
- This is because mangrove plants cannot stand sea waves
- Mangroves need nutrients that can come from mud
- The construction of coastal protection structures must synergize between the Municipal Government, Provincial Government and BBWS as a form of Mangrove rehabilitation stages

## Minutes of Meeting

### Workshop “Managing the Impacts of Climate Change and Natural Disasters in Pekalongan City-Increasing Protection Along the Coastline of Pekalongan City” Thursday, August 12 – Friday, August 13, 2021

2nd Workshop, 12 August 2021:

5. The agenda for the expert workshop morning session is to look at the location which consists of 5 posts:
  - a. Heading 1 = Ponds in Kel. Degayu
  - b. Heading 2 = TPA Pekalongan City and location of the BBWS parapet
  - c. Heading 3 = Slamaran Beach, On Shore port plan
  - d. Heading 4 = TPI affected by rob and plans to raise the embankment in the area along the Slamaran coast
  - e. Heading 5 = PIM (mangrove information center) and geotube location in Kel. Kandang Panjang & Kel. Bandengan
6. Facilitator Dr. Helmi from UNDIP explained that the focus of the discussion after reviewing the location today is POS 5. Where the location of post 5 is the focus of the AF Pekalongan program regarding plans for building coastal protection and mangrove rehabilitation plans. Then there are the main points of discussion which consist of the current condition of the geotubes in the post 5 area and what are the opinions of experts regarding the plan to plant mangroves in the post 5 area.
7. There was an opinion from each of the informants consisting of Kandang Panjang Village Head, Bandengan Village Head and North Pekalongan Sub-District Head who concluded:
  - a. Regarding postal area 5, it is necessary to review the land ownership around the PIM area.
  - b. PIM is a source of economic production for the community in 2 sub-districts (Kendang Panjang and Bandengan), therefore it is necessary to pay further attention to repairing mangroves in the PIM area so that the community's economy can increase again as it was before the 2017-2018 tidal floods which caused the PIM area lost a lot of its mangrove plants
8. Opinions from experts consisting of Mr. Nyoto (IPB) and Mr. Eka (ITB) who concluded:
  - a. Hearing the delivery from the lurah and sub-district heads, it becomes important for us together regarding the restoration of the mangrove ecosystem in the PIM area
  - b. Mangrove planting in the PIM area must be reviewed in terms of the feasibility of water depth and soil erosion that occurs in the area
  - c. In addition, land ownership also needs to be coordinated by Bappeda, DPUPR and DLH Pekalongan City Government so that appropriate recommendations can be made for the actions to be carried out in the PIM area.

9. Responses from Bappeda and DLH Pekalongan City Government regarding the PIM area:
  - a. Regarding land ownership, the municipal government actually has plans for development from PIM. However, this needs to be looked at again and if the affected community's land can be purchased by the City Government, then this will be done, of course, by prioritizing aspects of profit for the community.
  - b. In addition, there is a method of planting mangroves that has been carried out by DLH and is effective by making mounds right in front of the mangrove planting location. So that the planted mangroves do not die quickly from the currents from the sea and grow effectively
  - c. In the future, together with experts and the Pekalongan AF program. The City Government hopes to find alternatives related to mangrove rehabilitation and good methods to protect mangroves in the PIM area so that it can make the PIM area again an economic source for the Kandang Panjang and Bandengan communities.

2nd Workshop, 13 August 2021:

1. Facilitator Dr. Helmi from UNDIP explained the main discussion on the 2nd day of the expert workshop regarding: statements from participants that have been collected from the 1st and 2nd workshops which will be agreed upon. This is very important for experts to develop a work plan and time schedule for matters will be carried out by KEMITRAAN through the AF Pekalongan program.
2. The response from Abhimanyu S. Aji as the program manager of PMU HO KEMITRAAN contains:
  - a. Thank you to the workshop participants who did a field visit yesterday and I hope that the expected results also seem to be achieved so that they can jointly develop future work plans. And together we can immediately implement work in the field, especially those related to coastal management and coastal protection in Pekalongan City.
3. Dr.'s response Eka (ITB):
  - a. Based on the research that we have done in the area of post 5, that is true. As our hypothesis is, there is a shortage of sediment supply at the PIM location, causing the death of mangrove plants and ongoing erosion in the area.
  - b. When viewed from the balance of sediment along the coast from west to east in the central mangrove area, this is an area that lacks sediment supply here so that the scouring that occurs is large.
  - c. Apart from the hydrodynamic pattern, we also plan or study the problem of how we restore the coastline or at least maintain the current coastline. Here we model the buildings, but not yet the materials. As you can see, in the position on the far left, we will make a groin protruding into the beach, then we will also make a breakwater. We also make offshore breakwaters. So it's more to the sea to put on the breakwater. We are currently doing simulations of things like this. The concept that we examine uses the concept of building with nature.

4. Pak Nyoto's response (IPB):

- a. Thank you for the exposure from Dr. Eka, based on the study of mangrove rehabilitation that we have carried out, an alternative design for mangrove rehabilitation if it is in front of the BBWS giant embankment is unlikely to be possible.
- b. This is because there is still erosion and land grinding that continues to occur due to high sea waves and there are no current-retaining buildings or breakwaters that hit the mangrove planting site.
- c. So the best thing that can be done is to build a beach safety structure in front of the PIM location and when the building has been formed, then mangrove rehabilitation can be carried out behind the building

5. The conclusion conveyed by Dr. Helmi:

Based on the expert meeting that took place from August 5, 12 and 13, 2021 today, regarding post 5 there are several things that can be used as recommendations, namely:

1. Construction of coastal embankments or sea walls can be combined with ground breakwaters to trap sediment
2. The use of geotubes should be reviewed considering that it does not solve the damage to the coast due to erosion there. Maybe in some places it works but that doesn't mean it works in other places too.
3. There needs to be another thought effort related to handling coastal damage and rob in Pekalongan City, namely with the previous reclamation effort which we have never thought about. Maybe maybe this is one that we think about in the future. It doesn't have to be now. But the sooner the better
4. Rehabilitate mangroves with the appropriate mangrove habitat and species as I have stated. The habitat is suitable, the mangroves are suitable. Finished. If the habitat is not suitable, if the mangroves are suitable then it will not be completed either. Because those two things must become one.

**Minutes of Meeting**  
**Workshop “Aligning Policy Intervention Plans / Coastal Area Development Plans**  
**by Municipal Government of Pekalongan”**  
**Tuesday, 31 August 2021**

3rd workshop:

1. Opening of the workshop activities by Widi Artanti as the project officer of the AF Pekalongan program:

This meeting was held to follow up on the previous meeting, where today is more focused on good alignment of what has been explained by the experts, meetings and visits to the field. And continued today for the third workshop for alignment of data and information. Today's event was moderated by the Secretary of Bappeda, Mr. Cayekti.

2. Facilitator Pak Cayekti, head of Bappeda Pekalongan City:
  - a. KEMITRAAN is currently running a program in Pekalongan funded by the Adaptation Fund. The proposal for the project in Pekalongan has been implemented since 2015 so the proposal took quite a long time and the approval was only received around November 2020. So five years. There have been a lot of dynamics in the field since 2015 until now, so adjustments need to be made. Therefore, it is hoped that the series of workshops that have been held can become input for KEMITRAAN in making adjustments to the changing dynamics that have occurred in Pekalongan City.
  - b. Apart from that, it also needs synchronization with policies from the Central Java Provincial Government regarding locations for mangrove conservation and also from BBWS, both later need input in the form of development techniques, synchronization with the next development plan within the framework of tackling flood problems and climate change adaptation.
3. Response from Pak Dadang as the Team Leader of the AF Pekalongan program:
  - a. Thank you for the delivery from Mr. Cayekti as the facilitator of the 3rd workshop that we are currently doing. I would like to say that currently the AF Pekalongan program is preparing a TOR for what a third party should do. The third party is whoever is able to design a beach building that can divert the energy of big waves and erode the beach around the crematorium there so that it gets deeper and deeper there. So the energy is diverted as well as bringing sediment that is beneficial for the mangrove planting that we plan to do in the coming years. So on the one hand it's a pilot about mangroves, on the other hand it leads to detailed engineering design (DED) to make coastal protection buildings as discussed in the 2nd workshop that we did before
  - b. Based on this, we, the AF Pekalongan program team, need input and in the end we can fight together to protect the coast of Pekalongan City.
4. Response from Nur Hidayat as Central Java Provincial Government Data Center:
  - a. Regarding mangrove planting, I think the things that have been discussed and planned are very appropriate. Because we are a technical service, it is purely



civil, the handling is purely rigid infrastructure. So if for example it is combined with vegetation it will be very useful in our opinion. Especially those to the north of the sea wall on the west side. On the west side, the placement is slightly protruding to the south and this area is a buffer area in our opinion because the function of the sea wall is not to hold back waves. So if possible in the north there is a buffer or buffer

- b. When the buffer or buffer is lost, of course, the sea wall becomes threatened so if there is a buffer it is perfect. We maintain it as a buffer zone to protect the land as well as the infrastructure to the south. That's very helpful.
- c. So there is handling that is civil technical in nature which is rigid, and there is a combination of soft structure, vegetative handling. This is very good - only later planting mangroves to protect the land from sea water abrasion must also be carried out with the existing ecosystem

5. Mr. Agus's response (BBWS):

Related to the mangrove rehabilitation plan and the plan to build a coastal protection structure in the area of kel. Kandang Panjang and Bandengan, which are in front of PIM and the Crematorium, I think are very good. Because the building can be useful for the formation of sedimentation. As in the discussions with experts that have been carried out, I think building a breakwater can be an option for KEMITRAAN to do. In addition, there is no development plan from BBWS for this location. The seawall construction intervention made by BBWS is behind the PIM and Crematorium locations, so it doesn't create sedimentation and breaks up sea waves directly

6. Response from Mr. Wisnu Bappeda Pekalongan City:

We provide regulatory information that supports the Partnership program. We already have Perda No. 9 of 2020 concerning the Spatial Planning for the City of Pekalongan. It was just last December that it was divorced. So what the Partnership is planning is in line with what is stated in the RTRW Regional Regulation. The aim of the Regional Spatial Planning is to create a Creative City supported by trade, services, industry and fisheries that is comfortable, safe, conducive, productive and sustainable. There is this sustainable word associated with Partnership.

Conclusion:

- 1. The mangrove rehabilitation plan that will be carried out requires good planning action
- 2. Based on the experts in the workshop activities conducted, the problem of no sedimentation due to sea wave abrasion is the main problem
- 3. The recommendation that can be given to the Pekalongan AF program is to build a coastal protection structure such as a breakwater at the kel. Kandang Panjang and Bandengan (precisely in front of the location of PIM and Crematorium)
- 4. This recommendation is in line because the parapet development plan that was originally planned by KEMITRAAN had already been carried out by BBWS. This happened because the AF program approval process took 5

years from the time the initial proposal was made, therefore the province through BBWS made the parapet development proposal first.

5. In planning to build a coastal breakwater protection structure, KEMITRAAN will involve a third party to make a detailed engineering design (DED) to finalize and ensure before construction work is carried out.



ADAPTATION FUND

## ADAPTATION FUND BOARD SECRETARIAT TECHNICAL REVIEW OF PROJECT/PROGRAMME PROPOSAL

PROJECT/PROGRAMME CATEGORY: Regular Size Full Proposal

<b>Country/Region:</b>	Indonesia	
<b>Project Title:</b>	Safekeeping-Surviving-Sustaining towards Resilience: 3S Approach to Build Coastal City Resilience to Climate Change Impacts and Natural Disasters in Pekalongan City, Central Java Province	
<b>Thematic Focal Area:</b>	Multi-sectors	
<b>Implementing Entity:</b>	The Partnership for Governance Reform in Indonesia (Kemitraan)	
<b>Executing Entities:</b>	The Partnership for Governance Reform in Indonesia (Kemitraan)	
<b>AF Project ID:</b>	AF00000113	
<b>IE Project ID:</b>		<b>Requested Financing from Adaptation Fund (US Dollars):</b> 5,972,670
<b>Reviewer and contact person:</b>	Hugo Remaury	<b>Co-reviewer(s):</b> Martina Dorigo
<b>IE Contact Person:</b>	Abimanyu Sasongko Aji	

<b>Technical Summary</b>	<p>The project “Safekeeping-Surviving-Sustaining towards Resilience: 3S Approach to Build Coastal City Resilience to Climate Change Impacts and Natural Disasters in Pekalongan City, Central Java Province” aims to build resilience to climate change impacts in Pekalongan City (Indonesia) by implementing hard and soft adaptation interventions in vulnerable coastal communities. This will be done through the five components below:</p> <p><u>Component 1:</u> Enhancing protection along the coastal line of Pekalongan City (USD 1,329,480).</p> <p><u>Component 2:</u> Enhancing coastal community capacity in developing and implementing Local Climate Change Adaptation Action Plan (RAD API), climate change information system, Climate Smart Initiative (USD 1,004,444).</p> <p><u>Component 3:</u> Strengthening vertical coordination by enhancing provincial government’s capacity in mainstreaming climate change adaptation and resilience into Central Java Province development plan which in turn could foster better climate-related policy on climate financing and bottom-up planning (USD 194,815).</p> <p><u>Component 4:</u> Strengthening vertical coordination and collaboration between national and local government in climate adaptation context and Enriching knowledge, toolkits and methodologies coastal resilience for the national government (USD 290,371).</p>
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Component 5: Improving community's resilience through initiation of alternative livelihood and improvement of sanitation facility (USD 2,506,276).

Requested financing overview:

Project/Programme Execution Cost: USD 559,018

Total Project/Programme Cost: USD 5,325,386

Implementing Fee: USD 88,266

Financing Requested: USD 5,972,670

The 1<sup>st</sup> technical review raises some issues related to the design of the proposed revised interventions, their sustainability, compliance with the Fund's Environmental and Social Policy, among others, as discussed in the number of Clarification Requests (CRs) and Corrective Action Requests (CARs) raised in the review.

The 2<sup>nd</sup> technical review finds that the proposal has not addressed some of the CRs and CARs requests. Namely, the following issues remain: a letter from the Designated Authority must be submitted, the final feasibility study should be provided and reflected in relevant sections of the proposal, the environmental impact assessment should be provided, and its findings reflected in a revised ESMP, and both IE fee and EE cost should be brought in compliance with the caps set in the Fund's Operational Policies and Guidelines.

The 3<sup>rd</sup> technical review finds that the proposal has not addressed some of the CRs and CARs requests. Indeed, an Environmental and Social Impact Assessment (ESIA) for the breakwater construction should be carried out prior to construction and its findings subsequently reflected in a revised ESMP.

The 4<sup>th</sup> technical review finds that the proposal has not addressed some of the CRs and CARs requests. Indeed, an Environmental and Social Impact Assessment (ESIA) for the breakwater construction should be carried out prior to construction and its findings subsequently reflected in a revised ESMP. Similarly, the findings of the technical feasibility study should be reflected throughout relevant sections of the project document.

The 5<sup>th</sup> technical review finds that, although some CRs were addressed, the proposal has not addressed some of the CRs and CARs requests. Indeed, an Environmental and Social Impact Assessment (ESIA) for the breakwater construction should be carried out prior to construction and its findings subsequently reflected in a revised ESMP. Similarly, the findings of the technical feasibility study should be reflected throughout relevant sections of the project document.

The 6<sup>th</sup> technical review finds that, although some progress was made in addressing the pending CR/CAR, the

	proposal has not fully addressed them. Indeed, findings of both the feasibility study and ESIA should be reflected throughout all relevant sections of the project document and related annexes.
	The 7 <sup>th</sup> technical review finds that the proposal has addressed all of the CRs and CARs requests.
Date:	11 September 2024

Review Criteria	Questions	1 <sup>st</sup> technical review	6 <sup>th</sup> technical review	7 <sup>th</sup> technical review
Country Eligibility	3. Is the country party to the Kyoto Protocol or the Paris Agreement?	<b>Yes.</b>		
	4. Is the country a developing country particularly vulnerable to the adverse effects of climate change?	<b>Yes.</b> The country's geographic location makes it extremely vulnerable to climate change impacts (i.e., flash floods, sea level rise and urban vulnerability) and these impacts are already being felt by vulnerable coastal communities.		
Project Eligibility	15. Has the designated government authority for the Adaptation Fund endorsed the project/programme?	<b>Yes.</b> As per the Endorsement letter dated January 16, 2020.  <b>CAR 1:</b> Given that Kemitraan intends to serve both as the implementing entity and the executing entity for the project, please kindly submit at your earliest convenience a letter from the Designated Authority requesting such project management arrangement. <b>(Cleared as per the assessment of the 3<sup>rd</sup> technical review)</b>		

	16. Does the length of the proposal amount to no more than One hundred (100) pages for the fully-developed project document, and one hundred (100) pages for its annexes?	<b>No.</b> The revised project document is 116 pages long. Nevertheless, since the original project document was approved (Decision B.35.a-35.b/50), this criterion is waived.		
	17. Does the project / programme support concrete adaptation actions to assist the country in addressing adaptive capacity to the adverse effects of climate change and build in climate resilience?	<p><b>Yes.</b></p> <p><b>CR 1:</b> Please describe how the breakwater and mangroves development activities will be adequate to face the identified climate threats (namely, sea level rise, change in rainfall patterns, increasing frequency and intensity of floods). <b>(Cleared as per the assessment of the 2<sup>nd</sup> technical review)</b></p> <p><b>CR 2:</b> Please justify the location and design of both the proposed breakwater and mangroves development, using maps and technical studies/assessments as much as possible. Such justification should address why Bandengan and Kandang Panjang were prioritized over Panjang Baru and Penkang Wetan; whether any feasibility studies/assessments were already undertaken for the</p>	<p><b>CR 2: Not cleared.</b> Despite having conducted a feasibility study, its main findings are not fully reflected in the revised project document. Relevant sections of the document which must reflect the feasibility study findings include Part II A (e.g., i) describe how would the proposed structure be suited to the identified climate change related pressure; ii) explain the benefits in building two separate breakwaters instead of a single one; iii) clarify whether a groin will be built in addition to the breakwater, given its expected benefits in expanding the sedimentation area) and II C (e.g.,</p>	<p><b>CR 2: Cleared.</b> As per additional information included in paragraph 55.</p>

		<p>breakwater (if it was, please kindly share a copy); and why the breakwater will not be continuous along the coastline, among others.</p> <p><b>CR 3:</b> Please confirm whether the plantation of mangroves will take place on public lands or whether the Municipal government plans to acquire private land for this intervention (in which case, please reflect this in relevant sections of the revised proposal). <b>(Cleared as per the assessment of the 4<sup>th</sup> technical review)</b></p> <p><b>CR 4:</b> Please confirm whether the project overall timeline will be impacted by this request for changes and reflect the new timeline in the revised fully-developed project proposal as needed. <b>(Cleared as per the assessment of the 2<sup>nd</sup> technical review)</b></p>	<p>addressing discrepancies between the text provided in II C and those provided in the ESIA in terms of the structure expected lifetime). Please revise the project document accordingly.</p>	
	<p>18. Does the project / programme provide economic, social and environmental benefits, particularly to vulnerable communities, including gender considerations, while avoiding or mitigating</p>	<p><b>Yes.</b></p> <p><b>CR 5:</b> Since the target areas (Kelurahan) have now changed, please confirm whether the number of direct and indirect beneficiaries have changed, and revise the</p>		

	<p>negative impacts, in compliance with the Environmental and Social Policy and Gender Policy of the Fund?</p>	<p>figures provided in paragraph 68 accordingly. <b>(Cleared as per the assessment of the 2<sup>nd</sup> technical review)</b></p> <p><b>CR 6:</b> Please confirm whether any marginalized and/or vulnerable groups, including indigenous communities, have been identified in the new target areas (Kelurahan). If such groups were identified, please outline the particular benefits provided to those groups, and describe how the project will enable their full participation into the project, including in terms of decision making. <b>(Cleared as per the assessment of the 2<sup>nd</sup> technical review)</b></p> <p><b>CR 7:</b> Please revise the tables presented in paragraphs 70, 71 and 72 to reflect i) the new target areas and associated beneficiaries; and ii) the new activities proposed. <b>(Cleared as per the assessment of the 2<sup>nd</sup> technical review)</b></p> <p><b>CR 8:</b> Please revise paragraphs 82 and 89 to reflect the new activities proposed, whenever</p>		



		applicable. <b>(Cleared as per the assessment of the 2<sup>nd</sup> technical review)</b>		
	19. Is the project / programme cost effective?	<p><b>Yes.</b></p> <p><b>CR 9:</b> Please reflect all proposed changes (including the mangrove-related ones) in paragraph 90 and associated tables. <b>(Cleared as per the assessment of the 2<sup>nd</sup> technical review)</b></p> <p><b>CR 10:</b> In the “Proposed adaptive actions cost-effectiveness rationale” table, please expand on the rationale for selecting the breakwater intervention compared to other more cost-effective options (including geotubes), and the development of 3 ha of mangroves compared to other alternatives options that may exist. <b>(Cleared as per the assessment of the 2<sup>nd</sup> technical review)</b></p>		
	20. Is the project / programme consistent with national or sub-national sustainable development strategies, national or sub-national development plans, poverty reduction strategies, national	<p><b>This is yet to be demonstrated.</b></p> <p><b>CR 11:</b> The stated rationale behind this request for changes is that “changes in the development policy both</p>		

	communications and adaptation programs of action and other relevant instruments?	of the Province Central Java and the Municipality of Pekalongan city have taken place". However, these changes in policy/plans are not reflected in this section of the revised fully-developed proposal. As a result, please reflect these changes in policy/plan in the revised fully-developed proposal and describe how the proposed revised interventions will align with these policies/plans. <b>(Cleared as per the assessment of the 2<sup>nd</sup> technical review)</b>		
	21. Does the project / programme meet the relevant national technical standards, where applicable, in compliance with the Environmental and Social Policy of the Fund?	<b>Yes.</b> <b>CR 12:</b> Considering the selection of the breakwater option, please list relevant building codes and any other national technical standards that would apply; describe how the project will comply with such codes; and explain the steps that will be taken to comply with building codes (and related license/permits that may be required). <b>(Cleared as per the assessment of the 4<sup>th</sup> technical review)</b>		

	22. Is there duplication of project / programme with other funding sources?	<p><b>This is yet to be demonstrated.</b></p> <p><b>CR 13:</b> The stated rationale behind this request for changes is that on-going initiatives from the municipality of Pekalongan city and the Provincial Government of Central Java are already intervening in the Eastern Part of the city, where the original project proposal intended to intervene. However, these initiatives are not listed in this section of the revised fully-developed proposal. As a result, please list all relevant potentially overlapping initiatives and describe how the proposed new interventions will not overlap but rather build complementarity with them. In addition, please describe the framework the project will establish to coordinate with such initiatives. <b>(Cleared as per the assessment of the 3<sup>rd</sup> technical review)</b></p>		
	23. Does the project / programme have a learning and knowledge management component to	<b>Yes.</b>		

	capture and feedback lessons?			
	24. Has a consultative process taken place, and has it involved all key stakeholders, and vulnerable groups, including gender considerations in compliance with the Environmental and Social Policy and Gender Policy of the Fund?	<p><b>Unclear.</b></p> <p><b>CR 14:</b> Please confirm whether direct and indirect stakeholders in Bandegan and Kandang Panjang, including local communities, were consulted about the proposed breakwater, and include the key consultation findings (suggestions and concerns raised) in the revised fully-developed project proposal. <b>(Cleared as per the assessment of the 4<sup>th</sup> technical review)</b></p>		
	25. Is the requested financing justified on the basis of full cost of adaptation reasoning?	<p><b>Unclear.</b></p> <p><b>CR 15:</b> Since on-going initiatives are being implemented in the Eastern part of Pekalongan city, please demonstrate how the proposed breakwater will deliver its expected results regardless of the success of the other on-going initiatives. <b>(Cleared as per the assessment of the 3<sup>rd</sup> technical review)</b></p>		
	26. Is the project / program aligned with AF's results framework?	<b>Yes.</b>		

	<p>27. Has the sustainability of the project/programme outcomes been taken into account when designing the project?</p>	<p><b>This is yet to be demonstrated.</b></p> <p><b>CR 16:</b> Please remove statements related to the parapet construction and reflect the new proposed interventions throughout this section. <b>(Cleared as per the assessment of the 2<sup>nd</sup> technical review)</b></p> <p><b>CR 17:</b> Please describe how the proposed breakwater and mangroves will be sustained beyond the project lifetime (including but not limited to who will be responsible for operations and maintenance, including from a financial standpoint). <b>(Cleared as per the assessment of the 2<sup>nd</sup> technical review)</b></p>		
	<p>28. Does the project / programme provide an overview of environmental and social impacts / risks identified, in compliance with the Environmental and Social Policy and Gender Policy of the Fund?</p>	<p><b>Unclear.</b></p> <p><b>CAR 2:</b> Please note that, given the environmental and social risks identified, an Environmental and Social Impact Assessment (ESIA) for the breakwater construction should be carried out, in compliance with the Fund's Environmental and Social Policy. Such assessment should consider</p>	<p><b>CAR 2: Not cleared.</b> A new subset of CRs/CAR is created hereunder to facilitate the tracking of the follow-up comments raised below.</p> <p><b>CR 30:</b> Please kindly confirm whether the ESIA was submitted for public review.</p>	<p><b>CR 30: Cleared.</b> As per Kemitraan's confirmation that the ESIA is made available for public</p>

	<p>(i) all potential direct, indirect, transboundary, and cumulative impacts that could result from the proposed breakwater intervention; (iii) assess alternatives to this intervention; (iii) identify possible measures to avoid, minimize, manage or mitigate environmental and social impacts of the proposed breakwater intervention; and iv) be submitted for public review. Outcomes of the ESIA should be reflected in the project ESMP.</p> <p><b>CR 18:</b> Since this section was edited without using track changes, please confirm whether the project was entirely re-screened for ESP-related risks, in light of the new proposed interventions. <b>(Cleared as per the assessment of the 3<sup>rd</sup> technical review)</b></p> <p><b>CR 19:</b> <i>Principle 1:</i> please confirm whether the project was screened for ESP-related risks against all construction-related laws, in light of the proposed breakwater, and reflect this in part II.K. In line with the ESP, please describe</p>	<p><b>CR 31:</b> Please translate p.184-185 of the ESIA in English.</p> <p><b>CR 32:</b> The ESIA should clarify why some figures show five breakwaters despite the study assessing the impact of two breakwaters only. Alternatively, these figures may be replaced by others showing two breakwaters only.</p> <p><b>CR 33:</b> Principle 1: both the ESMP and project document Part II.K should include the applicable domestic laws listed in section 4.2 of the ESIA.</p> <p><b>CR 34:</b> Principle 1: considering the outcomes of the ESIA Focus Group Discussions with government officials, both the ESMP and project document Part II K should describe the current status, steps already taken,</p>	<p>review on its website.</p> <p><b>CR 31: Cleared.</b> As per the revised text inserted on p. 184-185 of the revised ESMP.</p> <p><b>CR 32: Cleared.</b> As per the revised figures inserted in revised ESMP.</p> <p><b>CR 33: Cleared.</b> As per the additional information provided in both part II.K of the revised project document and section 1.6.3 of the revised ESMP.</p> <p><b>CR 34: Cleared.</b> As per the additional information provided on p.79 of the revised project document and on p.28 of the revised</p>
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	<p>the legal and regulatory framework of prior permission (notably construction permit) that the construction of the breakwater may entail.  <b>(Cleared as per the assessment of the 3<sup>rd</sup> technical review)</b></p> <p><b>CR 20:</b> <i>Principle 2:</i> please confirm whether the proposed construction of a breakwater may impede access of any group to the essential services and rights mentioned in Principle 2 of the ESP.  <b>(Cleared as per the assessment of the 3<sup>rd</sup> technical review)</b></p> <p><b>CR 21:</b> <i>Principle 3:</i> please confirm whether any marginalized or vulnerable groups are present in the proposed breakwater target areas. If such groups were identified, please describe them; identify the adverse impacts they are likely to experience from the project; and describe how such impacts will be mitigated.  <b>(Cleared as per the assessment of the 3<sup>rd</sup> technical review)</b></p>	<p>and plan to achieve compliance with the UKL-UPL and securing the (KKPRL) clearance from the Ministry of Marine and Fishery Affairs.</p> <p><b>CR 35:</b> Principle 2: in both the ESMP and revised project document, please shift the elements related to “Recruitment of construction workers” related risk identified in the ESIA to Principle 2 Access and Equity (they are currently listed under Principle 6), as well as those of “Opening of Business Opportunities” which are currently not reflected in the ESMP nor in the project document.</p> <p><b>CR 36:</b> Principle 6: given that the ESIA identifies risks related to “Increasing Community Income” and “Work Health and Safety Disturbances” and defines associated</p>	<p>ESMP.</p> <p><b>CR 35: Cleared.</b>  As per additional information provided on p.80 of the revised project document and on p.37-38 of the revised ESMP.</p> <p><b>CR 36: Cleared.</b>  As per the additional information provided on p.39 and 63 of the revised ESMP and on p.80 and 82 of</p>
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	<p><b>CR 22:</b> <i>Principle 8:</i> please confirm whether involuntary resettlements are expected because of the breakwater construction and refer to the related guidance document for IEs compliance with the ESP in such case. <b>(Cleared as per the assessment of the 3<sup>rd</sup> technical review)</b></p> <p><b>CR 23:</b> Please revise sections related to principles 10 and 15 in light of the proposed interventions (breakwater and mangrove development). <b>(Cleared as per the assessment of the 3<sup>rd</sup> technical review)</b></p> <p><b>CR 24:</b> Given that the identification of environmental and social risks has changed due to the new proposed interventions, please provide a revised ESMP that includes revised risk mitigation measures and related M&amp;E approach. <b>(Cleared as per the assessment of the 3<sup>rd</sup> technical review)</b></p>	<p>mitigation measures, please reflect such risks and associated mitigation measures in both the ESMP and revised project document part II.K.</p> <p><b>CR 37:</b> Principle 8: the ESIA identifies risks related to land takeover and states “1 case of conflict”. Please clarify whether the project is facing a case of conflict related to land.</p> <p><b>CR 38:</b> Principle 8 : In both the ESMP and revised project document part II K, please determine if physical or economic displacement is required by the project and if it is voluntary or involuntary. Please refer to the <a href="#">guidance document for IEs on compliance with the AF ESP</a> for more information.</p> <p><b>CR 39:</b> Principle 9: given that the ESIA</p>	<p>the revised project document.</p> <p><b>CR 37: Cleared.</b> As per the information edited on p.139 of the ESIA.</p> <p><b>CR 38: Cleared.</b> As per the information provided in the response sheet.</p> <p><b>CR 39: Cleared.</b> As per the</p>
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			<p>identifies risks related to “Maintaining the Preservation of Natural Resources and Sustainability and Protection of Pekalongan City Coastal Areas” and “Recovery of Coastal Ecosystems and Mangrove Forests” and defines associated mitigation measures, please reflect such risks and associated mitigation measures in both the ESMP and revised project document part II.K.</p> <p><b>CR 40:</b> Principle 11: in both the ESMP and revised project document part II.K, please acknowledge a risk of temporary increased of greenhouse gases emission and, as associated mitigation measure, describe how the project will mitigate such emissions. Both ESIA and feasibility study (chapter 8) already include useful</p>	<p>additional information provided on p.45-46 of the revised ESMP and on p.83-84 of the revised project document.</p> <p><b>CR 40: Cleared.</b> As per the additional information provided on p. 84-85 of the revised project document and on p. 64 and 65 of the revised ESMP.</p>
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			<p>elements on building materials which can be used to demonstrate compliance with this principle.</p> <p><b>CR 41:</b> Principle 12: please reflect the risks related to “Decreased Ambient Air Quality and increased dust”, “noise exposure”, “Increased Waste Generation”, “Wastewater generation”, “hazardous waste” into part II.K of the revised project document, as well as the risks and mitigation measures related to “Increased Noise Intensity”, “Wastewater generation”, “hazardous waste” in both the ESMP and revised project document part II.K.</p> <p><b>CR 42:</b> Principle 15: please reflect the risks related to “Increased Noise Intensity” into part II.K of the revised project document and,</p>	<p><b>CR 41: Cleared.</b> As per the additional information provided on p. 85 of the revised project document and on p. 52-54 of the revised ESMP.</p> <p><b>CR 42: Cleared.</b> As per the additional information provided on p. 86 of the revised</p>
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			<p>in the ESMP, shift the elements related to this risk to “Lands and soil conservation”.</p> <p><b>CR 43:</b> Once all CRs are addressed, please share a copy of the final ESIA signed by Kemitraan.</p> <p><b>CAR 5:</b> The secretariat noticed that some changes made by Kemitraan do not appear in track change anymore. Please kindly share a revised project document highlighting all changes made in the original version of the project document approved by the Board.</p>	<p>project document and on p. 58-59 of the revised ESMP.</p> <p><b>CR 43: Cleared.</b> As per the revised ESIA.</p> <p><b>CAR 5: Cleared.</b> As per the revised project document.</p>
Resource Availability	4. Is the requested project / programme funding within the cap of the country?	<b>Yes.</b>		
	5. Is the Implementing Entity Management Fee at or below 8.5 per cent of the total project/programme budget before the fee?	<b>Yes.</b>		
	6. Are the Project/Programme Execution Costs at or below 9.5 per cent of the total project/programme budget (including the fee)?	<p><b>No.</b></p> <p>Please note, that in the case of an implementing entity acting as the executing entity</p>		

		<p>for a project/programme, execution costs are capped at 1.5% of the total budget requested, before the implementing entity fees.</p> <p><b>CAR 3:</b> Please reduce the project execution cost to 1.5% of the total budget requested, before the IE fee. <b>(Cleared as per the assessment of the 3<sup>rd</sup> technical review)</b></p>		
Eligibility of IE	2. Is the project/programme submitted through an eligible Implementing Entity that has been accredited by the Board?	<b>Yes.</b>		
Implementation Arrangements	11. Is there adequate arrangement for project / programme management, in compliance with the Gender Policy of the Fund?	<p><b>Yes.</b></p> <p><b>CR 25:</b> Please provide a strong justification on why Kemitraan is acting both as IE and EE, considering that the division of roles from an implementing to an executing entity is a principle of the Fund's Operational Policies and Guidelines. <b>(Cleared as per the assessment of the 3<sup>rd</sup> technical review)</b></p>		
	12. Are there measures for financial and project/programme risk management?	<b>Yes.</b>		

	13. Are there measures in place for the management of for environmental and social risks, in line with the Environmental and Social Policy and Gender Policy of the Fund?	<p><b>Yes.</b></p> <p><b>CR 26:</b> Given that the project has already started, please confirm whether the grievance mechanism described is already in place and reflect this throughout this section accordingly.  <b>(Cleared as per the assessment of the 3<sup>rd</sup> technical review)</b></p>		
	14. Is a budget on the Implementing Entity Management Fee use included?	<b>Yes.</b>		
	15. Is an explanation and a breakdown of the execution costs included?	<b>Yes.</b>		
	16. Is a detailed budget including budget notes included?	<p><b>Yes.</b></p> <p><b>CR 27:</b> Please revise the detailed budget to reflect the changes proposed (e.g., rephrase output 1.1.1, etc.).</p>		
	17. Are arrangements for monitoring and evaluation clearly defined, including budgeted M&E plans and sex-disaggregated data, targets and indicators, in compliance with the Gender Policy of the Fund?	<b>Yes.</b>		
	18. Does the M&E Framework include a break-down of how implementing entity IE fees	<b>Yes.</b>		

	will be utilized in the supervision of the M&E function?			
	19. Does the project/programme's results framework align with the AF's results framework? Does it include at least one core outcome indicator from the Fund's results framework?	<p><b>Yes.</b></p> <p><b>CR 28:</b> Please revise all relevant areas of the results framework (i.e., indicators, targets, risk and assumptions etc.) to reflect the changes proposed (e.g., rephrase output 1.1.1., remove reference to the parapet, geo-tubes etc.). <b>(Cleared as per the assessment of the 3<sup>rd</sup> technical review)</b></p>		
	20. Is a disbursement schedule with time-bound milestones included?	<p><b>Yes.</b></p> <p><b>CR 29:</b> Please confirm whether the disbursement schedule still stand in light of the proposed changes, and revise it as necessary. <b>(Cleared as per the assessment of the 2<sup>nd</sup> technical review)</b></p>		

## Annex 4 - Letter of endorsement from the Designated Authority for Indonesia



### MINISTRY OF ENVIRONMENT AND FORESTRY DIRECTORATE GENERAL OF CLIMATE CHANGE

Mangala Wanabakti Building Block VII 12<sup>th</sup> Floor, Jalan Gatot Subroto – Senayan, Jakarta 10270  
Phone +62 21 5730144 Fax : +62 21 5720194

Website : <http://ditjenppi.menlhk.go.id>

email : [tusetdippi@gmail.com](mailto:tusetdippi@gmail.com)

Our Ref. : *S. 278/PP/DP/KN.0/8/2022*  
Subject : Letter of Approval for Proposed Changes  
of Adaptation Fund Project in Indonesia

Jakarta, 2 August 2022

Attention to:

The Adaptation Fund Board Secretariat  
c/o Global Environment Facility  
Mail stop: N 7-700, 1818 H Street NW  
Washington DC 20433 USA  
email: [afbsec@adaptation-fund.org](mailto:afbsec@adaptation-fund.org)

Dear Board Members,

With regard to the implementation of the Adaptation Fund (AF) project in Indonesia, I would like to inform you that *Kemitraan* (Partnership Governance Reform in Indonesia) as the National Implementing Entity (NIE), has submitted a proposal of changes in the implementation plan of the component S1 (safekeeping): Safekeeping-Surviving-Sustaining towards Resilience: 3S Approach to Build Coastal City Resilience to Climate Change Impacts and Natural Disasters in Pekalongan City, Central Java Province. The ongoing activities need to be adjusted to the latest development in Pekalongan City, especially those related to coastal protection.

As the National Designated Authority (NDA), my team and I have thoroughly reviewed and discussed the proposal with *Kemitraan*. Based on the discussion, the basis for consideration of changes can be accepted and I endorse the proposed changes or adjustments.

Thank you for your attention and further cooperation.

Sincerely Yours,



**Laksmi Dewanthi**  
Director General for Climate Change  
As National Designated Authority  
for Adaptation Fund Indonesia

Copy to:  
*Kemitraan* (Partnership Governance Reform in Indonesia)



Certificate No. QSC 01469

## Annex 5 – Technical feasibility study



Revision	4.0	Approval
Status	Final	
Date	20.03.2023	







## FOREWORD

We express our praise and gratitude to Allah SWT, who has bestowed His grace and blessing so that the Final Report on Detailed Engineering Design of Mangrove Information Center (PIM) Coastal Area in Pekalongan City can be completely prepared.

This report was prepared in order to meet the requirements as regulated in the Cooperation Agreement (PKS) set out in the Terms of Reference for the survey work of Detailed Engineering Design of PIM Coastal Area in an effort to mitigate land erosion due to increasingly worrying coastal flooding and abrasion. This work constitutes one of the steps in the effort to develop protection so that the abrasion process can be curbed and/or entirely stopped. This Final Report addresses all field activities, desk studies and numerical modeling that have been carried out in order to prepare the Detailed Engineering Design of Mangrove Information Center (PIM) Coastal Area in Pekalongan City. The planning report related to structural calculation and analysis techniques, technical drawings, work plans and conditions, list of needs and estimated costs is presented in a separate report as an integral part of the Final Report on the Preparation of DED (Detailed Engineering Design) of PIM Coastal Area Protection in Pekalongan City.

With all humility, the team of authors would also like to thank all parties who were involved in a set of activities until the realization of this report. The team of authors is fully aware that this report still contains some flaws. Therefore, the Team of Authors is open to inputs and constructive criticisms from various parties

Jakarta, January 2023

PT Nawa Pancadasa Abadi



Tubagus Muhamad Iqbal, ST., (Han).

M.SiPresident Director



## DIGEST

The abrasion of Mangrove Information Center (PIM) Coastal Area, which is located in Pekalongan City, is increasingly worrying. The abrasion occurs due to coastal flooding and a high number of withered small Mangrove for being hit by waves. To overcome this issue, the construction of a coastal protection wall that is able to mitigate the brunt of waves and coastal flooding was initiated. It is expected that the protection wall will be able to allow Mangroves to grow and, in the end, to serve as a natural safeguard against coastal abrasion which is increasingly widespread.

This Detailed Engineering Design of PIM Coastal Area Protection in Pekalongan City was prepared as an initial study report on the implementation of the field studies that have been carried out. This document consists of 10 chapters. Each chapter describes different types of studies, including elevation, topological, hydro-oceanographical, mapping & benchmark description, geotechnical, inventory, availability, location and building material price surveys, as well as hydro and sedimentation modeling.

A tidal analysis was carried out to determine the design water level elevation for planning marine facilities, to determine the type of the occurring tides and to predict water level fluctuations. This analysis was carried out based on data collected directly in the field for 15 days x 25 hours and was combined with data obtained from the Geospatial Information Agency (BIG). The two types of data were then analyzed by using the Admiralty and Least Square methods. The two methods were used to calculate harmonic constants so that the values of Mean Sea Level (MSL), Mean Lowest Water Spring (MLWS), Mean Highest Water Spring (MHWS), Lowest Water Spring (LWS), Highest Water Spring (HWS) and average water level measured from Datum LWS (Z0) can be calculated. This analysis concludes that the waters on the Pekalongan coast have the type of Mixed prevailing semidiurnal Tide, which is a tide that experiences two high tides and two low tides in a day, but sometimes one high tide and one low tide of different heights and times.

The topographical and bathymetric surveys are aimed at obtaining an overview of the location of the planned coastal protection construction. The purpose of this survey is to obtain the seabed configuration around the coastal protection plan area which includes the installation of benchmark, geodetic measurement, topographical measurement, and sea depth measurement. The method used in carrying out this survey is sounding, namely using sound waves to obtain a number of geodetic parameters. In carrying out this survey a horizontal control point was utilized by using the Global Navigation Satellite System (GNSS) with the Pekalongan CORS station (CPKL) made as a reference point. This survey produces a detailed map of hydrographic and oceanographic conditions for the location of the planned coastal protection which can be seen in details in chapter 2.

The hydro-oceanographic survey aims to identify the current speed and type of surface base material. This survey was carried out by observing sea currents and sampling seawater and sediment. The current measurement was carried out simultaneously with the bathymetric measurement at 2 points at depths of 0.2d, 0.6d and 0.8d for 25 hours by using a Valeport current meter. Meanwhile, sediment samples were taken from 2 points at 3

depths. Results of the hydro-oceanographic survey can be seen in details in chapter 3.

The mapping survey with the installation of benchmark (BM) was intended to determine a permanent coordinate point in the survey area by using GPS. In this activity, 4 BM points that will also be used as a reference for other further studies and activities have been installed. Benchmark (BM) description is addressed in chapter 5 of this report.

The condition of the soil structure where the coastal protection will be constructed needs to be investigated so that the carrying capacity and potential for land subsidence can be identified. This can be analyzed through a geotechnical survey. In this case, a geotechnical survey has been carried out by using Hand Boring. Hand Boring is the simplest and most economical boring method at shallow depths. The hand boring survey was carried out at 5 points in the corridor of the work location to a depth of 8 meters. Results of this hydro-oceanographic survey can be read in details in chapter 6.

The analysis conducted by the Ministry of Marine Affairs and Fisheries (KKP) shows that mangroves in Pekalongan are at an index of 2.3 or it can be said that they have high vulnerability. Therefore, mangroves on the coast of Pekalongan City must be recovered immediately. To obtain a baseline overview for the mangrove planting program along with improvements to both methods and ways to make it effective, a survey of mangrove forest vegetation on the coast of Pekalongan has also been carried out. The scope of the existing vegetation inventory survey includes the collection of information and data on mangroves around the PIM area, completed with sample photo documentation of each type of plant found. In 2012, the recorded area of mangrove forest was 9.2 Ha. However, due to the critical land condition due to the prolonged coastal flooding, only 2.3 ha of mangrove forest remained. A number of mangroves can be found in the mangrove forest. However, based on the experience of local residents, the type of mangrove that is suitable and can survive is *api-api* or *Avicennia alba* Blume sp. Therefore, this type can be made as one of the options in reforestation efforts which must certainly involve the active participation of the community in sustainable conservation efforts. The efforts must also be accompanied by coastal flooding and wave mitigation through the construction of coastal protection so that the planted mangrove seedlings can grow to maturity. This is addressed in details in chapter 7.

In order to guarantee the seamless construction of the coastal protection, surveys have also been carried out on availability, location and price of building materials, which include crushed stone and ready-mix cement with a minimum quality of K-350, presented in chapter 8. These surveys include location identification, on-site field survey, analysis of availability, and accessibility related to the distance from the quarry location to the location of the planned construction in the PIM Area, Pekalongan. This survey produced information that the supply of natural stone materials as requested in the TOR is not available in Pekalongan City, but is available outside Pekalongan City with the shortest distance of 46.2 km, namely in Batang Regency. Meanwhile, the batching plant as the supply of ready-mix concrete material is located in Pekalongan City with the shortest distance of 12.5 km from the PIM location, Pekalongan.

Hydro-sedimentation modeling was carried out to obtain an analysis of the water condition in the work location and its surroundings before and after the breakwater is constructed. This modeling

was carried out by using secondary data in the form of data on wind speed and direction, tides, sedimentation, and bathymetry. Simulations for this hydro-sedimentation modeling have been carried out using the Delft3D software. Delft3D is a 3D modeling suite for studying hydrodynamics, sediment transport, morphology, and water quality for fluvial, estuarine and coastal environments.

The computational simulation has considered the existing conditions and structure, with the assumption that the coastal protection structure is in the form of a detached breakwater. With the existence of a coastal protective structure, current speed decreases in the protected areas and wave height can be reduced. Based on results of the modeling that has been done in the study area, erosion severity will increase due to the absence of a coastal protection system. Meanwhile, with the existence of a detached breakwater, erosion can be controlled, especially on the western and central sides. Meanwhile on the right side, there is erosion due to lack of sediment supply from the right side. On the other hand, the combination of a detached breakwater and a groin is able to expand the sedimentation area. Therefore, it can restore the condition of the coast behind it. On the right side, sediment can enter the protected area to supply the need for sediment. Based on the simulation, the existence of a groin on the western side makes the current at a low tide much smaller compared to the layout with only a detached breakwater. The low tide currents that are much smaller make sediment that has been carried during the high tide and deposited during slack water/tidal transition remains significant behind the combination of detached breakwater and groin structures.





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## GLOSSARY

Admiralty	Is one of the methods used to calculate two harmonic constants, namely amplitude and phase difference in a short time span (29 days).
Bathymetry	Results of measurement into the seabed in an area from the shoreline to the reviewed depth.
Littoral Drift	A shift in coastal areas due to coastal activities.
Littoral Transport	A term used for the transport of non-cohesive sediments, especially sand, along the foreshore and the coastal surface due to the action of breaking waves and currents parallel to the coast.
Day (24 hours). RZWP3K	A period of time for one day and one night in hours Coastal Area and Small Island Zoning Plan
ECMWF Forecasts.	European Center for Medium-Range Weather Forecasts.
Tide	High and Low Tides.
Reconnaissance Survey	Also referred to as <i>survei pengintaian</i> , is an extensive study of the entire area that might be used for a road or airfield. The purpose is to eliminate impractical or unfeasible routes or sites and to identify more promising routes or sites.
GRDP	Gross Regional Domestic Product.
ADHK	On the Basis of Constant Prices.
HWL	High Water Level is the high water level of the highest water level that is reached during the high tide in one tidal cycle.
LWS	Low Water Spring is the average water level of each successive low tide for a period of about 24 hours each semi-month (roughly every 14 days), during the greatest tidal range.
LWL	Low Water Level is the low water level of the lowest water level that is reached during the low tide in one tidal cycle.
MHWL	Mean High Water Level is the mean high water level, being the mean of high water level for a period of 18.6 years.
MLWL	Mean Low Water Level is the mean low water level, being the mean of low water level for a period of 18.6 years.
MSL	Mean Sea Level is the mean seawater level, being the mean water level between the being high water level and the being low water level.
HHWL	Highest High Water Level is the highest high water level, being the highest water level during the spring or neap tide.

LLWL	Lowest Low Water Level is the lowest low water level, being the lowest water during the spring or neap tide.
HHWL	Higher High Water Level is the highest of two high water levels in one day, like in the mixed-type tide.
LLWL	Lower Low Water Level is the lowest of the two low water levels in one day.
Topography	Results of measurements of a land area indicated by an elevation difference for the reviewed region or area.

## CHAPTER 1 INTRODUCTION

### 1.1 Background

The coastal area is defined as a land area that borders the sea, with onshore boundaries including waterlogged or non-waterlogged areas that are still affected by sea processes, such as: tide, sea breeze and salt intrusion and offshore boundaries including areas that are affected by natural onshore processes such as: sedimentation and the flow of fresh water into the sea, as well as sea areas that are affected by onshore human activities. The protection of coastal areas is carried out by reviewing and analyzing dynamic coastal phenomena visually by means of, among others: coastal erosion and accretion, direction and volume of sand transport parallel to the coast, weight and slope of armor, boundaries of the investigation area and others. Thereby, to maintain and improve the condition of coastal stability, several innovative construction alternatives have been developed for coastal protection and security in order to enable harmony and comfort for residents in coastal areas and other built infrastructure.

One of the objectives of this Project is to restore natural protection in order to increase resilience against the risks of coastal flooding and flood hazards, including vulnerability and exposure, by restoring the mangrove ecosystem and increasing coastal protection, where gaps still persist ('safekeeping' action approach).

### 1.2 Objective

In accordance with the TOR, the objectives of this work are:

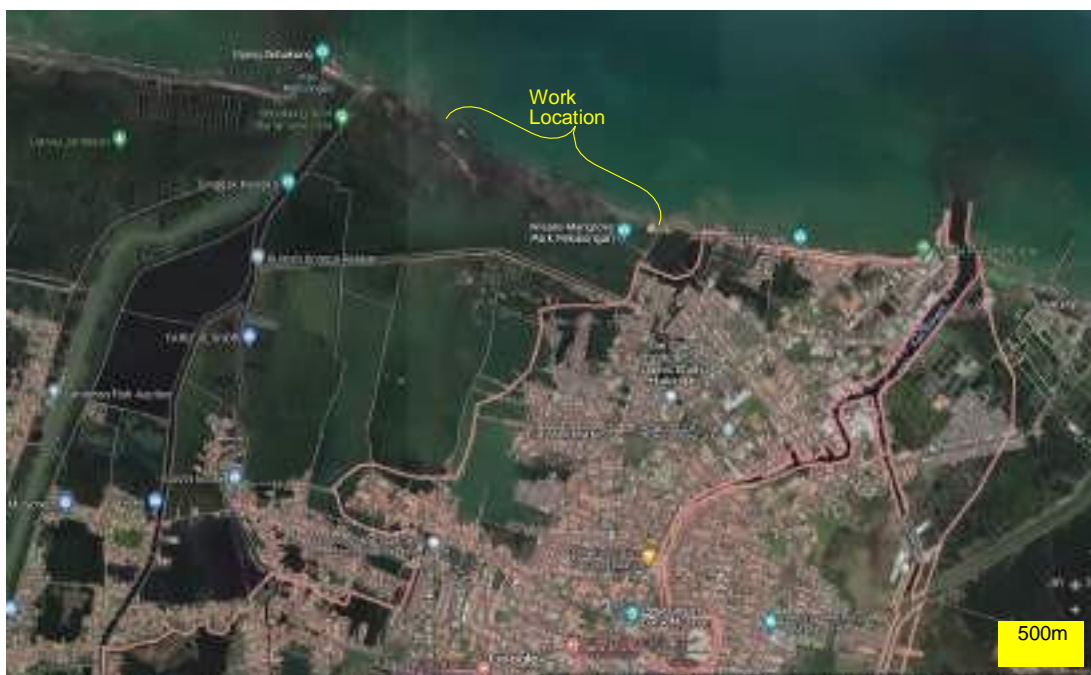
- 1) To obtain a detailed but limited bathymetric map around the protected coastline.
- 2) To obtain the high and low tide characteristics in the work location.
- 3) To obtain the characteristics of soil along the protected coastline.
- 4) To obtain an inventory of flora that grows all this time (existing) in the protected coastal area.
- 5) To obtain quantitative data on availability, location, and building material prices.
- 6) To obtain detailed engineering design (DED) of BPP the type of which has been determined in these Terms of Reference (TOR). The type of DED is explained in another section of this TOR.
- 7) To obtain tender documents for the BPP construction work in accordance with the DED referred to in the previous point (4).

### 1.3 Work Location

As informed in the TOR, the work location is situated on the north coast of Pekalongan City with the Eastern and Western boundaries as follows:

- 1) The Eastern boundary of the Work Location is the Crematorium building of Pekalongan (Kandang Panjang Sub-district, Pekalongan Utara, Pekalongan City, Postal Code 51149).
- 2) The Western boundary of the Work Location is the coastal boundary of Pekalongan City in the Western part. (Bandengan Sub-district, Pekalongan Utara, Pekalongan City, Postal Code 51149). It is not easy to obtain an official high-resolution map of the administrative boundaries of Pekalongan City. One of the official maps can be found in Regional Regulation of Pekalongan City Number 9 of 2020 on the Amendment to Regional Regulation of Pekalongan City Number 30 of 2011 on Spatial Layout Plan of Pekalongan City for 2009-2029.
- 3) The Northern and Southern boundaries follow the measurement limits required in the topographical and bathymetric surveys as far as 250 m landward and seaward respectively from the coastline.

The results of interpretation of the work location boundaries given in the three points above provide an overview of the work location along the 1,300 m x 2 x 250m coastline. Aerial montage in a satellite map is shown in Figure 1.1, while the results of interpretation of the work location are shown in Figure 1.2.



Source: TOR (Google Map downloaded in Feb 2022)

5.1.1.1 Figure 1.1 Satellite Image of the Work Location



Source: Google Map downloaded in April 2022 (processed by the consultant)

### 5.1.1.2 Figure 1.2 Work Location Area

#### 1.4 Legal References

- a. Law Number 17 of 2019 on Water Resources;
- b. Law Number 1 of 2014 on the Amendment to Law Number 27 of 2007 on Management of Coastal Areas and Small Islands;
- c. Presidential Regulation Number 51 of 2016 on Coastal Boundaries;
- d. Government Regulation of the Republic of Indonesia Number 42 of 2008 on Management of Water Resources;
- e. Regulation of the Minister of PWH of the Republic of Indonesia No.07/PRT/M/2015 on Coastal Protection.

#### 1.5 Scope of Work

In details, the scope of work includes:

- 1) Manual hourly primary tidal elevation survey for 15 (fifteen) days x 24 hours.
- 2) The detailed mapping survey used a simple measuring staff - theodolite - spirit level method, but the elevation of each measuring point had to be tied and corrected against the tidal elevation. The bathymetric survey area has a length along the work location, width of 250 (two hundred and fifty) meters landward and 250 (two hundred and fifty) meters seaward calculated from the current coastline (must obtain prior approval before the survey).

The measuring points form a grid like a chessboard with the distance of measuring points of 10 (ten) meters from each other.

- 3) The geotechnical survey used a hand bore at five (5) points in the work location corridor to a depth of 8 (eight) meters. Undisturbed soil samples were not required, but all of the bored soil must be systematically put in strong sample boxes (core boxes) so that they can be safely and securely transported out of town if necessary.
- 4) Existing vegetation inventory survey, completed with sample photo documentation of each species of plant found.
- 5) Availability, location, and building material price survey as follows:
  - a) Crushed natural stone (not river stone) for core material of 200-1000 kg.
  - b) Crushed natural stone (not river stone) for armor of 1,500 kg.
  - c) Ready mix concrete of K-350 quality or higher.

Each survey mentioned in points 1 to 5 is reported separately as a "Survey Report" with a title corresponding to each survey.

- 6) The construction of four (4) BM (benchmarks) in accordance with the topographical rule linked to the National BM system. The detailed methods for linking the four BM to the National BM system and BM description, including detailed orientation map and high-resolution photos, are contained in the Mapping Survey Report.
- 7) The preparation of Base Map must be carried out carefully in accordance with the cartographic rule with each step of map processing reported in details in the Mapping Survey Report. As a vertical reference, it is determined that LLWL (lowest low water level) = 0 (zero) meter elevation. Tide elevation calculations were carried out carefully in accordance with the common tidal calculation rule.
- 8) The raw data resulting from the tidal survey and detailed tidal calculations must be included in the Mapping Survey Report.
- 9) Collection of valid secondary data for input to computer modeling of seawater and coastal dynamics.
- 10) Computer simulation for making the scenario of water condition in the work location and its surroundings before and after the breakwater is constructed.
- 11) Breakwater structure design according to the water condition in the work location. This step (xi) is iterated reciprocally with step (10) because the structure design and computer simulation parts of the work depend on each other.
- 12) Presentation of work progress and discussion with the Employer to obtain approval for the progress of work that has been achieved and approval for carrying out the next steps. The presentation/discussion stage follows the report stages as follows:



- a) The Preliminary Report is submitted within one calendar month after the date of contract and is explained/discussed thereafter at the time to be determined by the Employer. The Preliminary Report contains a detailed work plan, and must have contained the results of the Consultant's introduction and visual observation of the location condition.
  - b) The Intermediate Report is submitted within three calendar months after the date of contract and is explained/discussed thereafter at the time to be determined by the Employer. The Intermediate Report summarizes all Survey Reports and at least the first iteration of steps (ix-x) so that the form of design could have been presented in the Intermediate Report.
  - c) The Draft Final Report is a draft of the Final Report. The format of Draft Final Report is the same as the format of Final Report to make it easier for the Consultant because the format has been determined and prepared since it was in the form of draft. The Draft Final Report is submitted within four and a half calendar months after the date of contract and is explained/discussed thereafter at the time to be determined by the Employer.
  - d) Presentation/discussion of the Final Report is required to ensure that the Consultant has carried out all work components under its obligations. The Final Report is submitted within five and a half calendar months after the date of contract. The discussion time will be determined by the Employer.
- 13) After the definitive design has been approved by the Employer, a Final Report is prepared consisting of the following report components:
- a) The Main Report contains a chronological description of the implementation of all work. The summary of each component of the work stages, including the budget plan for coastal protection structure construction, is presented in this report.
  - b) The Executive Summary summarizes the Main Report.
  - c) The Planning Drawing Album contains ready-to-build design drawings complete with all descriptions of dimensions, materials and specifications.
  - d) The Technical Specifications contain a detailed description of the detailed technical characteristics of all materials included in the building plan in the Drawing Album.
  - e) The List of Work Quantities contains the quantity of all materials contained in the building design in the Drawing Album, is systematically arranged for each work component, and outlines in details the respective quantity in units according to market prevalence.
  - f) The Cost Budget Plan contains a detailed calculation of the work costs to construct the building structure designed in the Drawing Album.





## CHAPTER 2 TIDAL ELEVATION SURVEY

Manual hourly primary tidal elevation survey for 15 days x 24 hours.

### 2.1 Introduction

The tidal elevation survey as set out in the Terms of Reference of the Detail Engineering Design work ranks first. However, the implementation in the field has been adjusted to the stages of work that must be carried out at PIM Pekalongan.

### 2.2 Implementation Method of Tidal Observation

#### 2.2.1 Tidal Observation

Tidal observation was carried out in a representative location with an observation period of 15 days x 24 hours. The observation was carried out by installing a water level gauge which was read every hour. The tidal observation tool used is a staff gauge with a scale interval of 1 (one) cm. The elevation resulting from the water level observation is then linked to the existing fixed point (Benchmark). Data resulting from the observation will be used to analyze the average water level and tidal constants. The results of this observation are linked to the nearest topographical measurement stake (levelling), to identify the zero staff gauge elevation by using a spirit level so that topographical, bathymetric and tidal measurement has the same datum (reference surface). The linking formula is as follows:

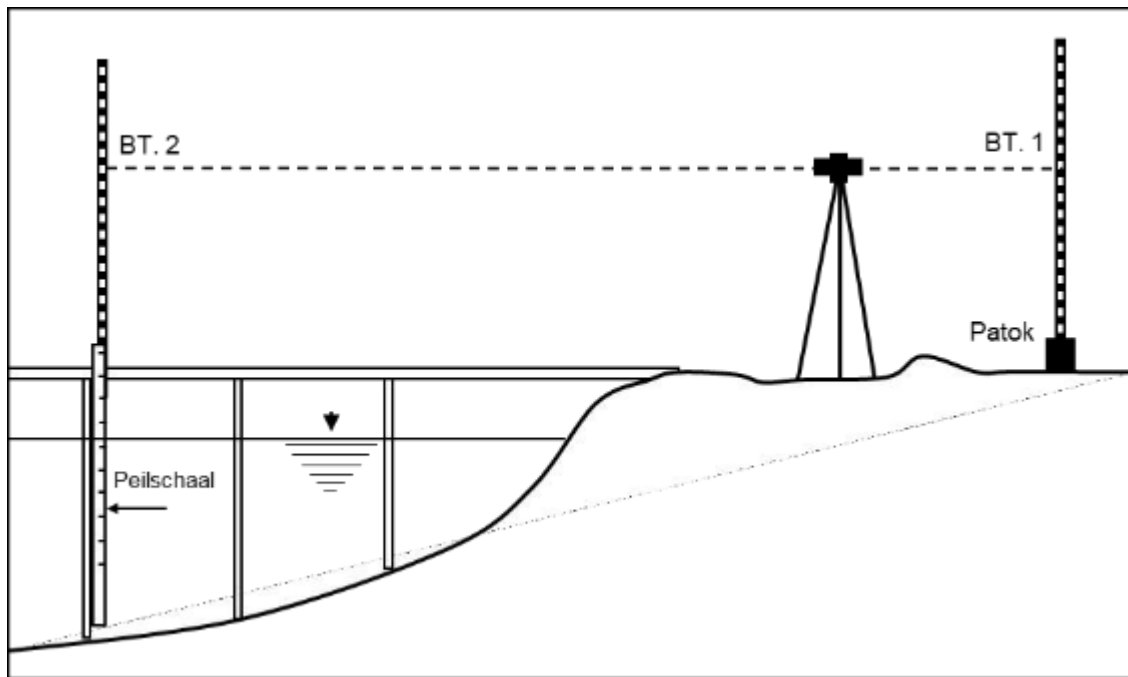
$$\text{Zero Staff Gauge Elevation} = \text{T.P} + \text{BT.1}$$

–BT.2 With:

T.P = height of the nearest stake point to the staff

gauge. BT.1 = middle thread reading at the stake.

BT.2 = middle thread reading at the staff gauge.



**Figure 2.1 Staff Gauge Linking (Leveling).**

A tidal analysis was carried out to determine the design water level elevation for planning marine facilities, to determine the type of the occurring tides and to predict water level fluctuations as illustrated in Figure 2.1. The order of tidal analysis is as follows:

- a) Outlining tidal components, namely by outlining the fluctuations in water level due to tides into 9 (nine) harmonic constituent components. The obtained values are amplitude and phase of each component. The method commonly used to describe tidal components is the Admiralty method. Before calculation, data resulting from the observation is first linked to the existing topographical references, while the description of tidal harmonic components is as shown in Tables 2.1 and 2.2:

**5.1.1.3 Table 2.1 Description of the tidal harmonic components**

Component	Symbol	Period (hours)	Remarks
Principal Lunar	M2	12.4106	Semidiurnal Tide
Principal solar	S2	12.0000	
Lunar due to the Monthly variation of earth-Moon distance	N2	12.6592	
Solar-Lunar due to changes in the sun-Moon declination angle	K2	11.9673	
Solar-Lunar	K1	23.9346	Diurnal Tide
Principal Lunar	O1	25.8194	
Principal solar	P1	24.0658	
Principal Lunar Solar-Lunar	M4	6.2103	Shallow Waters
Lunar Solar-Lunar	MS4	6.1033	

**Table 2.2 Tidal Types**

Formzahl Number (F)	Tidal Types	Remarks
$F < 0.25$	Semidiurnal tide	In 1 day, there are 2 high tides and 2 low tides with almost the same height and occurring consecutively in a regular manner. The average tidal period is 12 hours 24 minutes.
$0.25 < F < 1.5$	Mixed, prevailing semidiurnal	In 1 day, there are 2 high tides and 2 low tides with different heights and periods.
$1.5 < F < 3.0$	Mixed, prevailing diurnal	In 1 day, there are 1 high tide and 1 low tide with different heights. Sometimes, there are 2 high tides in 1 day with great differences in height and time.
$F < 3.0$	Diurnal tide	In 1 day, there are 1 high tide and 1 low tide. The tidal period is 24 hours 50 minutes.

- b) The calculation of tidal constants was carried out by using the Admiralty method. Recording results were taken at 1-hour intervals as input to the Admiralty and tidal constants. With the tidal constants existing in the previous process, the type of tide was determined according to the following formula:

$$NF = \frac{K_1 + O_1}{M'' + S''}$$

With the type of tide for NF value, among others:

- 0 – 0.25 = Semidiurnal.
- 0.25 – 1.5 = Mixed Type (Semidiurnal Dominant).
- 1.5 – 3.0 = Mixed Type (Diurnal Dominant).
- >3.0 = Diurnal.

Subsequently, tidal forecast for 30 days chosen together with the measurement period was carried out. The forecast results were compared to the elevation readings in the field to identify their conformance. With the constants obtained, tidal forecast was also carried out for a period of 18.6 years as of the date of observation. The results of this forecast were read to determine important tidal elevations that characterize the area as presented in Table 2.3:

**Table 2.3 Important Tidal Elevation**

No.	Important Elevation	Remarks
1	LWS (LAT)	Lowest Astronomical Tide
2	MSL	Mean Sea Level
3	HWS (HAT)	Lowest Astronomical Tide
4	Z0	Chart Datum
5	Range	Tidal Range
6	MHWS	Mean High Water Spring
7	MLWS	Mean Low Water Spring

## 2.2.2 Tidal Observation Analysis

The reading of tidal observation was carried out manually by the surveyor, and based on the results of visits to the survey location, the location of tidal observation was found in a location close to an accessible area, but the tide staff installation was still carried out by making a score orchard. This was because there was no building that can be used as a permanent station. The obtained location of tidal observation is shown in Table 2.4 and Figure 2.2.

**5.1.1.4 Table 2.4 Coordinates of tidal station position**

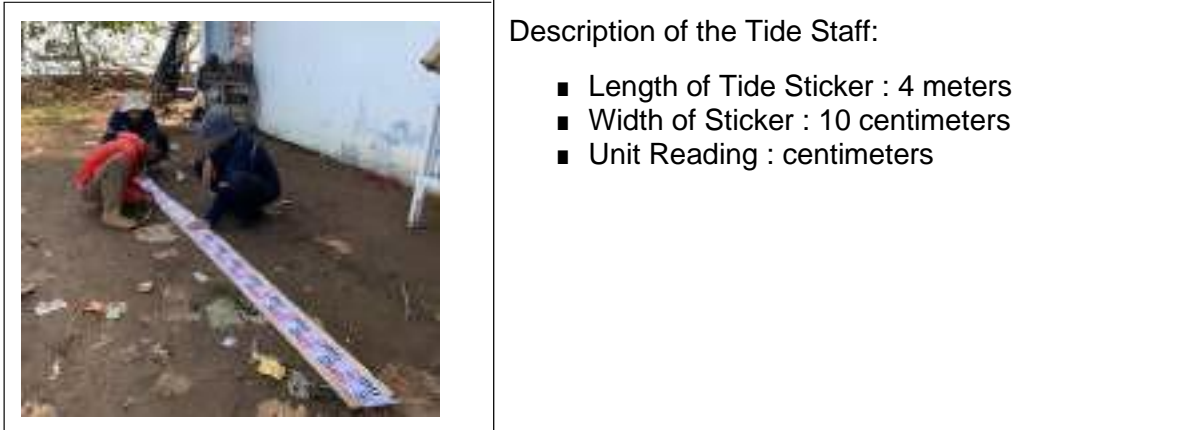
Station	Latitude	Longitude	Easting	Northing
Crematorium Area	6°51'25.34"S	109°40'33.79"E	353712.6930	9241853.2690



(Source: Google Earth with adjustments, 2022)

**5.1.1.5 Figure 2.2 Tidal observation location in the study location**

The tidal observation was carried out manually using a tide staff installed in the crematorium area. Tidal reading was carried out by an observer, with the distance between the observer and the tide reading of  $\pm 10$  meters. At night, the observer could still see the tidal reading quite clearly with a flashlight.



**5.1.1.6 Figure 2.3 Description of the tide staff**

The component separation analysis method used the Least Square and Admiralty Methods. The results of prediction on the two methods were then used to determine the best method to be used in the next analysis.

## **2.3 Results of Survey and Discussion**

### **2.3.1 Tidal Survey**

The tidal elevation survey or tidal observation was carried out from 15 May 2022 to 30 May 2022 in the Crematorium Area. The tidal observation was carried out at 60-minute intervals for 24 consecutive hours for 15 days. The results of this tidal value will later be used to determine the chart datum/vertical control point. Figure 1.4 shows the coordinates of tidal observation station position and Figure 1.5 shows the documentation of seawater level graphs at the time of observation.



Making a Tide Staff



Making a Tide Chart



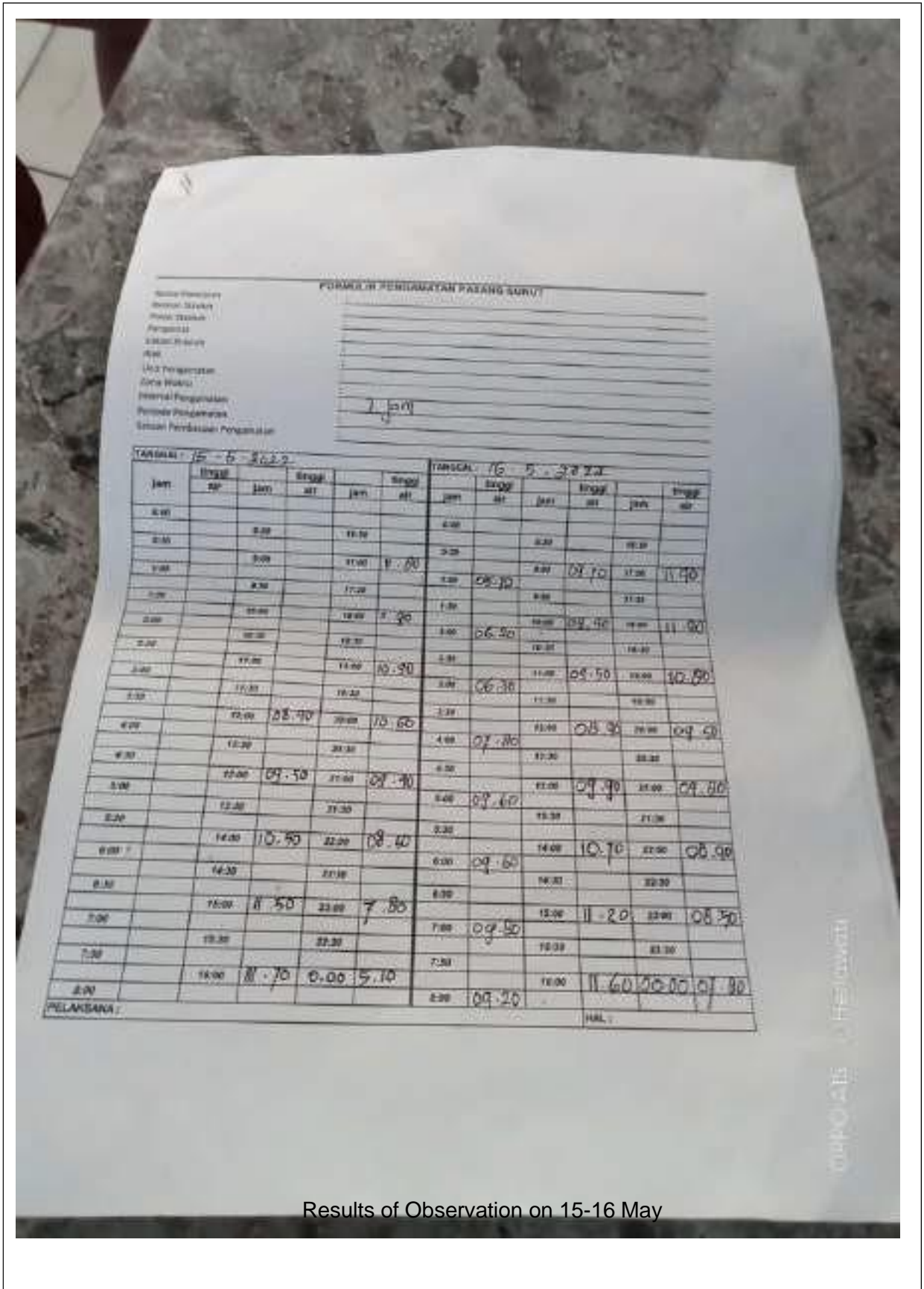
Installing a Tide Staff



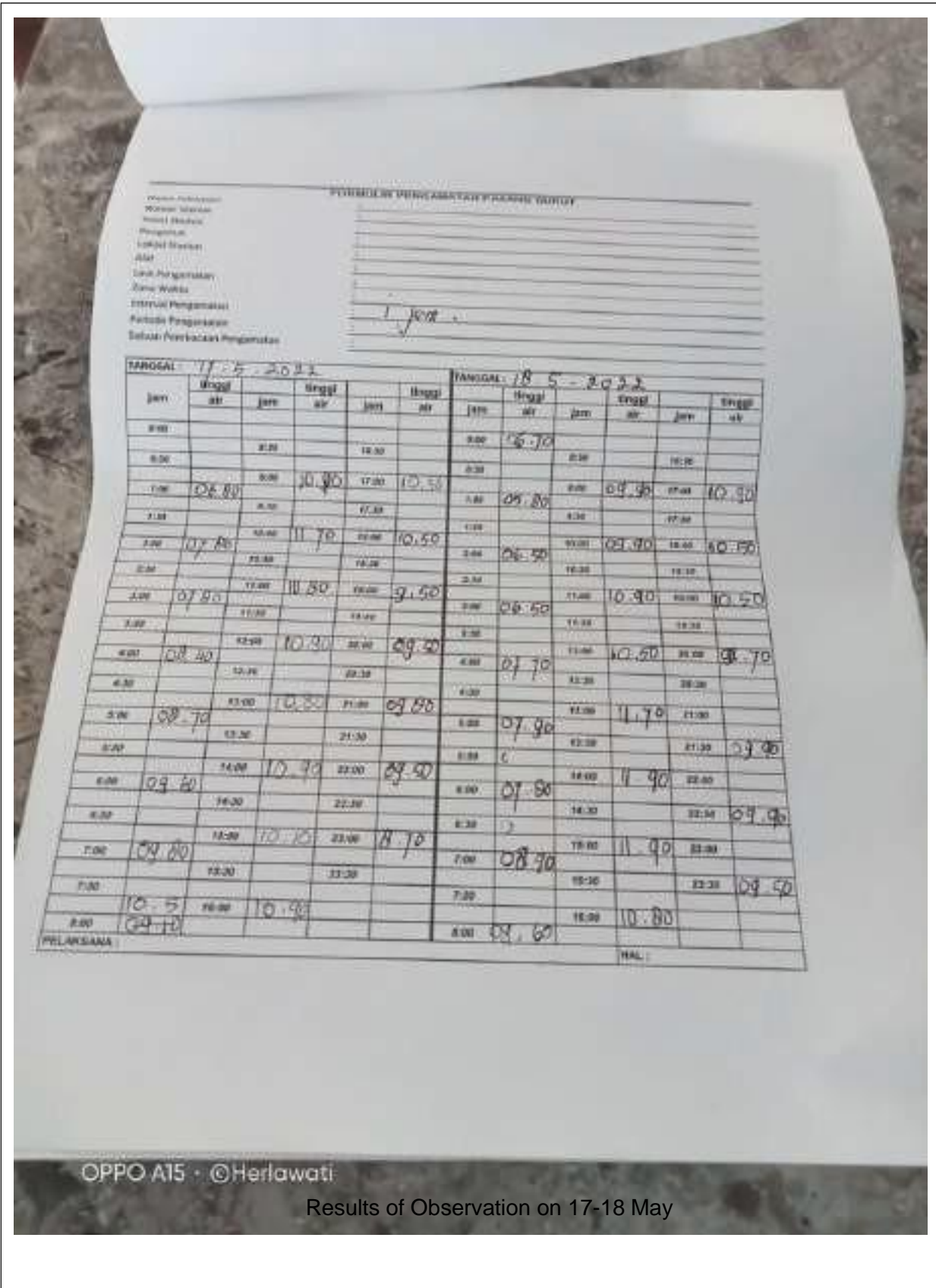
Installing a Tide Staff

5.1.1.7 Figure 2.4 Documentation of Tide Staff making and Installation





Results of Observation on 15-16 May



Petunjuk Observasi:  
 Waktu Observasi: \_\_\_\_\_  
 Nama Observer: \_\_\_\_\_  
 Program: \_\_\_\_\_  
 Lokasi Observasi: \_\_\_\_\_  
 Alat: \_\_\_\_\_  
 Cara Pengamatan: \_\_\_\_\_  
 Jenis Waktu: \_\_\_\_\_  
 Instruksi Pengamatan: \_\_\_\_\_  
 Format Pengamatan: \_\_\_\_\_  
 Salinan Perbaikan Pengamatan: \_\_\_\_\_

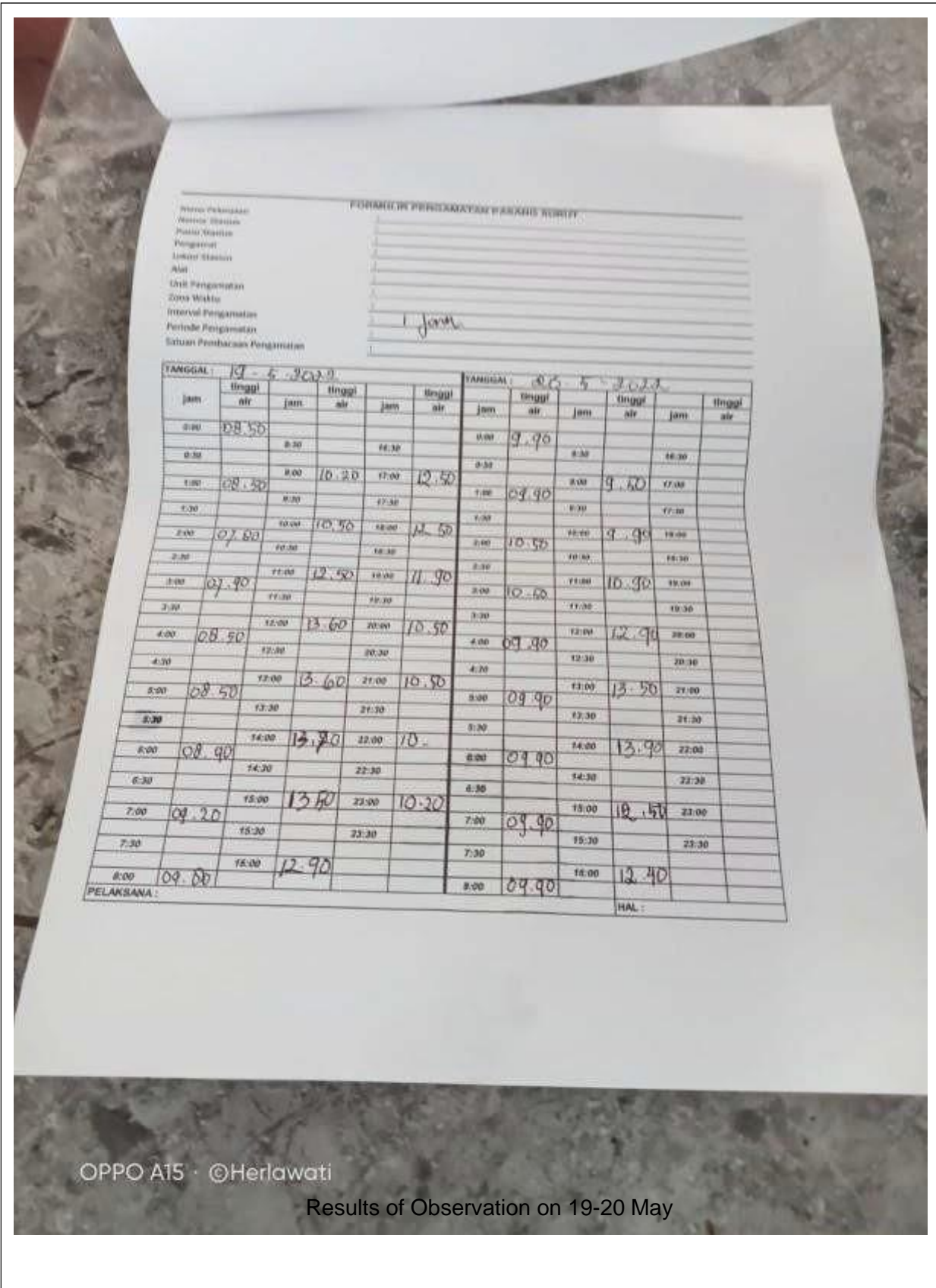
PENGAMATAN PENYAJIAN PIRAMIDA TERBUKA

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8:30		8:30		10:30		8:30		8:30		10:30	
9:00		9:00	10:30	17:30	10:30	9:00	07:30	9:00	09:30	07:30	10:30
9:30	06:30	9:30		17:30		9:30	08:30	9:30		17:30	
1:00	07:30	10:00	11:30	22:00	10:50	1:00	09:30	10:00	09:30	18:00	10:30
1:30		10:30		18:30		1:30	09:50	10:30		18:30	
2:00	07:30	11:00	11:50	19:00	9:50	2:00	09:50	11:00	10:30	19:00	10:50
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3:00	08:30	12:00	10:30	20:00	09:50	3:00	07:30	12:00	10:50	20:00	09:30
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4:00	08:30	13:00	10:30	21:00	09:50	4:00	07:30	13:00	11:30	21:00	
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5:00	09:30	14:00	10:30	22:00	09:50	5:00	07:30	14:00	11:30	22:00	
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8:00	10:30	16:30	10:30			8:00	08:30	16:30	10:30		

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Results of Observation on 17-18 May





FORMULIR PENGAMATAN PERAKHIS RUMAH

Nama Pengekspedien: \_\_\_\_\_  
 Nomor Stasiun: \_\_\_\_\_  
 Nama/No. Unit: \_\_\_\_\_  
 Pengekspedien: \_\_\_\_\_  
 Lokasi Stasiun: \_\_\_\_\_  
 Alat: \_\_\_\_\_  
 Unit Pengamatan: \_\_\_\_\_  
 Zona Waktu: \_\_\_\_\_  
 Interval Pengamatan: \_\_\_\_\_  
 Periode Pengamatan: \_\_\_\_\_  
 Situasi Pembacaan Pengamatan: \_\_\_\_\_

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8:00	09.00	16:00	12.90			8:00	09.40	16:00	12.40		

PELAKSANA:

HAL:

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Results of Observation on 19-20 May

**FORMULIR PENGAMATAN PASANG SURUT**

Nama Pekerjaan \_\_\_\_\_  
 Nomor Stasiun \_\_\_\_\_  
 Posisi Stasiun \_\_\_\_\_  
 Pengamat \_\_\_\_\_  
 Lokasi Stasiun \_\_\_\_\_  
 Alas \_\_\_\_\_  
 Unit Pengamatan \_\_\_\_\_  
 Zona Waktu \_\_\_\_\_  
 Interval Pengamatan \_\_\_\_\_  
 Periode Pengamatan \_\_\_\_\_  
 Satuan Pembacaan Pengamatan \_\_\_\_\_

1 Jam

TANGGAL: 21-5-2022						TANGGAL: 22-5-2022					
jam	tinggi air	jam	tinggi air	jam	tinggi air	jam	tinggi air	jam	tinggi air	jam	tinggi air
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7:30		16:00	10.90			7:30		15:30		23:30	
8:00	07.90					8:00	08.50	16:00	14.50		

PELAKEBAHA \_\_\_\_\_ HAL: \_\_\_\_\_

Results of Observation on 21-22 May

**FORMULIR PENGAMATAN PASANG SURUT**

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 Nomor Station: \_\_\_\_\_  
 Lokasi Station: \_\_\_\_\_  
 Rute: \_\_\_\_\_  
 Unit Pengamatan: \_\_\_\_\_  
 Jenis Waktu: \_\_\_\_\_  
 Interval Pengamatan: 1 jam  
 Periode Pengamatan: \_\_\_\_\_  
 Satuan Pembacaan Pengamatan: \_\_\_\_\_

TANGGAL: 23 & 24      TANGGAL: 24 - 5 - 2023

jam	tinggi		tinggi		tinggi		tinggi		tinggi	
	air	jam	air	jam	air	jam	air	jam	air	
0.00	07.90	8.30		18.30	0.00	07.50	8.30		18.30	16.50
0.30		8.30	09.40	17.00	0.30		8.30	10.40	17.00	16.50
1.00	07.90	8.30		17.30	1.00	8.40	8.30	10.40	17.30	
1.30		8.30	09.50	18.00	1.30		8.30	10.40	18.00	16.50
2.00	07.90	8.30		18.30	2.00	7.50	8.30		18.30	
2.30		8.30	10.00	19.00	2.30		8.30	11.00	19.00	16.50
3.00	07.90	8.30	11.00	19.30	3.00	7.40	8.30	11.00	19.30	
3.30		8.30		19.30	3.30		8.30	11.30	19.30	
4.00	07.90	8.30	12.50	20.00	4.00	9.50	8.30	12.00	20.00	16.30
4.30		8.30		20.30	4.30		8.30	12.30	20.30	
5.00	07.90	8.30	13.40	21.00	5.00	09.40	8.30	13.00	21.00	15.40
5.30		8.30		21.30	5.30		8.30	13.30	21.30	
6.00	07.90	8.30	14.50	22.00	6.00	09.40	8.30	14.00	22.00	14.50
6.30		8.30		22.30	6.30		8.30	14.30	22.30	
7.00	07.90	8.30	14.40	23.00	7.00	10.50	8.30	15.00	23.00	12.50
7.30		8.30		23.30	7.30		8.30	15.30	23.30	
8.00	07.40	8.30	16.50		8.00	10.40	8.30	16.00	23.30	

ARKANA: \_\_\_\_\_      HAL: \_\_\_\_\_

Results of Observation on 23-24 May



FORMULIR PENGAMATAN PELAKSANA KEGIATAN

Nama Kegiatan: \_\_\_\_\_  
 Nomor Kegiatan: \_\_\_\_\_  
 Tempat Kegiatan: \_\_\_\_\_  
 Tanggal: \_\_\_\_\_  
 Lokasi Kegiatan: \_\_\_\_\_  
 Jns: \_\_\_\_\_  
 Jenis Pengamatan: \_\_\_\_\_  
 Nama Mahasiswa: \_\_\_\_\_  
 Nomor Pengamatan: \_\_\_\_\_  
 Periode Pengamatan: \_\_\_\_\_  
 Jumlah Pengamatan: \_\_\_\_\_

1 Jam

WAKTU	K. 1		K. 2		K. 3		K. 4		WAKTU
	START	STOP	START	STOP	START	STOP	START	STOP	
0.00	06.30								06.30
0.30		06.30	10.50	11.00	06.30				06.30
1.00	05.30								07.30
1.30		05.30	11.30	11.30	07.40				07.30
2.00	05.30								07.30
2.30		05.30	10.30	10.30	07.30				08.30
3.00	06.30								08.30
3.30		06.30	11.50	11.50	08.40				08.30
4.00	06.40								08.30
4.30		06.40	12.00	12.00	09.40				08.30
5.00	07.00								08.30
5.30		07.00	12.30	12.30	09.40				08.30
6.00	08.30								08.30
6.30		08.30	13.30	13.30	09.40				08.30
7.00	09.40								09.40
7.30		09.40	13.30	13.30	10.50				09.40
8.00	10.50								09.40
									09.40

HAL: \_\_\_\_\_

Results of Observation on 25-26 May

**FORMULIR PENGAMATAN PASANG SURUT**

Nama Pekerjaan \_\_\_\_\_  
 Nomor Stasiun \_\_\_\_\_  
 Posisi Stasiun \_\_\_\_\_  
 Pengamat \_\_\_\_\_  
 Lokasi Stasiun \_\_\_\_\_  
 Alat \_\_\_\_\_  
 Urut Pengamatan \_\_\_\_\_  
 Zona Waktu \_\_\_\_\_  
 Interval Pengamatan \_\_\_\_\_  
 Periode Pengamatan \_\_\_\_\_  
 Satuan Pembacaan Pengamatan \_\_\_\_\_

TANGGAL: 27.5.2023

Jam	tinggi		tinggi		tinggi		tinggi		tinggi			
	air	jam	air	jam	air	jam	air	jam	air			
0:00	10.00											
0:30		0:00		0:30				0:00	0:30			
1:00	10.40		09.50	17:00	06.40			09.40	17:00	06.50		
1:30		0:30		17:30				09.30	17:30			
2:00	11.50		10:00	8.40	14:00	06.40		10:00	07.50	11:00	07.50	
2:30		1:00		10:30				09.40	10:30	10:30		
3:00	11.40		11:00	5.40	13:00	08.40		10.50	11:00	06.40	10:00	07.40
3:30		1:30		11:30					11:30	11:30		
4:00	12.50		12:00	5.50	20:00	07.40		10.50	12:00	06.50	20:00	07.90
4:30		2:00		12:30		20:30			12:30		20:30	
5:00	12.50		13:00	05.50	21:00	08.40		10.40	13:00	05.40	21:00	08.40
5:30		2:30		13:30		21:30			13:30		21:30	
6:00	11.50		14:00	6.50	22:00	09.40		10.40	14:00	04.40	22:00	08.50
6:30		3:00		14:30		22:30			14:30		22:30	
7:00	10.40		15:00	6.50	23:00	09.40		09.50	15:00	04.40	23:00	08.90
7:30		3:30		15:30		23:30			15:30		23:30	
8:00	10.50		16:00	6.40				08.40	16:00	05.40		

PELAKSANA: \_\_\_\_\_

Results of Observation on 27-28 May

RESULTS OF THE OBSERVATION ON TIDAL SURVEY

Nama Pengamat: \_\_\_\_\_  
 Nama Stasiun: \_\_\_\_\_  
 Tanggal: \_\_\_\_\_  
 Lokasi: \_\_\_\_\_  
 No: \_\_\_\_\_  
 Nama Pengamat: \_\_\_\_\_  
 Nama Stasiun: \_\_\_\_\_  
 Alamat Pengamat: \_\_\_\_\_  
 Alamat Stasiun: \_\_\_\_\_  
 Lokasi Pengamatan: \_\_\_\_\_  
 Lokasi Pengamatan: \_\_\_\_\_

TANGGAL: 29 - 30 Mei 2023

JAM	TANGGAL 29				TANGGAL 30			
	08.00	09.00	10.00	11.00	08.00	09.00	10.00	11.00
08.00	28.00				28.30			
09.00		28.50				29.00		
10.00			29.00				29.30	
11.00				29.50				30.00
12.00								30.30
13.00								31.00
14.00								31.30
15.00								32.00
16.00								32.30
17.00								33.00
18.00								33.30
19.00								34.00
20.00								34.30
21.00								35.00
22.00								35.30
23.00								36.00
24.00								36.30
25.00								37.00
26.00								37.30
27.00								38.00
28.00								38.30
29.00								39.00
30.00								39.30

PELAKSANA: \_\_\_\_\_

Results of Observation on 29-30 May

5.1.1.8 Figure 2.5 Manual Recording Data by Tidal Observers (cm unit)

**Table 2.5 Recapitulation of Tidal Data from Field Observations  
for 15 days**

Hour	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
15 May 2022													89.00	95.00	105.00	113.00	117.00	118.00	119.00	109.00	106.00	94.00	85.00	78.00
16 May 2022	51.00	51.00	62.00	63.00	78.00	96.00	96.00	98.00	92.00	97.00	99.00	95.00	89.00	99.00	107.00	112.00	116.00	114.00	119.00	108.00	95.00	98.00	89.00	85.00
17 May 2022	78.00	68.00	78.00	78.00	84.00	87.00	96.00	98.00	105.00	109.00	117.00	108.00	109.00	108.00	109.00	101.00	109.00	103.00	105.00	95.00	95.00	98.00	95.00	87.00
18 May 2022	67.00	58.00	65.00	65.00	77.00	79.00	78.00	89.00	96.00	99.00	99.00	109.00	105.00	117.00	119.00	119.00	108.00	109.00	105.00	105.00	117.00	99.00	99.00	95.00
19 May 2022	85.00	85.00	78.00	79.00	85.00	85.00	89.00	92.00	98.00	102.00	105.00	125.00	136.00	136.00	137.00	135.00	129.00	125.00	125.00	119.00	105.00	105.00	100.00	102.00
20 May 2022	99.00	99.00	105.00	105.00	99.00	99.00	99.00	99.00	99.00	95.00	99.00	109.00	129.00	135.00	139.00	125.00	124.00	118.00	114.00	110.00	108.00	107.00	103.00	95.00
21 May 2022	75.00	82.00	84.00	87.00	79.00	74.00	79.00	79.00	79.00	79.00	84.00	89.00	99.00	115.00	129.00	129.00	109.00	109.00	109.00	105.00	105.00	89.00	75.00	69.00
22 May 2022	57.00	57.00	65.00	79.00	85.00	99.00	99.00	99.00	85.00	99.00	95.00	99.00	109.00	119.00	125.00	139.00	145.00	145.00	139.00	125.00	119.00	105.00	95.00	89.00
23 May 2022	79.00	79.00	85.00	85.00	89.00	89.00	99.00	99.00	99.00	99.00	94.00	95.00	119.00	125.00	139.00	145.00	145.00	163.00	169.00	169.00	155.00	139.00	125.00	119.00
24 May 2022	95.00	89.00	75.00	79.00	95.00	99.00	99.00	105.00	109.00	109.00	109.00	119.00	124.00	135.00	134.00	134.00	149.00	165.00	165.00	165.00	163.00	159.00	145.00	125.00
25 May 2022	69.00	55.00	59.00	65.00	69.00	75.00	89.00	95.00	105.00	105.00	119.00	109.00	115.00	119.00	125.00	139.00	145.00	145.00	155.00	134.00	115.00	105.00	99.00	79.00
26 May 2022	69.00	65.00	79.00	79.00	84.00	95.00	99.00	105.00	105.00	99.00	105.00	95.00	79.00	55.00	49.00	55.00	59.00	65.00	75.00	79.00	79.00	85.00	89.00	95.00
27 May 2022	104.00	104.00	115.00	119.00	125.00	125.00	115.00	109.00	105.00	95.00	85.00	59.00	55.00	55.00	65.00	65.00	69.00	69.00	69.00	75.00	79.00	89.00	95.00	95.00
28 May 2022	95.00	99.00	99.00	105.00	105.00	109.00	105.00	95.00	89.00	75.00	75.00	69.00	65.00	59.00	49.00	49.00	55.00	65.00	75.00	79.00	79.00	85.00	85.00	89.00
29 May 2022	89.00	95.00	95.00	94.00	95.00	95.00	89.00	85.00	69.00	59.00	54.00	54.00	45.00	49.00	59.00	65.00	69.00	75.00	84.00	95.00	95.00	95.00	95.00	99.00
30 May 2022	105.00	109.00	109.00	95.00	95.00	95.00	89.00	85.00	79.00	75.00	75.00	69.00	65.00	59.00	59.00	65.00	79.00	79.00	79.00	85.00	85.00	85.00	95.00	99.00

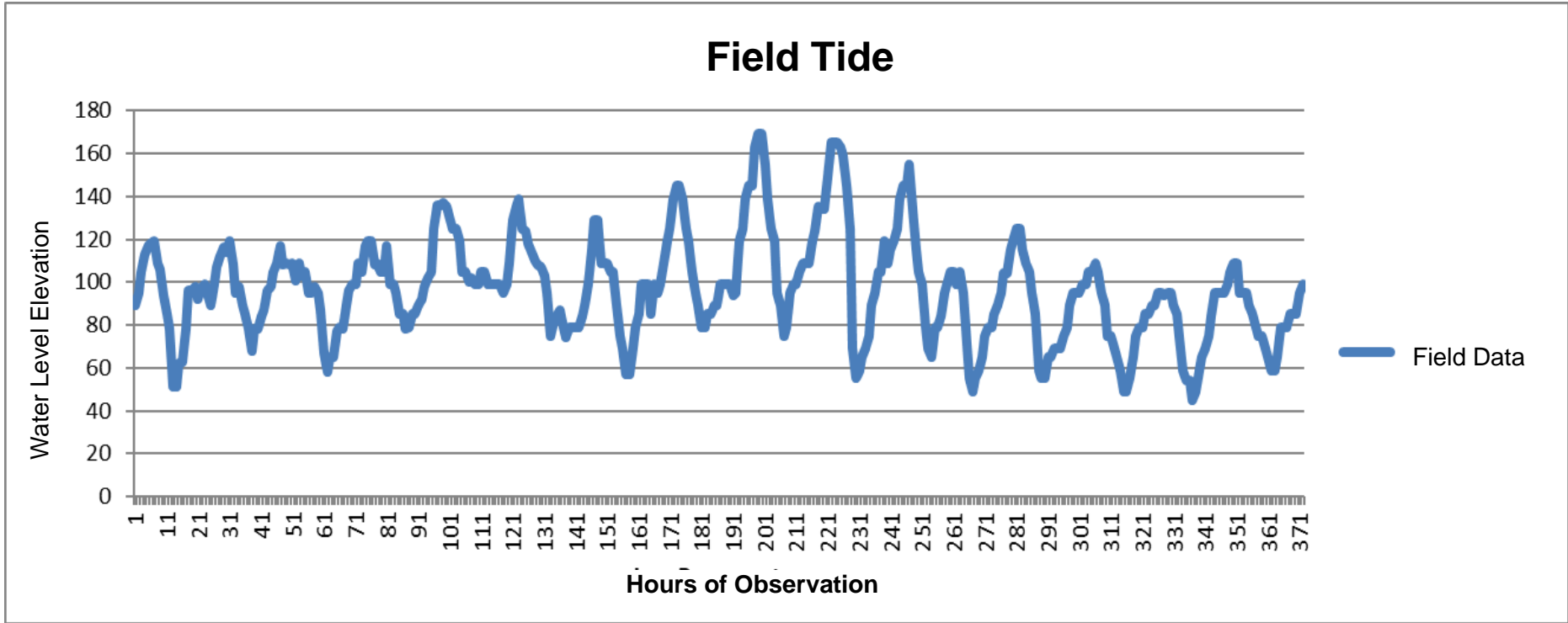
Based on the results of tidal observation for 15 days in the observation location, it can be

concluded as follows: Highest High Tide : 1.69 m

Lowest Low Tide : 0.45 m

Range : 1.24 m





**Figure 2.6 Graph of tidal elevation based on the results of observation for 15 days with reference to the MSL surface**



### 2.3.2 BIG Tidal Data

The BIG tidal data used originates from the results of observation of the Archipelagic Fishery Port (PPN) Station of Pekalongan City. Figure 2.6 shows the application form for obtaining the intended tidal data.

BIG tidal data acquired by the Consultant:

- 1) 1-year BIG tidal data of 2021
- 2) BIG tidal data of April 2022
- 3) BIG tidal data of May 2022

The obtained tidal data is shown in **Table 2.6** and **Figure 2.8**.



**BADAN INFORMASI  
GEOSPASIAL**

**GEOSPATIAL INFORMATION AGENCY  
(BIG)**

Jl. Raya Jakarta Bogor Km. 46 Cibinong 16911 Indonesia  
Tel. +62 21 8753155, Fax. +62 21 8791 6647  
E-mail : [info@big.go.id](mailto:info@big.go.id) Homepage : <http://www.big.go.id>

---


No.: 001-00/F/PTIG

Product Order and Examination Form

**Order Data**

Name :  
 Agency : **PT NAWA PANCADASA ABADI**  
 Address : **Jakarta**  
 Telephone/Mobile : ✓  
 Email :  
 Product Type : **Tide**

No	Station Name/ Pillar Name/ Map Sheet Name	Recording Date/ Map Sheet Number	Scale (specific for printed products)	Period
1	Pekalongan	January - December 2021	-	1 year
1	Pekalongan	April 2022	-	1 Month



**BADAN INFORMASI  
GEOSPASIAL**

**BADAN INFORMASI GEOSPASIAL  
(BIG)**

Jl. Raya Jakarta Bogor Km. 46 Cibinong 16911 Indonesia  
Telp. +62 21 8753155, Fax. +62 21 8791 6647  
E-mail : [info@big.go.id](mailto:info@big.go.id) Homepage : <http://www.big.go.id>

---

No.: 001-00/F/PTIG

Formulir Pemesanan dan Pemeriksaan Produk

**Data Pemesanan**

Nama :  
 Instansi : **PT NAWA PANCADASA ABADI**  
 Alamat : **Jakarta**  
 Telepon/HP :  
 Email :  
 Jenis Produk : **Pasang Surut (PASUT)**

No	Nama Stasiun/ Nama Pilar/ Nama Lembar Peta	Tanggal Perekaman/ Nomor Lembar Peta	Skala (khusus untuk produk cetak)	Jumlah
1	Pekalongan	May 2022	-	1 Bulan

5.1.1.9 Figure 2.7 Tidal data order form

5.1.1.10 Table 2.6 BIG Tidal Data in the Study Area

Hour Date	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1-May-22	146.00	152.00	152.00	152.00	154.00	150.00	153.00	162.00	171.00	180.00	183.00	186.00	189.00	192.00	194.00	190.00	180.00	172.00	163.00	154.00	152.00	156.00	156.00	160.00
2-May-22	159.00	160.00	161.00	159.00	158.00	160.00	163.00	170.00	178.00	186.00	194.00	197.00	194.00	198.00	196.00	190.00	182.00	175.00	173.00	165.00	163.00	162.00	161.00	160.00
3-May-22	161.00	159.00	155.00	160.00	156.00	156.00	158.00	164.00	173.00	183.00	184.00	188.00	191.00	188.00	183.00	177.00	172.00	172.00	170.00	164.00	165.00	166.00	166.00	166.00
4-May-22	163.00	160.00	158.00	157.00	159.00	153.00	156.00	159.00	166.00	170.00	174.00	176.00	176.00	175.00	171.00	171.00	169.00	163.00	167.00	166.00	167.00	168.00	167.00	168.00
5-May-22	167.00	163.00	166.00	164.00	166.00	170.00	173.00	179.00	184.00	184.00	185.00	181.00	175.00	178.00	173.00	168.00	169.00	169.00	167.00	166.00	163.00	166.00	167.00	162.00
6-May-22	158.00	156.00	154.00	153.00	159.00	166.00	167.00	173.00	176.00	180.00	179.00	175.00	170.00	165.00	157.00	158.00	156.00	159.00	165.00	166.00	169.00	173.00	174.00	170.00
7-May-22	165.00	159.00	159.00	161.00	165.00	173.00	177.00	188.00	190.00	195.00	189.00	180.00	171.00	161.00	156.00	152.00	149.00	159.00	158.00	163.00	168.00	164.00	171.00	168.00
8-May-22	163.00	159.00	148.00	150.00	151.00	161.00	172.00	178.00	185.00	185.00	186.00	177.00	167.00	156.00	146.00	141.00	141.00	141.00	145.00	156.00	164.00	173.00	174.00	175.00
9-May-22	167.00	162.00	157.00	151.00	154.00	162.00	174.00	184.00	191.00	197.00	202.00	195.00	179.00	166.00	154.00	142.00	141.00	141.00	143.00	151.00	162.00	171.00	172.00	171.00
10-May-22	164.00	160.00	154.00	152.00	150.00	156.00	165.00	174.00	183.00	189.00	191.00	189.00	182.00	165.00	155.00	141.00	139.00	137.00	134.00	141.00	153.00	165.00	173.00	173.00
11-May-22	169.00	162.00	155.00	147.00	148.00	151.00	162.00	176.00	190.00	199.00	203.00	198.00	189.00	175.00	158.00	146.00	141.00	140.00	137.00	135.00	145.00	157.00	167.00	174.00
12-May-22	172.00	166.00	157.00	151.00	149.00	153.00	161.00	176.00	189.00	200.00	206.00	204.00	195.00	179.00	164.00	151.00	141.00	140.00	140.00	141.00	146.00	158.00	165.00	171.00
13-May-22	172.00	169.00	160.00	155.00	152.00	156.00	165.00	176.00	189.00	198.00	208.00	207.00	200.00	190.00	173.00	156.00	144.00	140.00	140.00	139.00	143.00	148.00	159.00	168.00
14-May-22	169.00	170.00	163.00	155.00	151.00	153.00	161.00	173.00	184.00	194.00	202.00	204.00	202.00	192.00	180.00	166.00	151.00	144.00	141.00	141.00	144.00	152.00	157.00	166.00
15-May-22	170.00	170.00	167.00	160.00	154.00	157.00	162.00	173.00	185.00	192.00	196.00	201.00	201.00	197.00	186.00	172.00	162.00	151.00	144.00	142.00	141.00	147.00	156.00	159.00
16-May-22	164.00	164.00	162.00	161.00	151.00	154.00	158.00	167.00	177.00	186.00	192.00	196.00	197.00	192.00	184.00	174.00	163.00	152.00	145.00	145.00	145.00	151.00	159.00	161.00
17-May-22	168.00	170.00	170.00	167.00	162.00	158.00	160.00	165.00	178.00	184.00	190.00	196.00	198.00	200.00	194.00	183.00	175.00	162.00	157.00	156.00	154.00	156.00	162.00	164.00
18-May-22	168.00	172.00	175.00	173.00	173.00	168.00	170.00	173.00	179.00	183.00	186.00	191.00	194.00	193.00	190.00	183.00	177.00	173.00	167.00	165.00	163.00	161.00	162.00	159.00
19-May-22	164.00	170.00	172.00	178.00	177.00	181.00	182.00	186.00	187.00	185.00	183.00	185.00	181.00	178.00	175.00	169.00	167.00	166.00	168.00	166.00	167.00	158.00	153.00	152.00
20-May-22	151.00	157.00	159.00	164.00	171.00	179.00	185.00	190.00	193.00	191.00	183.00	178.00	173.00	170.00	167.00	167.00	167.00	167.00	172.00	167.00	175.00	172.00	167.00	163.00
21-May-22	161.00	160.00	160.00	167.00	168.00	178.00	187.00	197.00	195.00	196.00	184.00	171.00	157.00	153.00	152.00	151.00	154.00	158.00	165.00	172.00	174.00	172.00	168.00	163.00
22-May-22	157.00	151.00	153.00	160.00	169.00	181.00	192.00	206.00	211.00	208.00	198.00	183.00	166.00	151.00	143.00	143.00	143.00	149.00	158.00	170.00	178.00	183.00	183.00	175.00
23-May-22	168.00	158.00	153.00	154.00	161.00	174.00	189.00	202.00	210.00	214.00	207.00	199.00	179.00	164.00	148.00	142.00	141.00	141.00	148.00	161.00	175.00	183.00	187.00	179.00
24-May-22	178.00	166.00	162.00	157.00	158.00	167.00	180.00	199.00	210.00	215.00	214.00	206.00	191.00	170.00	146.00	141.00	141.00	140.00	139.00	143.00	152.00	170.00	178.00	179.00
25-May-22	177.00	167.00	161.00	154.00	152.00	158.00	174.00	190.00	205.00	215.00	221.00	218.00	204.00	186.00	166.00	149.00	141.00	141.00	141.00	140.00	150.00	160.00	174.00	186.00
26-May-22	187.00	185.00	177.00	168.00	163.00	165.00	169.00	181.00	191.00	206.00	210.00	211.00	208.00	195.00	177.00	155.00	142.00	141.00	141.00	139.00	138.00	147.00	158.00	166.00

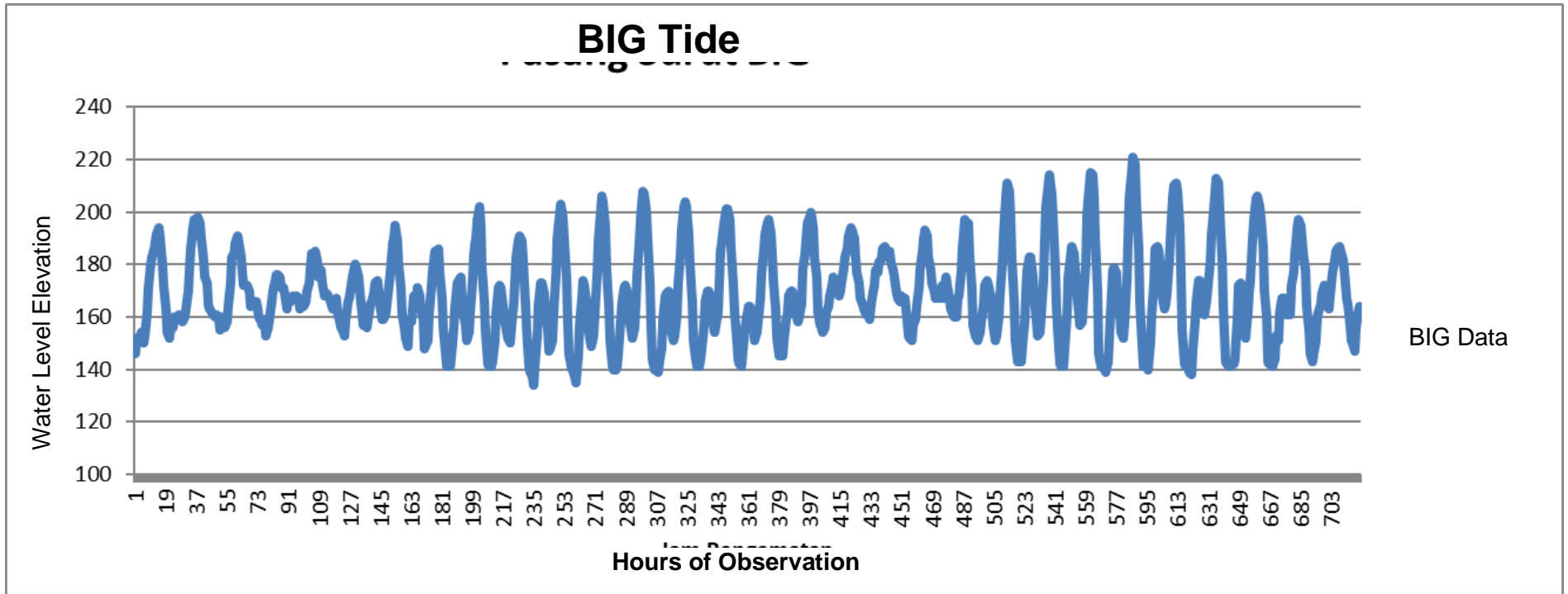
27-May-22	174.00	174.00	169.00	164.00	161.00	167.00	172.00	181.00	192.00	201.00	208.00	213.00	211.00	200.00	183.00	164.00	143.00	142.00	141.00	141.00	142.00	142.00	144.00	160.00
28-May-22	172.00	173.00	164.00	164.00	152.00	162.00	169.00	174.00	190.00	197.00	205.00	206.00	202.00	198.00	187.00	170.00	160.00	143.00	142.00	142.00	141.00	144.00	153.00	151.00
29-May-22	162.00	167.00	167.00	167.00	161.00	162.00	161.00	172.00	177.00	184.00	194.00	197.00	195.00	190.00	184.00	178.00	164.00	155.00	146.00	143.00	146.00	151.00	160.00	162.00

Based on BIG data for 30 days at the Pekalongan station, the following were

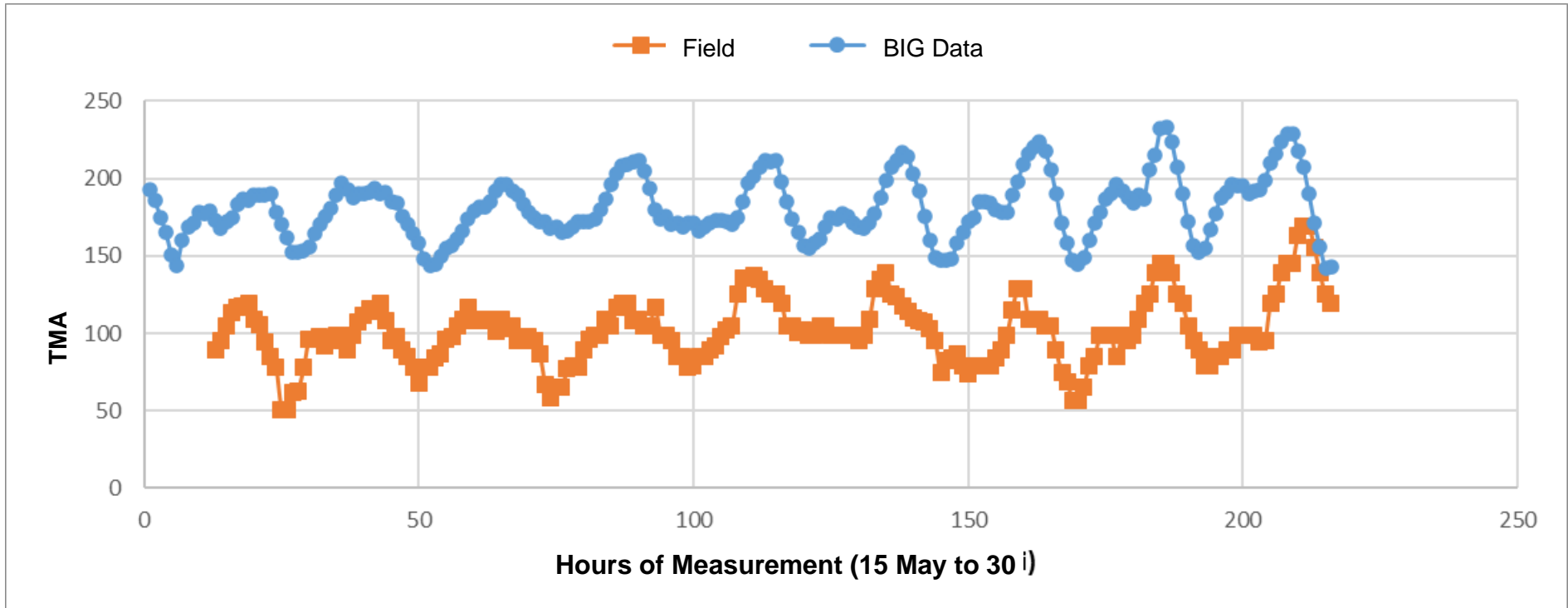
obtained: Highest High Tide : 2.21 m

Lowest Low Tide : 1.34 m

Range : 0.87 m



5.1.1.11 Figure 2.8 Tidal elevation based on BIG Data for 30 days with reference to the MSL surface



**Figure 2.9 BIG tidal elevation with reference Field Data to the MSL surface**

Based on the results of data identification between observation and BIG data, it can be concluded that the trend in seawater level rise and fall is the same, so the tide used in the modeling is BIG tide for 30 days. The method used in the tidal data analysis is the Admiralty and Least Square method to obtain 9 (nine) main tidal components (M2, S2, N2, K1, O1, M4, MS4, K2, and P1).

### 2.3.3 Analysis Method

#### a) Admiralty Method

From the data resulting from the observation that has been smoothed with BIG data, processing is carried out using the Admiralty method. The results of this Admiralty processing produced harmonic constants so that the values of Mean Sea Level (MSL), Mean Lowest Water Spring (MLWS), Mean Highest Water Spring (MHWS), Lowest Water Spring (LWS), Highest Water Spring (HWS) and average water level measured from Datum LWS (Z0) can be calculated. The results of calculation of nine (9) harmonic constants and tidal reference elevation by using the Admiralty method are as follows:

- 1) Calculation of nine (9) harmonic constants by using the Admiralty method:

**Table 2.7 Tidal Harmonic Constants of the Admiralty Method**

FINAL RESULTS										
	S <sub>0</sub>	M <sub>2</sub>	S <sub>2</sub>	N <sub>2</sub>	K <sub>1</sub>	O <sub>1</sub>	M <sub>4</sub>	MS <sub>4</sub>	K <sub>2</sub>	P <sub>1</sub>
A (cm)	169	11	16	5	20	7	1	1	4	6
g°		295	322	255	219	358	306	332	322	219

With:

- A = Amplitude of the tidal curve,
- g = Phase lag angle,
- S<sub>0</sub> = Mean sea level value above the zero point of staff gauge,
- M<sub>2</sub> = Constant affected by the Moon,
- S<sub>2</sub> = Constant affected by the sun,
- N<sub>2</sub> = Constant affected by distance due to the Moon's elliptic trajectory,
- K<sub>2</sub> = Constant affected by distance due to the sun's elliptic trajectory,
- O<sub>1</sub> = Constant affected by the Moon's declination,
- P<sub>1</sub> = Constant affected by the sun's declination,
- K<sub>1</sub> = Constant affected by the Moon's declination and the sun's declination,
- M<sub>4</sub> = Constant affected by the Moon 2 times (2 x M<sub>2</sub>),
- MS<sub>4</sub> = Constant affected by the interaction between M<sub>2</sub> and S<sub>2</sub>.

#### 2) Tidal characteristics

##### TIDAL TYPE:

- F < 0.25 = Semidiurnal Tide
- 0.25 < F < 1.50 = Mixed prevailing semidiurnal Tide
- 1.50 < F < 3.0 = Mixed prevailing diurnal Tide

$F > 3.0$  = Diurnal Tide

$$F = \frac{A_{K1} + A_{O1}}{A_{M2} + A_{S2}}$$

With  $F = 0.97$ .

The value of tidal range based on an analysis with the Admiralty method is 106.75 cm. The Formzahl number obtained from the results of Admiralty calculation in the work location is 0.97. This number indicates that the waters have the type of **Mixed prevailing semidiurnal Tide**, which is a tide that experiences two high tides and two low tides in a day but sometimes one high tide and one low tide of different heights and times.

### 3) Datum Elevation/Chart Datum

All results of hydrographic/bathymetric measurement must refer to an equation or datum surface. As a reference for work, important elevations resulting from the tidal analysis with the Admiralty method are as follows:

**Table 2.8 Tidal Values of the Admiralty Method**

	Remarks	Value (cm)	LWS Value (cm)
HWS	Highest Water Spring	222.26	106.75
MHWS	Mean High Water Spring	196.02	80.50
MSL	Mean Sea Level	168.89	53.37
MLWS	Mean Low Water Spring	141.76	26.24
LWS	Lowest Water Spring	115.52	0.00
Z0/CD/LWS	Chart Datum	53.37	
HWS-LWS	Tidal Range	106.75	

With:

- HWS : the highest water level during the spring or neap tide.
- MHWS : the average water level of high water during the spring tide.
- MSL : the average water level.
- MLWS : the average water level of low water during the spring tide.
- LWS : the lowest average water level during the spring or neap tide.
- Z0 : Ebb to the lowest water level.

#### b) Least Square Method

From the data resulting from the observation that has been smoothed with BIG data, processing is carried out using the Least Square method. The results of this Least Square processing produced harmonic constants so that the values of Mean Sea Level (MSL), Mean Lowest Water Spring (MLWS), Mean Highest Water Spring (MHWS), Lowest Water Spring (LWS), Highest Water Spring (HWS) and average water level measured from Datum LWS (Z0) can be calculated. The results of calculation of 9 harmonic constants and tidal reference elevation by using the Least Square method are as follows:

1) Calculation of 9 harmonic constants by using the Least Square method.

**Table 2.9 Tidal Harmonic Constants of the Least Square Method**

FINAL RESULTS										
	S0	M2	S2	N2	K2	K1	O1	P1	M4	MS4
A (cm)	168.93	11.09	9.08	3.67	3.46	17.9	6.92	6.92	0.78	0.91
g°		-45.74	-31.9	-52.68	-20.56	191.46	71.7	13.17	-30.29	-12.36

With:

- A = Amplitude of the tidal curve,
- g = Phase lag angle,
- S<sub>0</sub> = Mean sea level value above the zero point of staff gauge,
- M<sub>2</sub> = Constant affected by the Moon,
- S<sub>2</sub> = Constant affected by the sun,
- N<sub>2</sub> = Constant affected by distance due to the Moon's elliptic trajectory,
- K<sub>2</sub> = Constant affected by distance due to the sun's elliptic trajectory,
- O<sub>1</sub> = Constant affected by the Moon's declination,
- P<sub>1</sub> = Constant affected by the sun's declination,
- K<sub>1</sub> = Constant affected by the Moon's declination and the sun's declination,
- M<sub>4</sub> = Constant affected by the Moon 2 times (2 x M<sub>2</sub>),
- MS<sub>4</sub> = Constant affected by the interaction between M<sub>2</sub> and S<sub>2</sub>.

2) Tidal characteristics

**TIDAL TYPE:**

- F < 0.25 = Semidiurnal Tide.
- 0.25 < F < 1.5 = Mixed prevailing semidiurnal Tide. 1.50 < F < 3.0 = Mixed prevailing diurnal Tide.
- F > 3.0 = Diurnal Tide.

$$F = \frac{A_{K1} + A_{O1}}{A_{M2} + A_{S2}}$$

With F = 1.23.

The value of tidal range based on an analysis with the Least Square method is 97.58 cm. The Formzahl number obtained from the results of Least Square calculation in the work location is 1.23. This number indicates that the waters have the type of **Mixed prevailing semidiurnal Tide** which is a tide that experiences two high tides and two low tides in a day but sometimes one high tide and one low tide of different heights and times.



### 3) Datum Elevation/Chart Datum

All results of hydrographic/bathymetric measurement must refer to an equation or datum surface. As a reference for work, important Elevations resulting from the tidal analysis with the Least Square method are shown in Table 2.10.

**5.1.1.12 Table 2.10 Tidal values of the least square method**

Remarks		Value (cm)	LWS Value (cm)
HWS	Highest Water Spring	224.78	97.58
MHWS	Mean High Water Spring	210.92	83.72
MSL	Mean Sea Level	168.93	41.73
MLWS	Mean Low Water Spring	137.66	10.46
LWS	Lowest Water Spring	127.20	0.00
Z0/CD/LWS	Chart Datum	41.73	
HWS-LWS	Tidal Range	97.58	

With:

- HWS : the highest water level during the spring or neap tide.
- MHWS : the average water level of high water during the spring tide.
- MSL : the average water level.
- MLWS : the average water level of low water during the spring tide.
- LWS : the lowest average water level during the spring or neap tide.
- Z0 : Ebb to the lowest water level.

## 2.4 Conclusion Resulting from Tidal Processing

Data resulting from the processing with the two methods, namely Admiralty and Least Square, can be concluded for determining LWS, MSL and HWS using the Admiralty data with the difference shown in Table 2.11.

**5.1.1.13 Table 2.11 Comparison of tidal range**

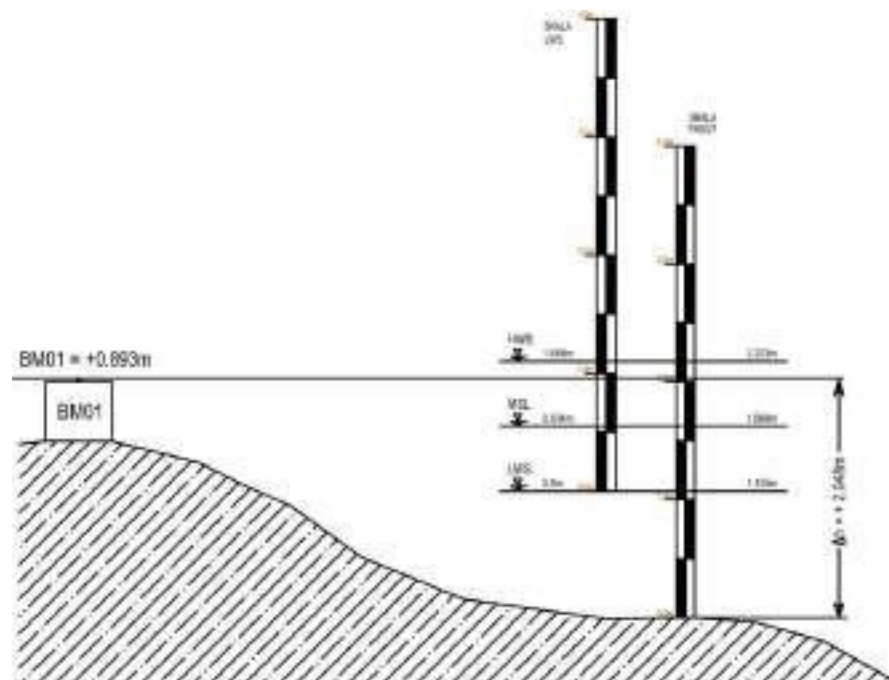
Tidal Range of Field Observation	Tidal Range of Admiralty Processing	Tidal Range of Least Square Processing
124 cm	106.75 cm	97.58 cm

Subsequently, the important elevation differences between the results of the Admiralty and Least Square methods are shown in Table 2.12.

5.1.1.14 Table 2.12 Comparison of Important Elevation Resulting from the Admiralty vs Least Square Methods

Elevation Type		Admiralty Elevation (cm)	Least Square Elevation (cm)	Difference (cm)
Highest High Spring	(HWS)	222.26	224.78	-2.52
Mean High Water Spring	(MHWS)	196.02	210.92	-14.90
Mean Sea Level	(MSL)	168.89	168.93	-0.04
Mean Low Water Spring	(MLWS)	141.76	137.66	4.10
Lowest Water Spring	(LWS)	115.52	127.20	-11.68
Tidal Range (HWS-LWS)		53.37	41.73	11.64
ZO (MSL-LWS)		106.75	97.58	9.17

Based on the results of tidal data analysis with the two methods, namely Admiralty and Least Square, the next step is to determine which method is used in determining the lowest water level (LWS) linking for the need to determine the leveling linking (Vertical control point). **The difference in tidal range of the Admiralty method and the Least Square method is not much when compared with the field tidal range.** However, the Admiralty method is closer to the field data, so it will be used in determining the tidal elevation reference value for determining the bathymetric elevation and topographical measurement.



5.1.1.15 Figure 2.10 Sketch of important elevation value linking to the benchmark

The Formzahl number obtained from the results of Least Square calculation in the work location is 1.23. This number indicates that the waters have the type of **Mixed prevailing semidiurnal Tide** which is a tide that experiences two high tides and two low tides in a day but sometimes one high tide and one low tide of different heights and times.



## CHAPTER 3 TOPOGRAPHICAL AND BATHYMETRIC SURVEY

### 3.1 Introduction

The mapping survey work in this Work on the Preparation of DED of PIM Coastal Area Protection in Pekalongan City was carried out by including geodetic measurement, topographical measurement and bathymetric measurement.

### 3.2 Purpose and Objective

The hydrographic and oceanographic survey data is aimed at obtaining an overview of the location of the planned coastal protection construction. The purpose of this survey is to obtain the seabed configuration around the coastal protection plan area.

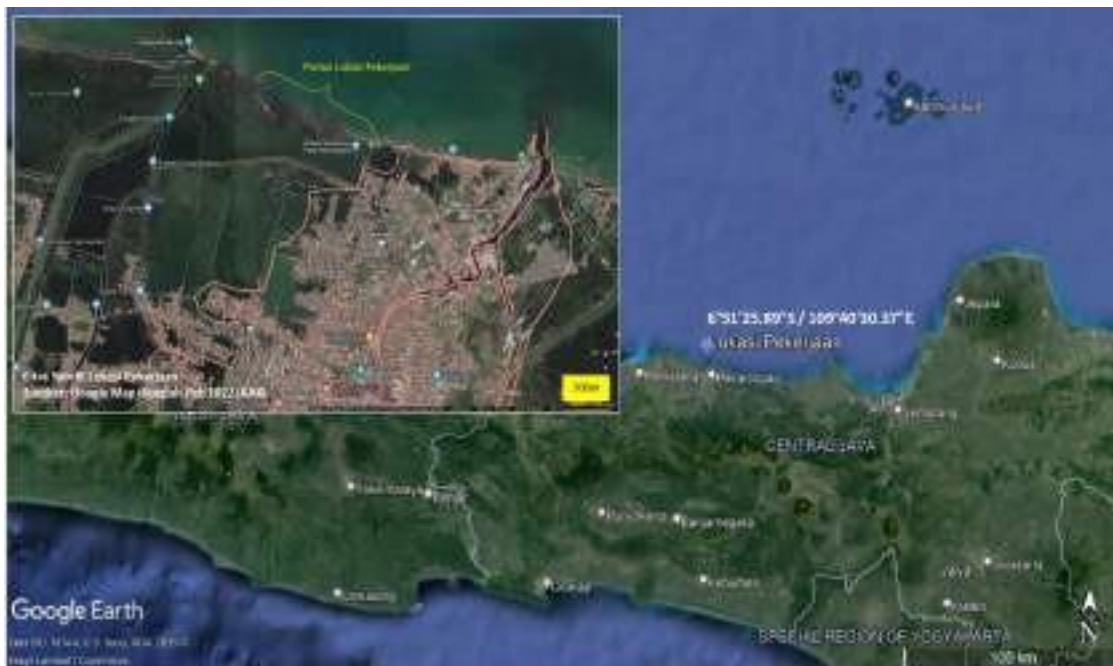
### 3.3 Scope of Work

The scope of this mapping survey work includes, among others:

- a. Installing a benchmark.
- b. Geodetic measurement.
- c. Topographical measurement.
- d. Sea depth measurement.

### 3.4 Work Location

The work location is situated in Pekalongan. The survey area is shown in Figure 3.1.





(Source: Google Earth with adjustments, 2022, TOR)

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### 5.1.1.16 Figure 3.1 Orientation of Topographical and Bathymetric Survey Locations

The personnel involved in carrying out the hydro-oceanographic survey are shown in Table 3.1.

5.1.1.17 Table 3.1 List of Involved Personnel

No.	Name of Personnel	Position
1	Asep Irwan	Survey Coordinator
2	Isya Nursalam	Surveyor
3	Hana Handiana	Surveyor
4	Ega Sujarwadi	Surveyor
5	Suherman	Surveyor
6	Sapta	Surveyor
7	Gigih	Local Worker
8	Rudi	Local Worker

### 3.6 Equipment

The equipment used in carrying out the topographical and hydro-oceanographic

surveys is shown in Table 3.2.

**5.1.1.18 Table 3.2 List of equipment used**

No.	Type/Kind/Tool	Quantity	Capacity/Function	Equipment Type Brand
I. SURVEY EQUIPMENT				
1	Geodetic GNSS	1 unit	Geodetic Observation/BM point	Trimble R8s
2	Total Station	1 Set	Topographical Measurement	Topcon GT520

No.	Type/Kind/Tool	Quantity	Capacity/Function	Equipment Type Brand
3	Tide Staff	1 station	tidal observation	Manual
4	Echosounder Garmin 585	1 Set	sea depth measurement.	Garmin 585
5	Spirit Level	1 unit	Height difference measurement/leveling	Sokkia AT-B4
6	Laptop	1 unit	Data Acquisition and Input	Mobile Phone
7	Current Meter	1 unit	Current Measurement	Current Meter (CM OSS B1)
8	Grab Sampler	1 unit	Sediment sampling	Standalone
9	Water Sampler	1 unit	Water Sampling	Standalone
<b>II. SOFTWARE</b>				
1	Microsoft Office (Excel)	1 set	Data Processing	Windows
2	Surfer	1 pack	Data Processing	Golden Software
3	Global Mapper	1 pack	Data Processing	Blue Marble Geographics
4	Auto Cad	1 pack	Mapping	AutoCAD
5	WRPLOT	1 pack	Drawing of wind rose, wave and current	Lakes Environmental

### 3.7 Survey Period

The period of topographical and hydro-oceanographic survey activities is described in Table 3.3.

**5.1.1.19 Table 3.3 Field Survey Activity Period**

No.	Date of Implementation	Activity
1	10-13 May 2022	<ul style="list-style-type: none"> <li>- Personnel Preparation</li> <li>- Equipment Preparation</li> <li>- Mobilization</li> </ul>
2	14 May 2022	<ul style="list-style-type: none"> <li>- Work Location orientation</li> </ul>
3	15 May 2022	<ul style="list-style-type: none"> <li>- Tide Staff Installation</li> <li>- BM1 and BM2 Installation</li> </ul>
4	16 May 2022	<ul style="list-style-type: none"> <li>- Geodetic Observation</li> <li>- Tidal Observation</li> <li>- Current Measurement and Sediment Sampling</li> </ul>
5	17-20 May 2022	TEAM 1 <ul style="list-style-type: none"> <li>- Waiting for Base GPS at BM</li> </ul> TEAM 2 <ul style="list-style-type: none"> <li>- Topographical &amp; Bathymetric Measurements</li> </ul>
6	18 May 2022	<ul style="list-style-type: none"> <li>- Leveling Measurement</li> </ul>
7	20 May 2022	Team Demobilization
8	6 August 2022	2 <sup>nd</sup> Measurement Mobilization
9	7-10 August 2022	Bathymetric Measurement
10	10 August 2022	Team Demobilization

### 3.8 Methodology

Sounding was carried out to identify the depth and shape of the sea surface covering the waterArea. The details of sounding implementation are as follows:

- a. To detect the depth and surface view of seabed, the GARMIN Maps 48s Plus and RTKGNSS Trimble R8 were used.
- b. Sounding was carried out after first determining the boundaries of survey area, at 10 m intervals in the area to be surveyed.
- c. Sounding started from the sea towards the coast with the bow direction of the ship/boat while sounding was carried out perpendicular to the coast and the ship/boat speed at the time of sounding was kept constant.
- d. Shallow/near-shore areas that cannot be reached by the sounding ship were subject to topographical measurement using GPS RTK.
- e. The results of the sounding need to be cross-checked by using a random method in the survey area.

#### 3.8.1 Geodetic Parameters

Geodetic parameters are parameters made as a reference to determine a position on the earth's surface. The determination of these parameters is fundamental so that every positioning during the field survey becomes uniform, making it easier to draw a topographical map of the bottom of waters and land. Likewise in this work, all coordinates of several different surveys used the same geodetic parameters.

5.1.1.20 Table 3.4 Geodetic Parameters

Spheroid	WGS 84
Projection	UTM
Centre Meridian	109° E
Zone	49 S
False Easting	500000 m
False Northing	10000000 m
Scale Factor	0.9996

Several matters related to the determination of these geodetic parameters include the determination of shape and size of the ellipsoid as a mathematical form of the earth, projection system from geodetic coordinates (earth) to plane coordinates (map), and determination of midpoint of the meridian. The ellipsoid used in this work is WGS-84 which has been defined in the GPS measurement tool and is global. The projection system used is the Universal Transverse Mercator (UTM) projection. This UTM projection system is global, so the determination of a position on the earth's surface must follow the defined zoning system. The zoning system in the UTM projection consists of 49 S zones, each 6° meridian wide.



The coordinates of survey area in this work follow zone 49 S UTM. Meanwhile, the latitude position is located in the southern hemisphere, meaning that the survey area is located at the beginning of the southern part of zone 49.

a) *Horizontal Control Point Linking*

**A. Horizontal Control Point and Geodetic Measurement**

The positioning system used the Global Navigation Satellite System (GNSS). GNSS is a technology used to determine position or location (latitude, longitude, and altitude) and time in a scientific unit on earth. The satellite will transmit high-frequency radio signals containing time and position data that can be picked up by receivers which allow users to know their exact location on the earth's surface. The reference point used as a position reference in this work is the CORS Pekalongan (CPKL) station.

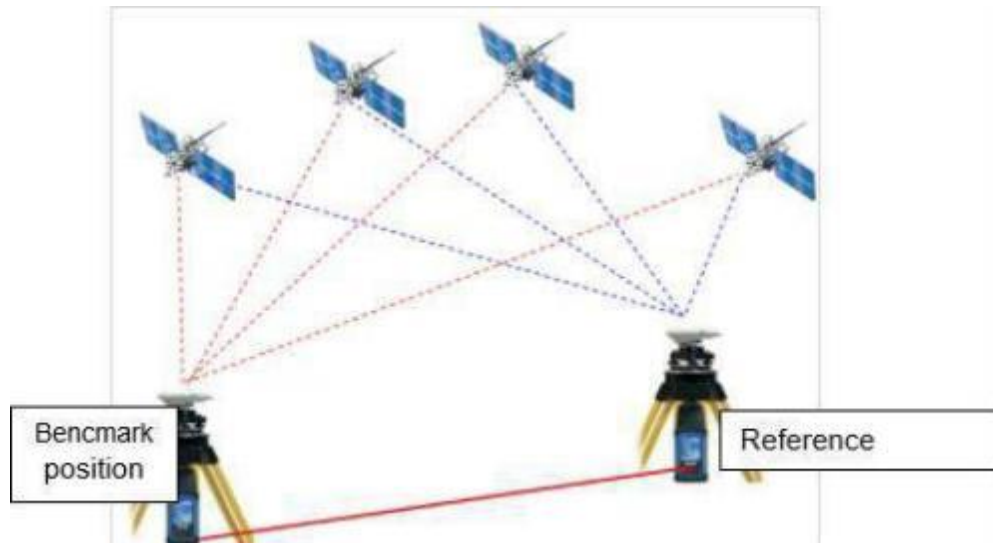
		<b>BADAN INFORMASI GEOSPASIAL (BIG)</b> <small>Jl. Sekeloa - Bogor Km. 10 (Pasar), 16111 Bogor, 021-822-0111-0110001              www.big.go.id email: info@big.go.id</small>		<b>CPKL</b>	
<b>DESKRIPSI CORS</b>					
Nama Stasiun	Pekalongan	Kabupaten	Pekalongan	Provinsi	Jawa Tengah
DuaKeterarahan	Pekalongan				
Koordinat	Pekalongan				
<b>URAIAN LOKASI</b>					
Urutan Lokasi Data	Data GPS-RTK yang diupload dengan DWL ke server				
Alamat	R. Pemuda No. 45, Kota Pekalongan				
Kemampuan Menangkap	Radio 570 Telukon Pekalongan				
Kemampuan Transmisi	Informasi lebih lengkap mengenai IGA-CORS silahkan kunjungi <a href="http://rtk.big.go.id">http://rtk.big.go.id</a> atau <a href="mailto:info@big.go.id">info@big.go.id</a>				
<b>KOORDINAT GEODETIK (WGS84)</b>			<b>KOORDINAT KARTUSIAN (SRG 2011 Epoch 2011)</b>		
Lintang	0° 57' 13.1222" S	X		-2131062,170 meter	
Bujur	109° 21' 34.8961" E	Y		580262,867 meter	
Tinggi Ellipsoid	38,491 meter	Z		-19032,521 meter	
<b>LAJU KECEPATAN KARTESIAN</b>			<b>LAJU KECEPATAN TORIGENTRIK</b>		
Vx	0,010 meter/detik	V <sub>horis</sub>		0,010 meter/detik	
Vy	-0,100 meter/detik	V <sub>vertikal</sub>		0,021 meter/detik	
Vz	0,000 meter/detik	V <sub>total</sub>		0,100 meter/detik	
<b>PERANGKAT</b>					
Receiver	LEICA GR10	Antena		LEIT	
Antena	LEIAR23	Tinggi Antena		0	
Tahun Dibangun	2010	Ket. Tinggi Antena		Batas of Antena	
Komunikasi Data	UM, USB				
<b>SKETSA UMUM</b>			<b>BOX PERANGKAT</b>		
					
<b>FOTO PELARIBAN ANTENA</b>			<b>FOTO KANTOR LOKASI CORS</b>		
					

(Source: SRGI of the Geospatial Information Agency, 2022)

**5.1.1.21 Figure 3.2 CORS PEKALONGAN reference point**

**B. Geodetic GPS Measurement**

In the Geodetic measurement, there are two methods used to determine positions at the control point and at sea. The methods used are static positioning and kinematic positioning. Static positioning is used for the linking survey of a position and kinematic positioning is usually for navigation. In the static positioning, the GPS receiver does not move (stationary) in one observation location while kinematic positioning consists of 2 receivers, namely 1 receiver referred to as a monitor or base and the second receiver known as a rover which changes paths for position.



5.1.1.22 Figure 3.3 Global Positioning System Static Method

### C. Processing of Data Resulting from Geodetic GPS Measurement

GPS data processing is a calculation process to obtain the coordinates measured in a certain coordinate system, in this case the national coordinate system.

In data processing, there are several things that need to be taken into account, namely:

- 1) All GNSS observation data is converted to rinex (receiver independent exchange format).
- 2) GNSS baseline processing, the software used should be adapted to the GNSS receiver used.
- 3) GNSS baseline processing, the coordinates of the reference point used for determining the baseline vector may not originate from the absolute positioning results.
- 4) List of definitive coordinates of all points in the network resulting from the constrained network adjustment along with its variance-covariance matrix;
- 5) List of definitive baseline values resulting from the constrained network adjustment along with their standard deviation values and correction values to the baseline values resulting from the observation;
- 6) Point error ellipses for each point;
- 7) Relative error ellipses for each observed baseline;

- 8) Results of the statistical tests performed on the residual value after adjustment.
- 9) Survey result coordinates in a .txt format

### 5.1.1.23 Table 3.5 Technical specifications of control point network data

#### processing method and strategy

Satellite orbit type	Broadcast
Phase ambiguity	Fixed
Error and Bias Elimination	Differencing
5.1.1.24 Stage	Baseline processing
coordinate determination	

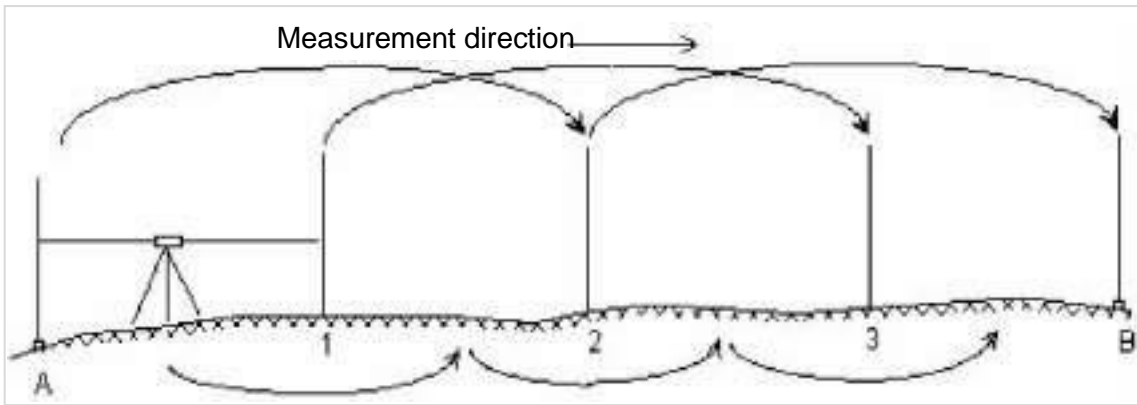
**Quality control mechanism** Statistical tests on coordinate accuracy parameters

#### *b) Vertical Control Point*

The vertical control point is a point that is made as a reference for determining the height of other points (of a lower order). The vertical control point measurement was carried out by determining the difference in height between two points against the same height reference surface. The point height determination was carried out by leveling measuring, using a spirit level that refers to a level surface (the position of points that have the same potential gravity).

The measurement stages using the leveling method are as follows:

- 1) The reticle observation is carried out before and after the measurement;
- 2) Each section is measured on a round trip;
- 3) The distance between the tool and the sign ranges from 5 - 40 meters;
- 4) The height of sign reading is between 0.5 to 2.5 meters;
- 5) The number of slugs for each section is even;
- 6) The skip system signs are relocated;
- 7) The measurement is carried out with a double stand;
- 8) The tool is placed between two signs, and if possible, the distance to the rear sign is the same as the distance to the front sign;
- 9) On stand one, the readings of the middle thread (BT), the upper thread (BA) and the lower thread (BB) are carried out;
- 10) On stand two, only the reading of BT is read.



5.1.1.25 Figure 3.4 Skip system in spirit level measurement

The linking formula is as follows: Zero

$$\text{Staff Gauge Elevation} = \text{T.P} + \text{BT.1} - \text{BT.2}$$

With:

- T.P = height of the nearest stake point to the staff gauge.
- BT.1 = middle thread reading at the stake.
- BT.2 = middle thread reading at the staff gauge.

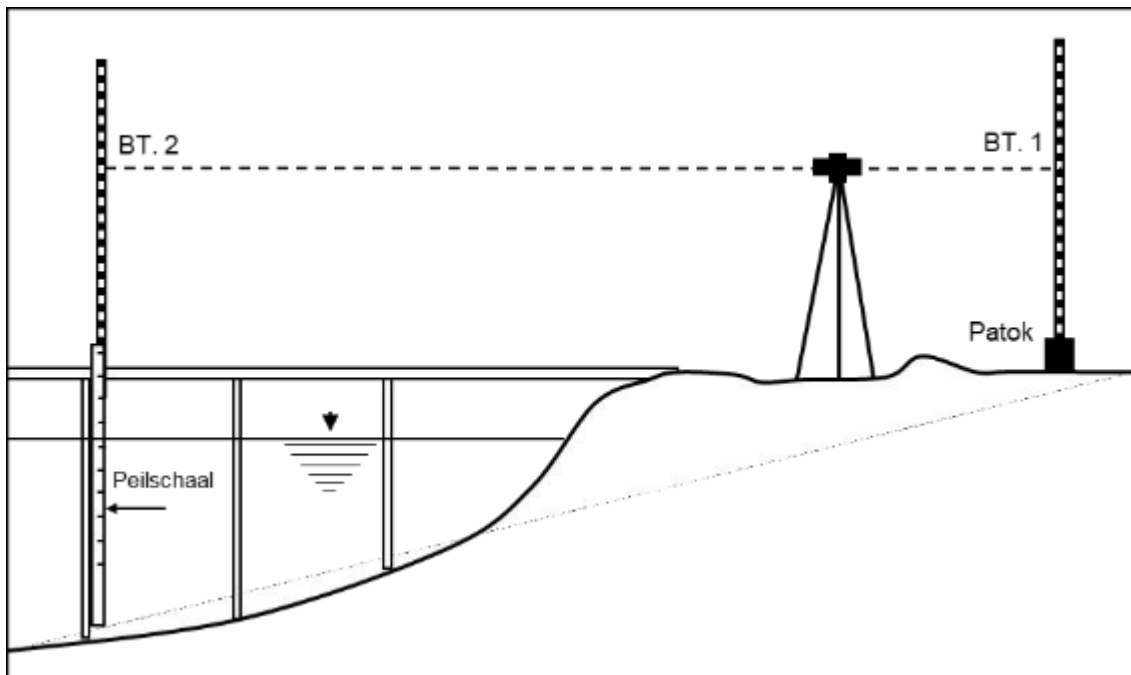


Figure 3.5 Staff Gauge Linking (Leveling)

### 3.8.2 Bathymetric Survey

In the bathymetric survey, there are 2 main acquisition methods, namely the Navigation System for positioning and the sounding system for obtaining the water depth data.

#### a) *Navigation System*

The navigation system used in this bathymetric survey includes the DGPS positioning system. This positioning has been included in the software in the integrated bathymetric survey tool.

#### b) *Sounding System*

##### 1) **Staff Survey Method**

The bathymetric survey used a manual system by utilizing measuring staffs/poles as depthmarkers. The tools used in carrying out the bathymetric survey include:

- 1) Measuring staffs in meters.
- 2) GPS (handheld) as a navigation tool.
- 3) Recording board.
- 4) Camera for documenting the depth of each reviewed point.
- 5) Ship/boat with a single engine.

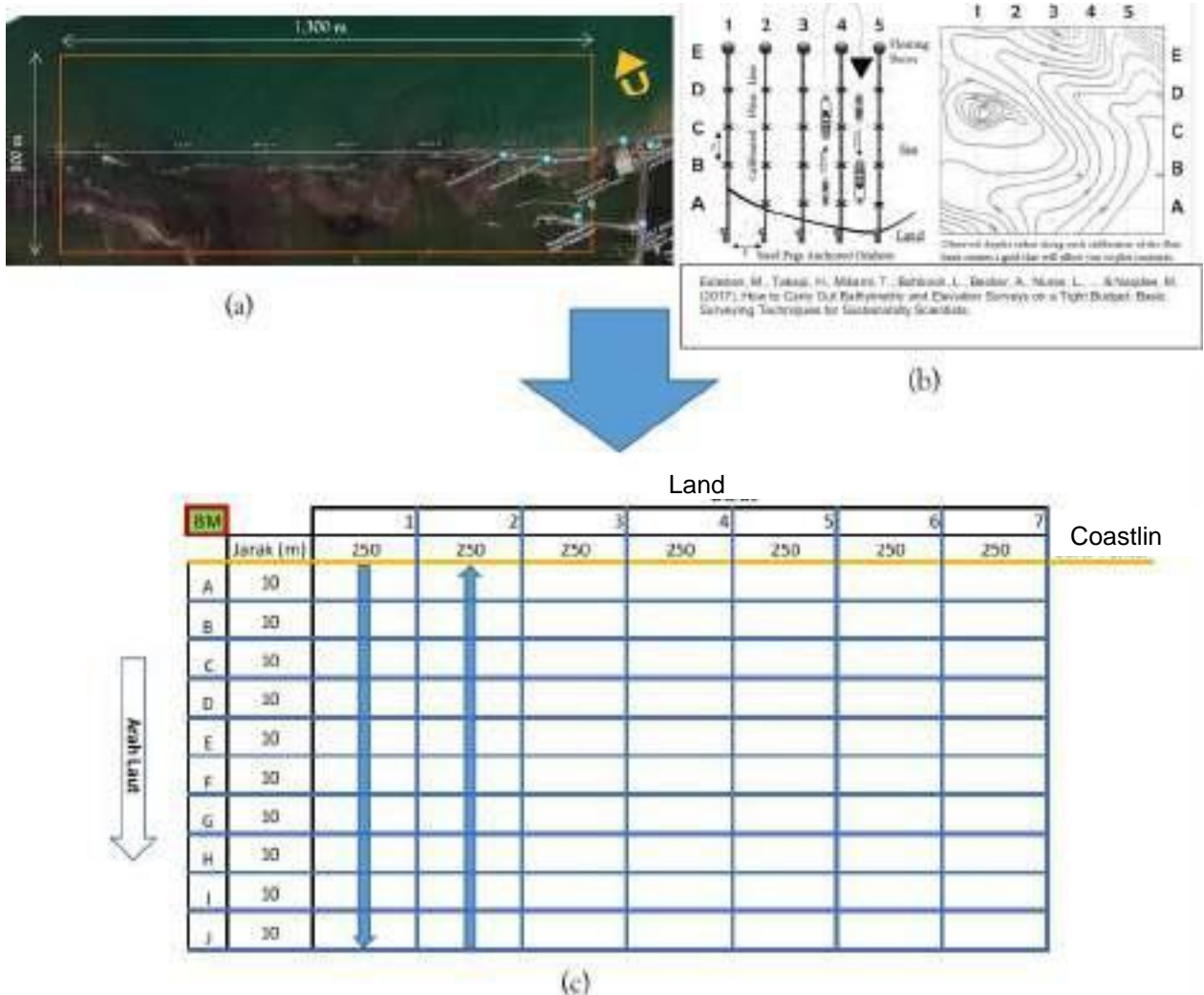
In the bathymetric survey, the sounding system was used to obtain the water depth data.

The bathymetric survey used grids like a “chessboard”. As known, the distance from the shoreline to the sea is 250 m. Meanwhile, the interval distance from the point on the shoreline is 250 meters. In addition, it is 10 meters seaward. The illustration of the reviewed grids is shown in Figure 3.6.

Control points were placed onshore and are shown as numbers on the grids. Meanwhile, the seaward direction is designated as an alphabet.

The sequence of the carried-out processes is as follows:

- 1) The process of depth recording was carried out by utilizing GPS to mark the location of grid points that have previously been programmed and tabulated onto the recording board.
- 2) At the time of implementation, the camera would make recording by simultaneously capturing the reached position and depth.
- 3) The process was carried out sequentially as shown in Figure 3.6.



5.1.1.26 Figure 3.6 Grid illustration for bathymetric survey implementation at PIM Pekalongan

## 2. Echosounder Survey Method

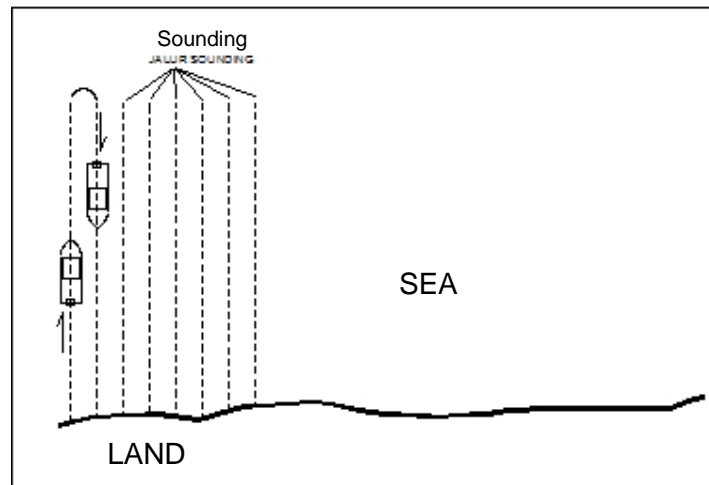
A bathymetric survey or often referred to as sounding was intended to identify the condition of sea topography. This measurement used the method of determining the positions of sea depth on the longitudinal and transverse paths for cross-checks. Depth positions were determined using GPS MAP.

The methodology for carrying out this bathymetric survey is as follows:

### a) Sounding Path Determination

A sounding path is the travel path of the ship carrying out the sounding from the starting point to the ending point of the survey area. In parts subject to abrasion, the sounding path was made at a distance of 25 m. For each sounding path, water depth data was collected every 25 m. The starting and ending points for each sounding path were recorded and then inputted into a measuring device equipped with a GPS facility, to be used as a reference for the boat's trajectory along the

sounding path. An example of a sounding path in the measurement area can be seen in 5.1.1.27 Figure 3.7.



**Figure 3.7 Sketch of boat movement path along the sounding path**

Data was recorded every 20 meters with the sounding path made perpendicular to the coastline with a distance of 25 meters between the lines. A cross-check track was made at distances of 100 meters, 200 meters, 600 meters, 800 meters, 1000 meters and 1.5 kilometers from the coastline.

Echosounder and GPS were installed on the boat, thus depth and position data or X, Y and Z were automatically recorded every time the boat moves for 20 meters. The depth resulting from the survey was corrected by the tidal water level the survey of which was carried out simultaneously. Data was required as a layout determining parameter.

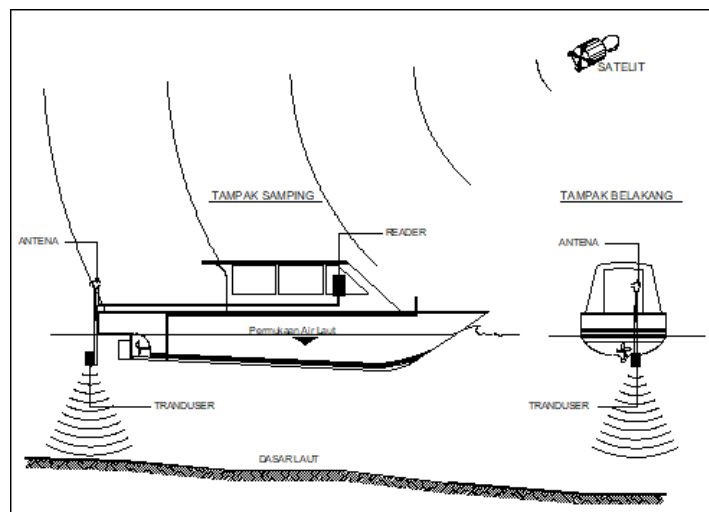
## b) Survey Equipment

The survey equipment needed in the bathymetric measurement is:

1. Echo Sounder, GPS and their accessories. GPS (Global Positioning System) provides the tool position on a horizontal frame with the help of satellites. With this facility, position control on a horizontal frame from a fixed point onshore is no longer necessary. In addition to the GPS facility, this tool has the ability to measure water depth using sound waves that are reflected to the bottom of the waters. The chart of this tool is presented in Figure 3.7, while the placement of this tool and its accessories on the boat can be seen in Figure 3.8.
2. Notebooks. One portable computer unit was needed to store the data downloaded from the GPS tool.
3. Boat. A boat was used to carry surveyors and measuring tools along the specified sounding paths. In its operation, the boat must meet several criteria, among others:

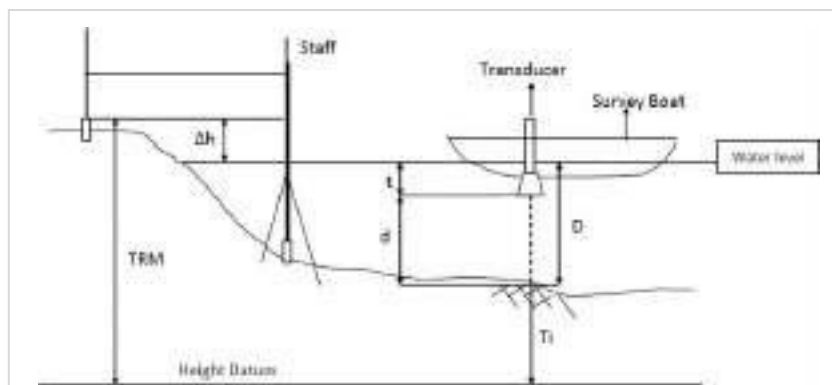


4. The boat must be wide and comfortable enough for the surveyors in carrying out measurement activities and downloading data from the tool to the computer, and preferably be closed and free from engine vibration.
5. The boat must be stable and easy to maneuver at low speed.
6. The fuel capacity must be in accordance with the length of the sounding path.
7. Staff gauge. The staff gauge was used in the activity of observing water level fluctuations on the sea.
8. Safety equipment. The safety equipment required during the survey activity is among others life jackets.



5.1.1.28

**Figure 3.8 Sketch of tool placement in the Bathymetric Survey and GPSMap placement on the boat**



**Figure 3.9 Principle of Bathymetric measurement**

Calculation:

$$T_i = TRM - [\Delta h + t + d]; D = d + t$$

With:

- $\Delta h$  = Difference in elevation between the Water Level and the benchmark.
- $T_i$  = Point elevation  $i$  ( $i = 1$  until  $n$ ).
- $D$  = Actual Depth resulting from the measurement.



T = Draft transducer.

d = Depth resulting from the transducer reading.  
 TRM = Benchmark elevation.

The formula for calculating depth reduction against the benchmarks and Tide is as follows  $T_i = WL - [t + d]$ ;  $D = d + t$

With:

WL = Water level.

### 3.8.3 Situation Survey

The scope of this topographical survey work includes, among others:

1. The determination of azimuth or starting point of the direction reference was calculated the using standard order coordinates of mapping surveys.
2. The BM made as a reference used the existing BM that has been made in the previous study document and/or used the existing BM. If no existing BM is found, a minimum of 2 (two) new Benchmarks (BM) would be built in a safe position and visible to each other with a height based on LWS and a minimum distance of 10 m between the two BM. The BM was made of concrete with a size of 40x40x150 cm<sup>3</sup>, was planted 60 cm deep from the ground surface and was plotted on the map. The placement of BM must consider the port development plan, so that BM can be useful for a long time and easy to supervise. BM painted in dark blue serves as the starting point of mapping.
3. The coordinates of reference point, namely BM, were determined by measuring the Geodetic GNSS using the Static Differential method:
  - The national reference point, namely the BM Order-0 point belonging to BIG, was used as the linking/base point.
  - GNSS measurement was carried out with a network system.
  - The measurement was made with a duration according to the length of the baseline or the distance to the base point.
  - Data processing used the Static Differential technique with ambiguity solutions that must be resolved and fixed status.
4. Detailed Situation Measurement and Spot elevation
  - Detailed situation measurement was carried out by using the RTK (RealTime Kinematic) Geodetic GNSS method so that it did not require polygon points.
  - The coordinate reference point used one of the BM in the location of

port the coordinates of which were known in determining the coordinates of a reference point.

- The transmission range of the RTK radio correction reached a radius of 2 km.
- The measurement must be corrected with the fixed status in order to achieve accuracy up to the cm order at the situation point.
- The position of important buildings related to the design work must be taken.
- The position of each end of the existing pier must be taken and the distance between the ends of the adjacent pier must also be measured (for checking).

## 5. Leveling Measurement

- The leveling measurement was carried out from the tidal station – pier floor and linked to a Benchmark.
- The leveling measurement from a tidal station, pier floor, and Benchmark to another Benchmark with a spirit level tool was carried out carefully, with a covering error of not more than  $(8 \sqrt{d})$  mm where  $d$  = distance of the measurement path (in km). All elevations must refer to the lowest ebb in the Coast Protection work.
- The leveling measurement was carried out by means of a double stand (backwards and forwards). The maximum difference in the reading for each stand is 2 mm and the difference in the total measurement result between backwards and forwards may not be more than  $(8 \sqrt{d})$  mm with  $d$  = distance of the measurement path (in km).

## 3.9 Results of Topographical and Bathymetric Survey

### 3.9.1 Situation Measurement

#### a) Making Benchmarks

The installation of benchmarks was intended to establish a permanent point in the Survey area, the coordinates of which were then determined by means of the Global Navigation Satellite System (GNSS) or commonly known as GPS. This benchmark position was then used as a reference point to determine the position (coordinates) of all measurement points, so that they can be depicted on a map. To determine the azimuth direction of all measurement points, a pair of benchmarks, namely a Main Benchmark and a Secondary Benchmark, was built in each location. The main and secondary benchmarks are in the form of concrete stakes measuring  $40 \times 40 \times 40 \text{ cm}^3$ , were planted at a depth of +/- 60 cm underground, and were built in a safe place where the possibility of being moved is very small. 4 benchmarks measuring  $40 \times 40 \times 100 \text{ cm}^3$  were made and planted at a depth of 100 cm. The Benchmarks (BM) were made on 16 November 2021.







BM02



BM03



5.1.1.29

Figure 3.10 Results of making GPS01 and GPS02 Benchmarks in the Pekalongan Coastal Protection Study Area



TOPOGRAPHICAL AND HYDRO-OCEANOGRAPHIC SURVEY IN  
PEKALONGAN

Benchmark 01

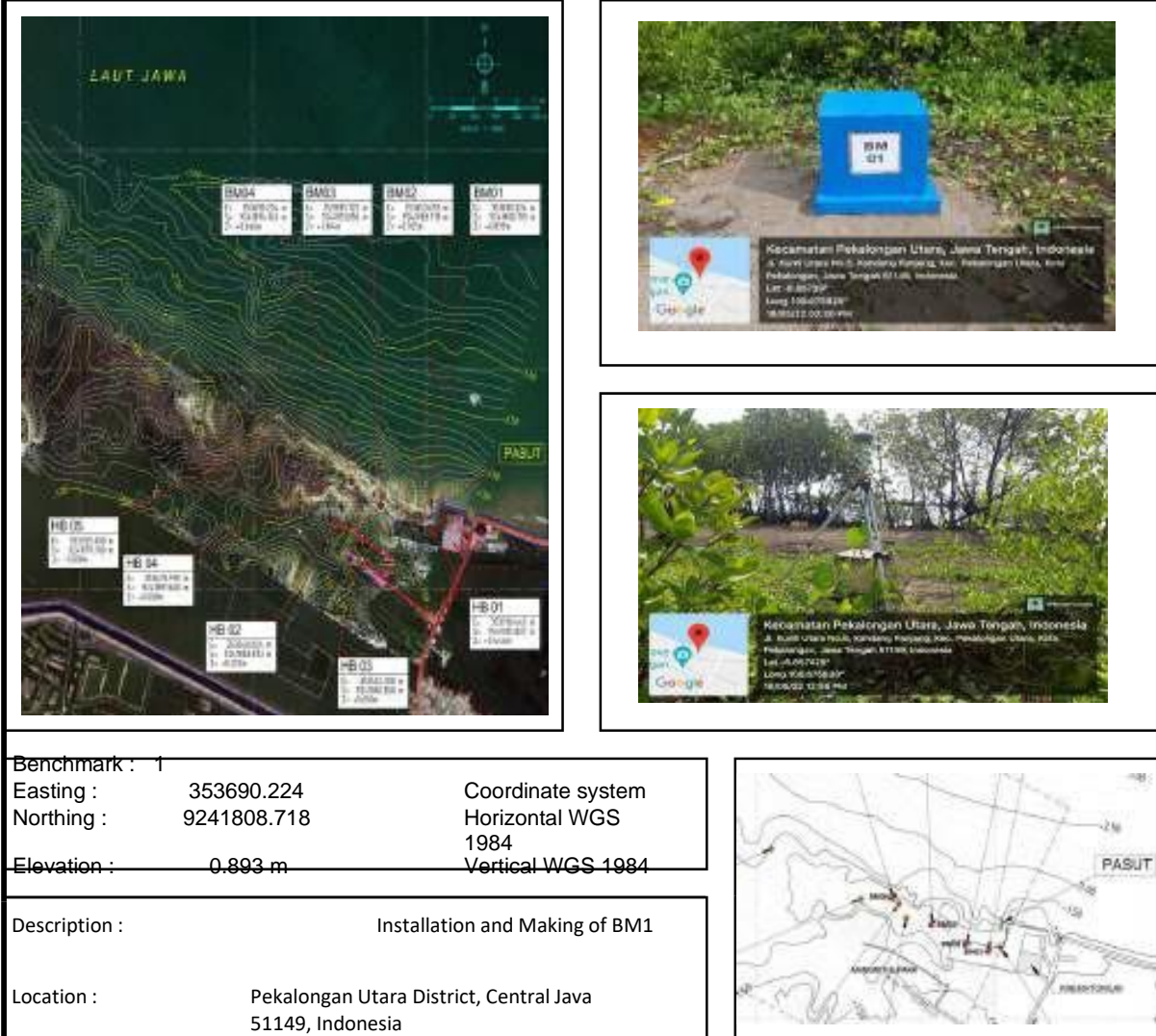
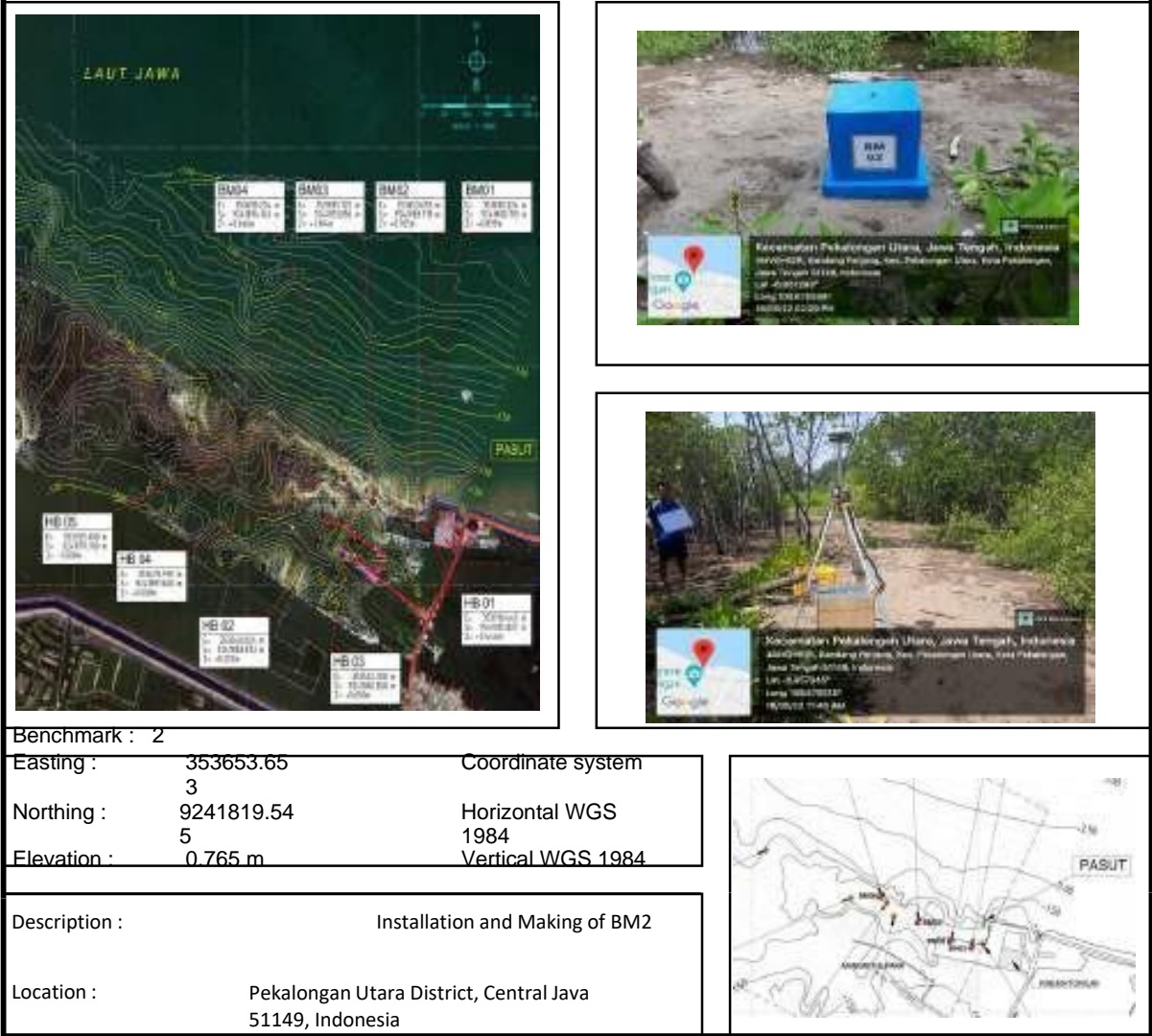


Figure 3.11 Description of BM 01

TOPOGRAPHICAL AND HYDRO-OCEANOGRAPHIC SURVEY IN PEKALONGAN

Benchmark 02



5.1.1.30 Figure 3.12 Description of BM 02

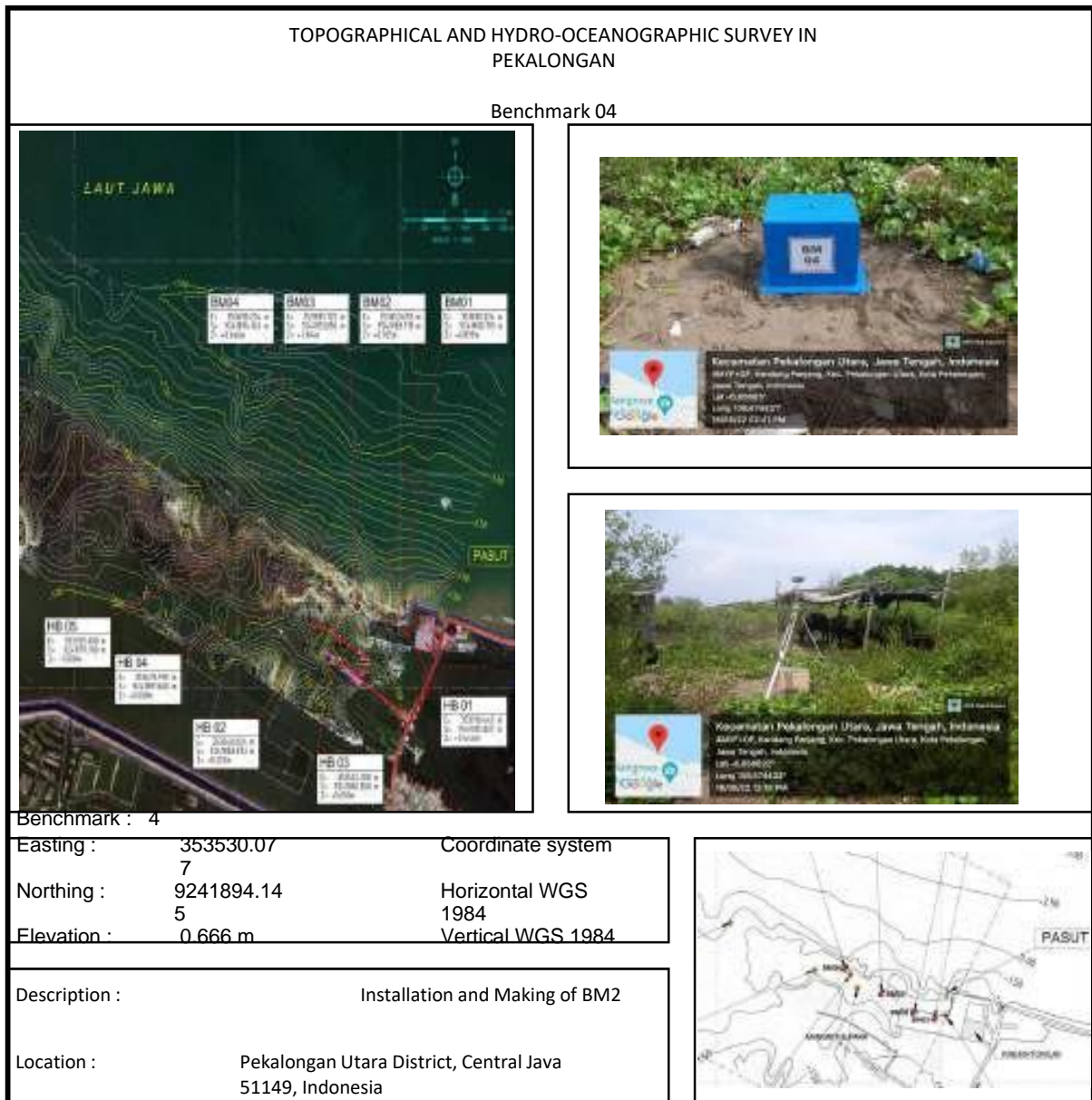


TOPOGRAPHICAL AND HYDRO-OCEANOGRAPHIC SURVEY IN  
PEKALONGAN

Benchmark 03



Figure 3.13 Description of BM 03







**5.1.1.31 Figure 3.14 Description of BM 04**

**b) Horizontal Control Point and Geodetic Linking**

The geodetic observation was used to determine the BM point position linked to the CORS point. The reference point used as a position reference in this work is the CORS Pekalongan (CPKL) station. Subsequently, the point position of BM made in the survey location was determined by geodetic measurement in order to obtain a position as a horizontal control point in the survey area, namely BM. The tool used in this geodetic survey is the Trimble R8s.

**Table 3.6 Description of geodetic observation**

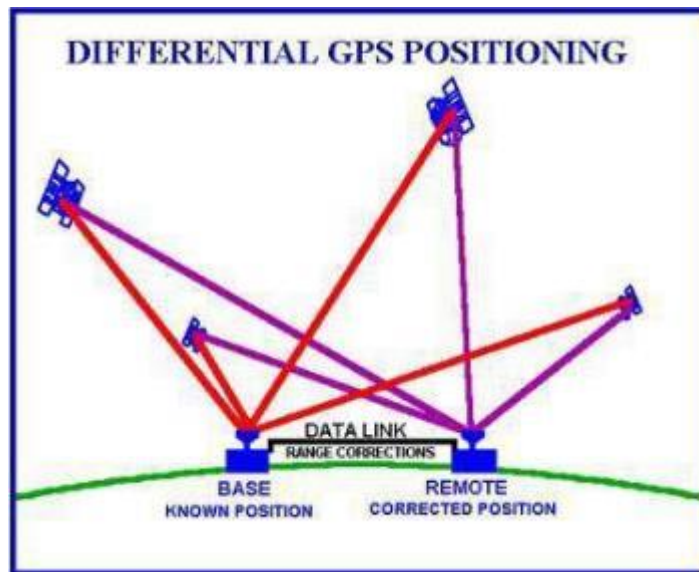
No.	Date	Activity	Location
1	18 May 2022	Geodetic Measurement	BM1, BM2, BM3, BM4
Documentation			
			
Geodetic BM 1		Geodetic BM 2	
			
Geodetic BM 3		Geodetic BM 4	

The Horizontal Base Frame constitutes work to determine the position of all points located in the survey area and must be mapped on a bathymetric map. By using the land mapping technology and sea navigation of the Real Time Kinematic (RTK) Geodetic GNSS method, at least 1 BM point is needed as a basis or measurement reference point. Reference points can be multiplied to become a base frame network in the conventional topographical mapping method if the mapping area is large enough so that the detailed measurement points are no longer covered by the RTK radio correction signal on the used GNSS.

In order to obtain coordinates linked to the national reference system, coordinate linking was carried out by using the differential static method. The purpose of linking to this reference point is to obtain the relative position/coordinate results of the measurement point to the linking point in Geodetic coordinates (latitude and longitude) and coordinates in the UTM projection surface (X and Y) with the same reference system. Illustration of the Geodetic Static Differential GNSS method



is shown in Figure 3.15.



**Figure 3.15 Illustration of the static differential method**

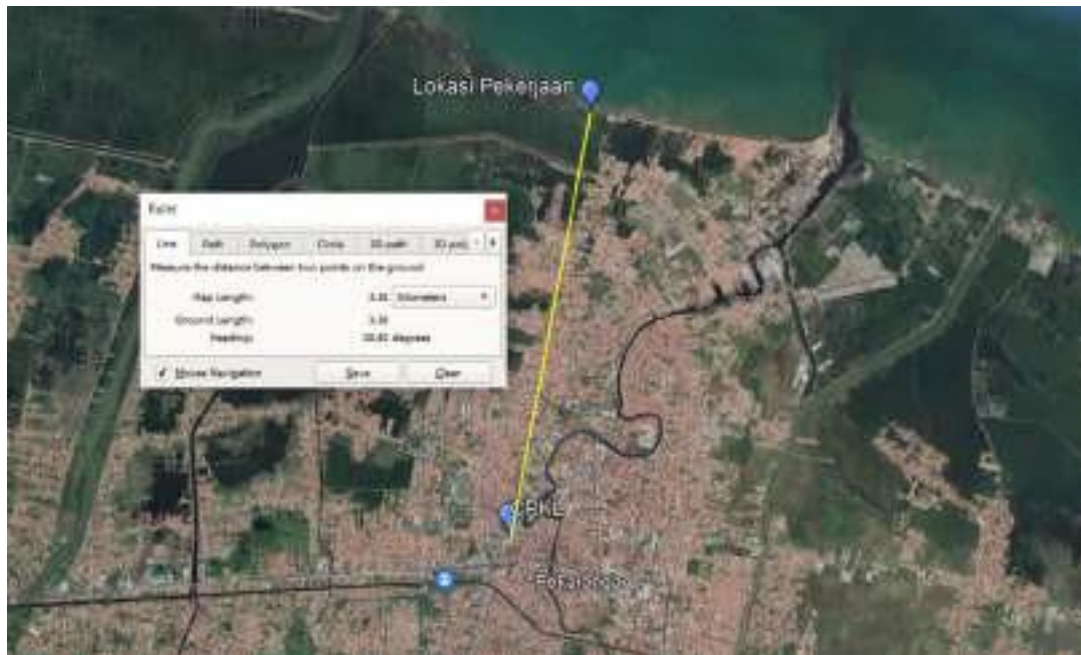
In this survey work, the BM coordinates to be used as the linking points for all measurements were determined. The coordinates were determined by the Geodetic GNSS measurement of the static differential method with the linking point or base on the mapping control point of the Indonesian Geospatial Reference System (SRGI) order-0 CORS Station with code CPKL in Pekalongan City, Central Java. The linking point was chosen based on the distance of the closest SRGI linking point to the mapping location. Based on the results of GNSS data processing in the measurement, coordinate verification results that are different from the existing coordinate values were obtained. The results of the verification measurement were used as an update of the previous coordinates because these points have been linked to the national mapping control points (SRGI) and were obtained with very good data deviation standards.

In the location, the total measurement area is only around 10 hectares so that the 4 existing BM points are sufficient to map the entire area using the RTK Geodetic GNSS technology, thus the base frame network of mapping does not need to be multiplied. The Horizontal Base Frame (KDH) measurement on the two existing BM was carried out by using the Static Differential GNSS method with Trimble R4 and Trimble R8 as rovers. The devices used are:

- 2 Units of Trimble R8 GNSS Series.
- 2 Units of Retort Stand.
- Tape measure.

The following are several criteria defined in the Geodetic Static Differential GNSS measurement in the location.

- Epoch at 5-second intervals.
- Measurement basis point at the CORS station order 0 (SRGI) inPekalongan City (CPKL).
- Length of the main baseline to the SRGI linking point of 3.3 km.
- Minimum static measurement period of 2 hours.
- Elevation mask of 15 degrees.
- Data processing with the network system and that must meet the givenloop standard.
- Baseline data processing by using the Trimble Business Center device.
- Data processing being double checked on other similar devices.



5.1.1.32 Figure 3.16 Distance between the CORS Pekalongan point and the study location (to BM)

Table 3.7 and Figure 3.7 show the geodetic observation carried out.

### 5.1.1.33 Table 3.7 List of Geodetic GPS observation

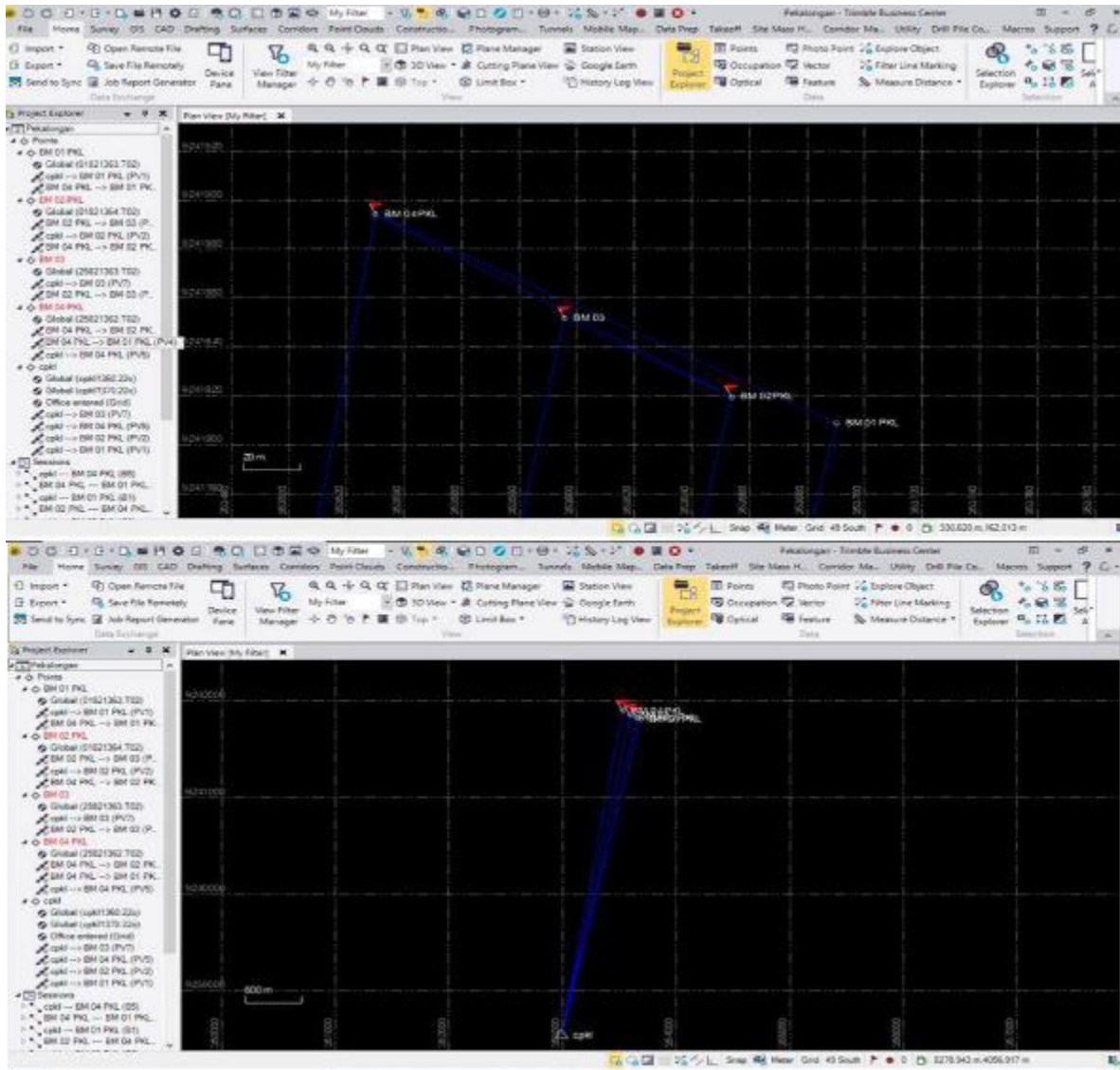
Project file data		Coordinate System	
Name:	C:\Users\Sapta\Documents\Trimble Business Center\Pekalongan.vce	Name:	World wide/UTM
Size:	69 KB	Datum:	WGS 1984
Modified:	5/18/2022 9:52:50 AM (UTC:7)	Zone:	49 South
Time zone:	SE Asia Standard Time	Geoid:	EGM2008 Global
Reference number:		Vertical datum:	QC
Description:		Calibrated site:	
Comment 1:			
Comment 2:			
Comment 3:			

#### Point List

ID	Easting (Meter)	Northing (Meter)	Elevation (Meter)	Feature Code
BM 01 PKL	353690.224	9241808.718	1.365	BM 01 PKL
BM 02 PKL	353653.653	9241819.545	1.176	BM 02 PKL
BM 03	353595.722	9241851.856	1.585	BM 03
BM 04 PKL	353530.077	9241894.145	1.151	BM 04 PKL
cpk	352990.593	9238533.306	13.705	

5/18/2022 9:53:44 AM	C:\Users\Sapta\Documents\Trimble Business Center\Pekalongan.vce	Trimble Business Center
----------------------	---	-------------------------



(Source: Google Earth with adjustments, 2022)

### 5.1.1.34 Figure 3.17 BM observation and baseline point to CORS Pekalongan

#### c) GNSS Data Processing

GPS data processing is a calculation process to obtain the coordinates measured in a certain coordinate system, in this case the national coordinate system.

In data processing, there are several things that need to be taken into account, namely:

- 1) All GNSS observation data is converted to rinex (receiver independent exchange format).
- 2) GNSS baseline processing, the software used should be adapted to the GNSS receiver used.

- 3) GNSS baseline processing, the coordinates of the reference point used for determining the baseline vector may not originate from the absolute positioning results.

**5.1.1.35 Table 3.8 Technical specifications of control point network data processing method and strategy**

Software type	Commercial (such as SKI, GPS Survei, TBC, etc)
Satellite orbit type	Broadcast
Phase ambiguity	Fixed
Error and Bias Elimination	Differencing
Coordinate determination stage	Baseline processing
Quality control mechanism	Statistical tests on coordinate accuracy parameters

Results of GNSS survey data processing:

- 1) List of definitive coordinates of all points in the network resulting from the constrained network adjustment along with its variance-covariance matrix;
- 2) List of definitive baseline values resulting from the constrained network adjustment along with their standard deviation values and correction values to the baseline values resulting from the observation;
- 3) Point error ellipses for each point;
- 4) Relative error ellipses for each observed baseline;
- 5) Results of the statistical tests performed on the residual value after adjustment.
- 6) Survey result coordinates in a .txt format

Geodetic GPS Data processing was carried out after the GPS Geodetic measurement had been complete. Data resulting from Geodetic GPS measurement constitutes coordinate data with the accuracy of 1mm. Calculation in determining the position used the least square method. Statistically, the coordinate results were shown by the chi-square test at the confidence level of 95%. Statistical calculation showed that the survey results have an Order 2 accuracy classification. Data resulting from the measurement was then downloaded using the Total Business Center (TBC) software. The following are results of the baseline report and network adjustment.



Project file data		Coordinate System	
Name:	C:\Users\Sapta\Documents\Trimble Business Center\Pekalongan.vce	Name:	World wide/UTM
Size:	69 KB	Datum:	WGS 1984
Modified:	5/18/2022 9:52:50 AM (UTC:7)	Zone:	49 South
Time zone:	SE Asia Standard Time	Geoid:	EGM2008 Global
Reference number:		Vertical datum:	CG
Description:		Calibrated site:	
Comment 1:			
Comment 2:			
Comment 3:			

## Baseline Processing Report

### Processing Summary

Observation	From	To	Solution Type	H. Prec. (Meter)	V. Prec. (Meter)	Geodetic Az.	Ellipsoid Dist. (Meter)	ΔHeight (Meter)
cpkl --- BM 03 (B7)	cpkl	BM 03	Fixed	0.0091	0.0333	10°29'56.3"	3373.7221	-12.1248
cpkl --- BM 04 PKL (B5)	cpkl	BM 04 PKL	Fixed	0.0066	0.0307	9°16'42.9"	3404.3175	-12.5708
cpkl --- BM 02 PKL (B2)	cpkl	BM 02 PKL	Fixed	0.0077	0.0523	11°33'59.6"	3352.9122	-12.5426
cpkl --- BM 01 PKL (B1)	cpkl	BM 01 PKL	Fixed	0.0094	0.0515	12°12'59.3"	3349.7483	-12.3519
BM 02 PKL --- BM 04 PKL (B3)	BM 04 PKL	BM 02 PKL	Fixed	0.0097	0.0213	121°17'22.2"	144.3734	0.1202
BM 04 PKL --- BM 01 PKL (B4)	BM 04 PKL	BM 01 PKL	Fixed	0.0014	0.0021	118°14'00.1"	181.5296	0.2295
BM 02 PKL --- BM 03 (B6)	BM 02 PKL	BM 03	Fixed	0.0025	0.0046	299°18'22.7"	66.3314	0.3177

### cpkl - BM 03 (4:52:30 PM-6:10:09 PM) (S7)

Baseline observation:	cpkl --- BM 03 (B7)
Processed:	5/18/2022 9:52:17 AM
Solution type:	Fixed
Frequency used:	Dual Frequency (L1, L2)
Horizontal precision:	0.0091 m
Vertical precision:	0.0333 m
RMS:	0.0231 m
Maximum PDOP:	1.403
Ephemeris used:	Broadcast
Antenna model:	NGS Absolute
Processing start time:	5/16/2022 4:52:42 PM (Local: UTC+7hr)
Processing stop time:	5/18/2022 6:09:42 PM (Local: UTC+7hr)
Processing duration:	01:17:00
Processing interval:	30 seconds

**Vector Components (Mark to Mark)**

From: <b>cpkl</b>					
Grid		Local		Global	
Eastling	352990.593 m	Latitude	S6°53'13.35769"	Latitude	S6°53'13.35769"
Northing	9238533.308 m	Longitude	E 109°40'09.99340"	Longitude	E 109°40'09.99340"
Elevation	13.705 m	Height	37.741 m	Height	37.741 m

To: <b>BM 03</b>					
Grid		Local		Global	
Eastling	353595.722 m	Latitude	S6°51'25.37079"	Latitude	S6°51'25.37079"
Northing	9241851.856 m	Longitude	E 109°40'30.00591"	Longitude	E 109°40'30.00591"
Elevation	1.595 m	Height	25.617 m	Height	25.617 m

Vector					
ΔEastling	605.1287 m	NS Fwd Azimuth	10°29'36.3"	ΔX	-708.1221 m
ΔNorthing	3318.5507 m	Ellipsoid Dist.	3373.7221 m	ΔY	155.5674 m
ΔElevation	-12.110 m	ΔHeight	-12.1248 m	ΔZ	3294.9361 m

**Standard Errors**

Vector errors:					
σ ΔEastling	0.0034 m	σ NS fwd Azimuth	0°00'00.2"	σ ΔX	0.0056 m
σ ΔNorthing	0.0034 m	σ Ellipsoid Dist.	0.0033 m	σ ΔY	0.0163 m
σ ΔElevation	0.0170 m	σ ΔHeight	0.0170 m	σ ΔZ	0.0038 m

**Aposteriori Covariance Matrix (Meter<sup>2</sup>)**

	X	Y	Z
X	0.0000319209		
Y	-0.0000735515	0.0002649389	
Z	0.0000096307	-0.0000260776	0.0000143193

**Occupations**

	From	To
Point ID:	cpkl	BM 03
Data file:	C:\Users\Sapta\Documents\Trimble Business Center\Pekalongan\cpkl1360.220	C:\Users\Sapta\Documents\Trimble Business Center\Pekalongan\25821363.T02
Receiver type:	GR10	R8s LT
Receiver serial number:	1704517	5731R02582
Antenna type:	AR25	R8s Internal
Antenna serial number:	10231008	31R02582
Antenna height (measured):	0.0000 m	1.3400 m
Antenna method:	Bottom of antenna mount	Bottom of antenna mount

5.1.1.36 Figure 3.18 Report on observation and baseline point processing

The results of Geodetic GNSS data processing with the Network Static Differential method in the form of the final coordinates of the two benchmarks are presented in the form of a Benchmark Description which is attached at the end of this report. The coordinates of each benchmark are shown in Table 3.9.

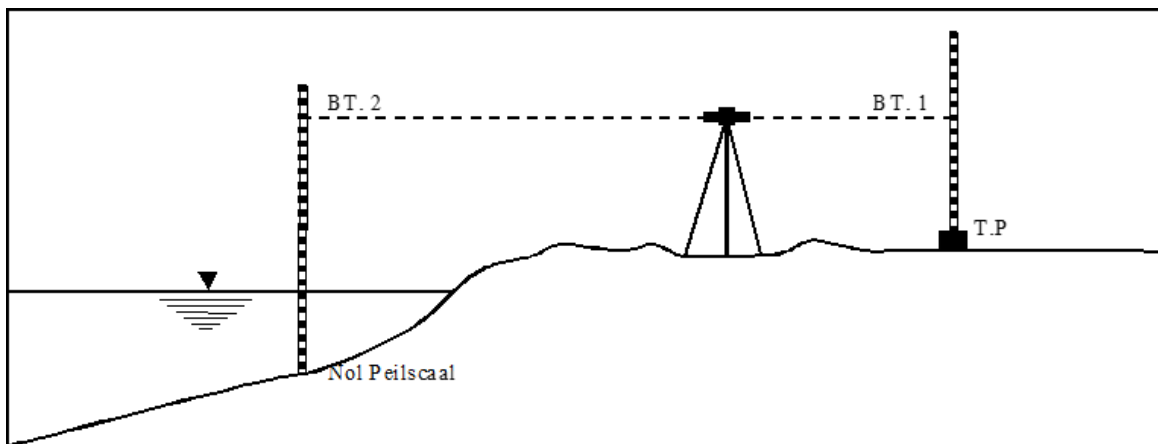
**Table 3.9 Benchmark Coordinates**

Point No.	Geographic Coordinate		UTM Zone (49 South)	
	Latitude	Longitude	Easting (m)	Northing (m)
BM 1	6°51'26.81"S	109°40'33.07"E	353690.224	9241808.718
BM 2	6°51'26.45"S	109°40'31.87"E	353653.653	9241819.545
BM 3	6°51'25.40"S	109°40'29.98"E	353595.722	9241851.856
BM 4	6°51'23.99"S	109°40'27.87"E	353530.077	9241894.145

The vertical reference system used in this work used a reference datum obtained from a tidal elevation measurement analysis. To get the elevation value from the built benchmark, height difference or leveling measurement was carried out.

*d) Vertical Base Frame Measurement*

The vertical base frame measurement was carried out using the leveling method. Therefore, the height difference backwards and forwards could be identified. In this measurement, the height difference between the benchmark and the height at the tidal station was linked as a reference for the elevation to be used. The sketch of benchmark elevation linking to the reference surface (tide) is shown in Figure 3.19.



**Figure 3.19 Sketch of benchmark elevation reference linking to a Staff Gauge (Tide Staff).**

The vertical control point is a point that is made as a reference for determining the height of other points (of a lower order). Measurement of the vertical control point between the BM reference point and the zero staff of the water level station. The point height

determination was carried out by the leveling measurement, using a spirit level that refersto a level surface. The tool used for this vertical control point/leveling measurement is Topcon Auto Level (RT-B3).

**5.1.1.37 Table 3.10 Snippet of the documentation of leveling measurement**

Date	Activity	Location
18 May 2022	Water Level Linking	Coastal Protection Area
<b>Documentation</b>		
<div style="display: flex; justify-content: space-around;"> <div style="text-align: center;">  <p data-bbox="333 920 627 958">To Tide Staff &amp; BM 1</p> </div> <div style="text-align: center;">  <p data-bbox="965 920 1299 958">Linking of BM 1 &amp; BM 2</p> </div> </div>		
<div style="display: flex; justify-content: space-around;"> <div style="text-align: center;">  <p data-bbox="405 1352 691 1391">Linking of BM 2 &amp; 3</p> </div> <div style="text-align: center;">  <p data-bbox="991 1352 1270 1391">Linking of BM 3 &amp; 4</p> </div> </div>		

The processing and calculation used the Microsoft Office Excel software. The following are documentation of some Processing and calculation of height difference from BM to tide staff.

5.1.1.38 Table 3.11 Benchmark Elevation used in the Location

DOUBLE STAND LEVELING COUNT														
Slag	POINT NO.	STAND I		STAND II		HIGH DIFFERENCE			DISTANCE			Correction	POINT HEIGHT (Ref. MSL)	POINT NO.
		THREAD READING		THREAD READING		STAND I	STAND II	AVERAGE	STAND I	STAND II	AVERAGE			
		BT	BA	BT	BA									
		(m)	(m)	(m)	(m)	(m)	(m)	(m)	(m)	(m)	(m)			
			2.871	2.546	2.729								-1.689	Tide
	Tide	2.688	2.506	2.546	2.364	2.048	2.048	2.0480	36.500	36.500	36.500	0.0000	0.359	BM01
	BM01	0.640	0.740	0.498	0.598				20.000	20.000	20.000			
			0.540	0.498	0.398									
	BM01	0.453	0.552	0.546	0.645	-0.128	-0.128	-0.1280	19.800	19.800	19.800	0.0000	0.231	BM02
			0.354	0.546	0.447									
	BM02	0.581	0.681	0.674	0.774				19.900	19.900	19.900			
			0.482	0.674	0.575									
	BM02	0.812	0.878	0.767	0.833	-0.570	-0.571	-0.5705	13.200	13.200	13.200	0.0000	-0.340	P1
			0.746	0.767	0.701									
	P1	1.382	1.448	1.338	1.404				13.100	13.100	13.100			
			1.317	1.338	1.273									
	P1	1.619	1.720	1.609	1.710	0.910	0.910	0.9100	20.100	20.100	20.100	0.0000	0.571	BM03
			1.519	1.609	1.509									
	BM03	0.709	0.809	0.699	0.799				20.000	20.000	20.000			
			0.609	0.699	0.599									
	BM03	0.370	0.512	0.502	0.644	-0.508	-0.507	-0.5075	28.300	28.300	28.300	0.0000	0.063	P2
			0.229	0.502	0.361									
	P2	0.878	1.019	1.009	1.150				28.100	28.100	28.100			
			0.738	1.009	0.869									
	P2	0.709	0.765	0.695	0.751	0.069	0.070	0.0695	11.100	11.100	11.100	0.0000	0.133	BM04
			0.654	0.695	0.640									
	BM04	0.640	0.696	0.625	0.681				11.200	11.200	11.200			
				0.625										
						1.821	1.822	1.822	241.300	241.300	241.300			
<b>SPIRIT LEVEL MEASUREMENT ACCURACY ANALYSIS:</b> ===== Total Height Difference (dH) = 1.822 m Total Distance = 241.30 m Total Height Difference Correction = <b>-0.001</b> Spirit Level Accuracy = <b>1 (VD<sub>km</sub>) mm</b>														

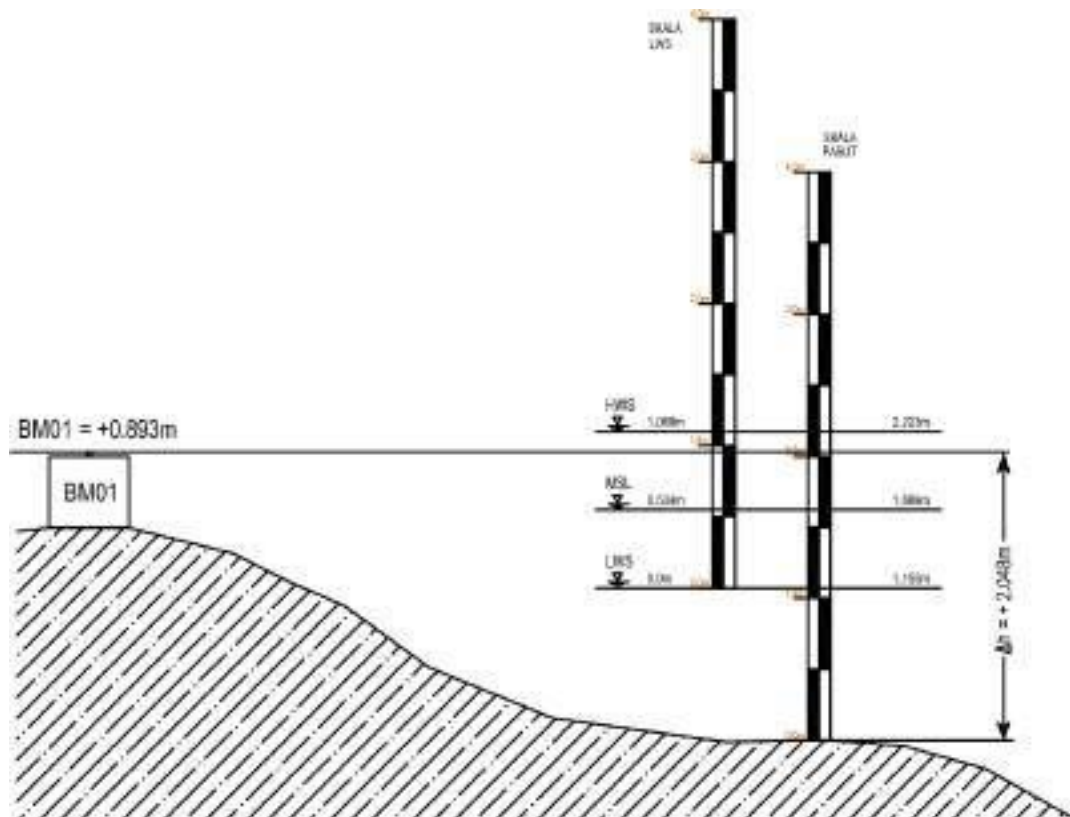


Figure 3.20 Sketch of benchmark elevation reference linking to a Staff Gauge (tide staff).



e) *Situation Measurement*

The topographical survey was carried out on 17-20 May 2022. The topographical survey was carried out in the study area of approximately 9.24 ha. The tools used in this topographical survey are Total Station and RTK GNSS. The following show the results of detailed topographical point measurement in the study area.

**A. Theodolite Method (Total Station)**

The situation measurement method with a total station was carried out in an area that was still accessible, because the study location area is a mangrove conservation area so that for some areas that could not be reached by the total station, the RTK method was carried out. The following are snippets of documentation and processed data resulting from the situation measurement with the total station.

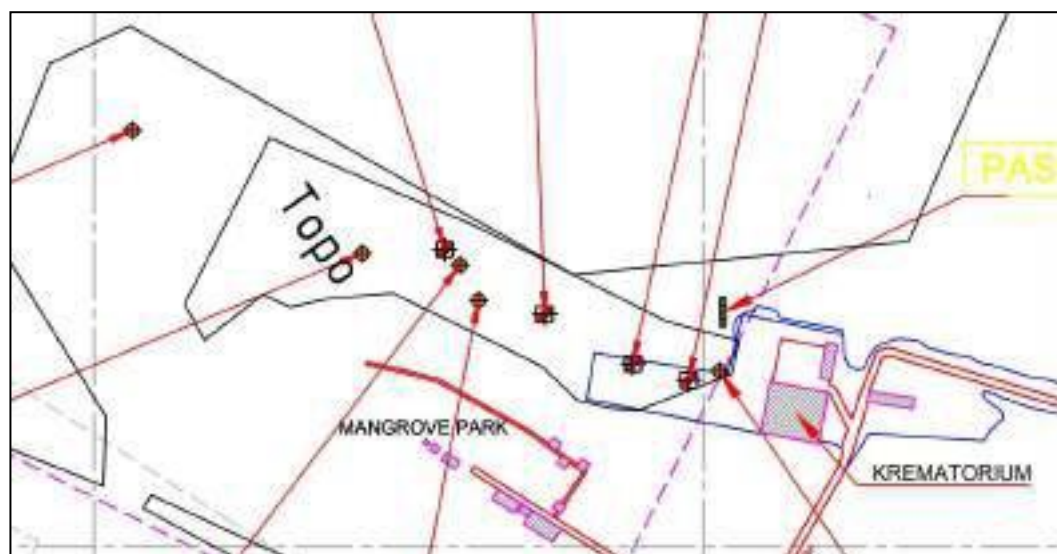
**5.1.1.39 Table 3.12 Description of topographical measurement with a Theodolite (Total Station)**

Date	Activity	Location
17-20 May 2022	Situation and Topography	Survey Area of Pekalongan Utara District

**Documentation**



The area obtained for the situation measurement with the total station reaches 2.48 ha, with an area illustration as shown in Figure 3.21.



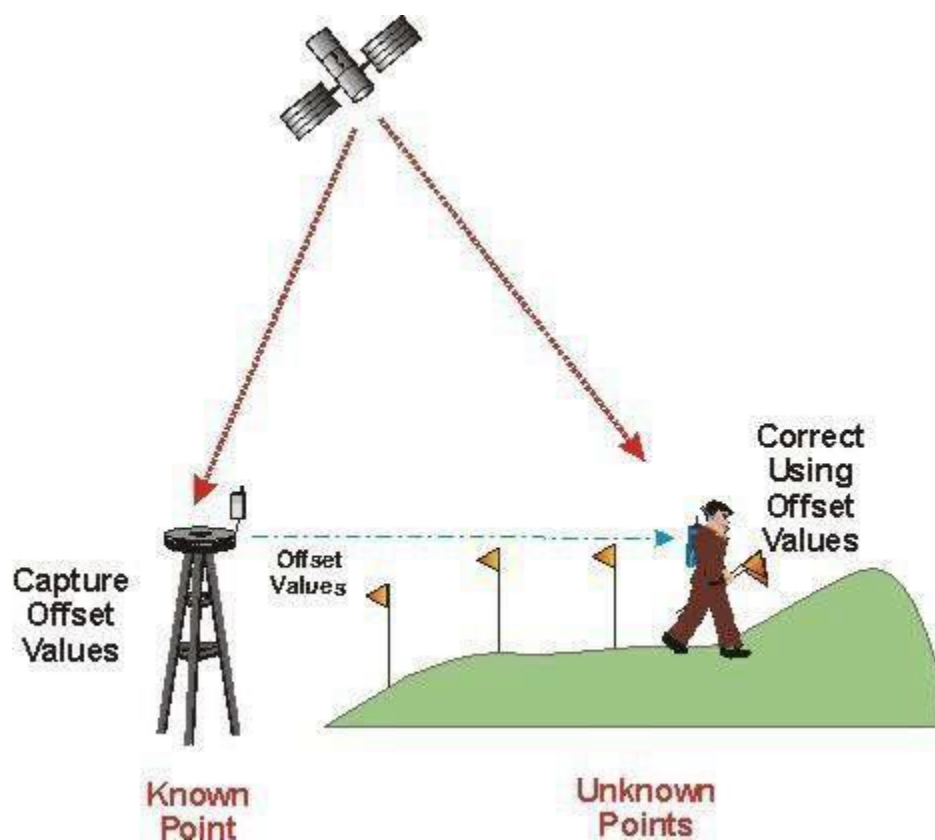
**5.1.1.40 Figure 3.21 Area Resulting from the Situation Measurement with a Total Station**

**Table 3.13 Snippet of detailed situation and elevation point measurement data with a Total Station**

HITUNGAN SITUASI PKL															Halaman Dititung Tanggal								
Titik	Tinggi	BACAAN SUDUT			BACAAN SUDUT			Sudut Jurusan (Azimuth)		Tinggi	Jarak	Jarak	d[X]	d[Y]	Denda	K O R D I N A T			Tinggi Titik	Nomor			
TARGET	Ajar	Sdt. Horizontal			Sdt. Vertikal					TARGET	MIRING	Datar			Tinggi	X	Y	Z	LWS	Titik			
																Elevasi Target			-1,155				
BMD1		0	0	0	0.000	89	40	16	0	0	0	1.085	38.345	38.144	0.123	#####	#####	2.577	1.422	BMD1	0.000		
	0.989															#####	#####	2.454	1.299	BMD2			
PI		202	45	28	202.758	90	19	52	202	45	28	1.400	26.708	26.798	-10.311	-24.628	-0.565	153643.322	#####	1.889	0.734	PI	202.758
PASUT		353	46	24	353.773	91	13	55	353	46	24	1.500	68.008	67.993	-49.097	47.038	-1.884	#####	#####	0.520	-0.635	PASUT	353.773
PGR		307	25	17	307.423	91	10	8	307	25	17	1.600	4.393	4.382	-3.484	2.649	-0.704	#####	#####	1.755	0.588	PGR	307.423
K		47	1	11	47.025	89	13	15	47	1	11	1.600	4.082	4.082	2.585	2.782	-0.585	#####	#####	1.903	0.746	K	47.025
K		74	50	17	74.844	91	13	18	74	50	17	1.600	16.050	16.046	15.488	4.095	-0.855	153669.143	#####	1.499	0.344	K	74.844
PGR		78	51	18	78.855	91	5	9	78	51	18	1.600	28.626	28.621	28.081	5.532	-1.137	153681.734	#####	1.517	0.162	PGR	78.855
PGR		71	56	4	71.934	91	2	49	71	56	4	1.600	25.219	25.234	27.709	9.066	-1.149	153681.446	#####	1.109	0.154	PGR	71.934
K		334	31	31	334.531	91	4	20	334	31	31	1.600	21.356	21.352	-9.268	19.458	-1.014	153644.385	#####	1.430	0.285	K	334.531
PGR		343	58	44	343.979	90	54	14	343	58	44	1.600	20.365	20.560	-5.675	19.762	-0.933	153647.978	#####	1.519	0.364	PGR	343.979
K		2	20	20	2.656	89	46	18	2	20	20	1.600	20.806	20.606	0.955	20.584	-0.531	153654.608	#####	1.923	0.768	K	2.656
K		160	47	9	160.786	89	12	2	160	47	9	1.600	3.668	3.668	1.107	-1.863	-0.560	153654.860	#####	1.894	0.739	K	160.786
K		140	54	53	140.904	92	57	14	140	54	13	1.600	4.857	4.846	3.056	-1.761	-0.863	153656.709	#####	1.593	0.638	K	140.904
K		165	28	53	165.481	91	13	33	165	28	53	1.600	15.985	15.982	4.006	-15.471	-0.844	153657.659	#####	1.510	0.355	K	165.481
K		154	57	31	154.959	91	3	23	154	57	31	1.600	16.355	16.352	6.921	-14.815	-0.813	153660.574	#####	1.543	0.386	K	154.959
PGR		194	31	40	194.528	89	60	46	194	31	40	1.600	8.048	8.048	-2.019	-7.291	-0.646	153651.634	#####	1.888	0.733	PGR	194.528
BMD2		0	0	0	0.000	89	45	43	0	0	0	0.971	26.707	26.797				#####	#####	2.454	1.299	BMD2	0.000
	1.42															#####	#####	1.889	0.734	PI			
BMD3		163	19	10	163.325	89	13	14	163	19	10	1.052	40.402	40.299	11.565	-38.604	0.905	153654.885	#####	2.704	1.639	BMD3	163.325
KR		199	6	11	199.109	89	56	8	199	6	11	1.600	36.413	36.413	-13.910	-34.407	-0.189	153631.403	#####	1.750	0.595	KR	199.109
KR		196	34	17	196.577	90	21	35	196	34	17	1.600	34.301	34.100	-9.729	-32.683	-0.397	153633.593	#####	1.497	0.337	KR	196.577
KR		189	41	27	189.691	91	20	40	189	41	27	1.600	30.974	30.965	-5.212	-30.524	-0.207	153638.109	#####	0.962	-0.173	KR	189.691
K		176	20	24	176.340	91	11	2	176	20	24	1.600	27.360	27.157	1.734	-27.102	-0.741	153645.055	#####	1.147	-0.008	K	176.340
K		165	20	49	165.347	89	50	10	165	20	49	1.600	26.662	26.663	6.785	-25.796	-0.106	153650.066	#####	1.782	0.623	K	165.347
K		144	57	17	144.955	88	58	9	144	57	17	1.600	19.952	19.949	11.855	-16.332	0.179	153654.777	#####	2.068	0.913	K	144.955
K		155	24	18	155.405	90	56	47	155	24	18	1.600	16.687	16.685	6.944	-15.171	-0.456	153650.266	#####	1.433	0.278	K	155.405
K		118	47	53	118.798	84	7	46	118	47	53	2.000	-7.601	7.561	6.626	-3.442	0.197	153649.948	#####	2.086	0.931	K	118.798
PGR		75	15	19	75.255	88	52	59	75	15	19	2.000	30.693	30.691	30.319	1.771	-0.872	153653.660	#####	1.517	0.362	PGR	75.255

### 5.1.1.41 B RTK GNSS method

The method for measuring detailed situation and spot elevation is the extraterrestrial method using the RTK GNSS. Positioning can be done in real time during the survey with reference points as control points in the mapping. The instrument used is the same as when determining the BM coordinates, namely the dual frequency Geodetic GNSS. However, the method used is different, namely real-time positioning with two sets of GPS, each functioning as a control (base) placed at a reference point and the other as a set for retrieving coordinate data at points the coordinates of which want to be identified (rover). The base station will send a correction via radio signals sent with a radius of up to 2 km. The purpose of this correction is that the coordinates obtained are accurate and meet the desired criteria according to the measurement specifications. Illustration of measurement with the Real Time Kinematic (RTK) GNSS technology is shown in Figure 3.22.



5.1.1.42 Figure 3.22 Illustration of topographical mapping with the RTK method.

Benchmark coordinates were obtained by processing data in Geodetic GNSS measurement that has been carried out by meeting the given technical requirements.

The detailed situation measurement with the RTK Geodetic GNSS method was carried out simultaneously with the elevation point measurement on land areas and sea areas that cannot be reached.



during bathymetric measurement because they are too shallow. A snippet of the results of detailed situation and elevation point measurements is shown in Table 3.14. The results of situation mapping in the form of plots of measurement points are shown in Figure 3.23.

**5.1.1.43 Table 3.14 Snippet of Detailed Situation and Elevation Point measurement data**

K O O R D I N A T											TINGGI TITIK (Ref. LWS) (m)
Local Reference					Status	SRGI 2013 Reference BIG (Rer MSL)					
No	X	Y	Z	Desc		No	X	Y	Z	Desc	
	(m)	(m)	(m)				(m)	(m)	(m)		
											-1.155
1	353690.224	9241808.718	2.582	BM1_PKL	RTK Fixed	1	353691.056	9241809.507	1.427	BM1_PKL	
2	353605.077	9241592.117	-0.389	A1	RTK Fixed	2	353605.909	9241592.906	-1.544	A1	
3	353591.265	9241599.611	-0.073	A2	RTK Fixed	3	353592.097	9241600.4	-1.228	A2	
4	353595.563	9241587.332	1.523	A1a	RTK Fixed	4	353596.395	9241588.121	0.368	A1a	
5	353592.319	9241594.918	2.588	A2x	RTK Fixed	5	353593.151	9241595.707	1.433	A2x	
6	353582.267	9241598.859	3.187	A3c	RTK Fixed	6	353583.099	9241599.648	2.032	A3c	
7	353580.328	9241596.787	-0.509	yy	RTK Fixed	7	353581.16	9241597.576	-1.664	yy	
8	353585.649	9241600.094	-0.532	yz	RTK Fixed	8	353586.481	9241600.883	-1.687	yz	
9	353581.646	9241598.892	0.24	A3	RTK Fixed	9	353582.478	9241599.681	-0.915	A3	
10	353573.258	9241602.568	0.457	A4	RTK Fixed	10	353574.09	9241603.357	-0.698	A4	
11	353562.853	9241607.284	-0.305	A5	RTK Fixed	11	353563.685	9241608.073	-1.460	A5	
12	353553.187	9241608.647	0.159	A6	RTK Fixed	12	353554.019	9241609.436	-0.996	A6	
13	353539.018	9241615.812	0.028	A7	RTK Fixed	13	353539.85	9241616.601	-1.127	A7	
14	353525.555	9241625.156	0.175	A8	RTK Fixed	14	353526.387	9241625.945	-0.980	A8	
15	353516.507	9241631.43	0.205	A9	RTK Fixed	15	353517.339	9241632.219	-0.950	A9	
16	353507.234	9241636.205	-0.325	A10	RTK Fixed	16	353508.066	9241636.994	-1.480	A10	
17	353690.224	9241808.718	2.582	BM1 pkl	RTK Fixed	17	353691.056	9241809.507	1.427	BM1 pkl	
18	353690.129	9241808.905	2.533	cek bm1	RTK Fixed	18	353690.961	9241809.694	1.378	cek bm1	
19	353690.132	9241808.903	2.532	cek bm2	RTK Fixed	19	353690.964	9241809.692	1.377	cek bm2	
20	353690.132	9241808.902	2.531	cek bm3	RTK Fixed	20	353690.964	9241809.691	1.376	cek bm3	
21	353690.132	9241808.904	2.534	cek bm4	RTK Fixed	21	353690.964	9241809.693	1.379	cek bm4	
22	353710.455	9241814.827	2.113	Bor1	RTK Fixed	22	353711.287	9241815.616	0.958	Bor1	
23	353506.817	9241638.5	-0.083	A11	RTK Fixed	23	353507.649	9241639.289	-1.238	A11	
24	353497.384	9241641.421	0.096	A12	RTK Fixed	24	353498.216	9241642.21	-1.059	A12	
25	353489.078	9241646.486	0.192	A13	RTK Fixed	25	353489.91	9241647.275	-0.963	A13	
26	353478.62	9241650.999	-0.407	A14	RTK Fixed	26	353479.452	9241651.788	-1.562	A14	
27	353470.218	9241654.96	-0.291	A15	RTK Fixed	27	353471.05	9241655.749	-1.446	A15	
28	353461.943	9241660.67	-0.273	A16	RTK Fixed	28	353462.775	9241661.459	-1.428	A16	
29	353452.605	9241667.209	-0.282	A17	RTK Fixed	29	353453.037	9241667.998	-1.437	A17	
30	353444.279	9241673.396	-0.28	A18	RTK Fixed	30	353445.511	9241674.185	-1.435	A18	
31	353436.166	9241677.244	-0.453	A19	RTK Fixed	31	353436.998	9241678.033	-1.608	A19	
32	353425.406	9241684.717	-0.19	A20	RTK Fixed	32	353426.238	9241685.506	-1.345	A20	
33	353418.725	9241689.217	-0.122	A21	RTK Fixed	33	353419.557	9241690.006	-1.277	A21	
34	353409.266	9241692.796	-0.529	A22	RTK Fixed	34	353410.098	9241693.585	-1.684	A22	
35	353397.068	9241696.666	-0.299	A23	RTK Fixed	35	353397.9	9241697.455	-1.454	A23	
36	353387.818	9241700.121	-0.236	A24	RTK Fixed	36	353388.65	9241700.91	-1.391	A24	
37	353377.052	9241702.385	-0.644	A25	RTK Fixed	37	353377.884	9241703.174	-1.799	A25	
38	353368.462	9241709.867	-0.675	A26	RTK Fixed	38	353369.294	9241710.656	-1.830	A26	
39	353358.33	9241716.326	-0.549	A27	RTK Fixed	39	353359.162	9241717.115	-1.704	A27	
40	353351.186	9241719.712	-0.664	A28	RTK Fixed	40	353352.018	9241720.501	-1.819	A28	
41	353343.216	9241726.171	-0.418	A29	RTK Fixed	41	353344.048	9241726.96	-1.573	A29	
42	353335.302	9241732.475	-0.429	A30	RTK Fixed	42	353336.134	9241733.264	-1.584	A30	
43	353611.897	9241601.408	-0.389	B1	RTK Fixed	43	353612.729	9241602.197	-1.544	B1	
44	353601.953	9241606.11	-0.305	B2	RTK Fixed	44	353602.785	9241606.899	-1.460	B2	
45	353592.72	9241611.593	-0.279	B3	RTK Fixed	45	353593.552	9241612.382	-1.434	B3	
46	353583.55	9241617.154	-0.205	B4	RTK Fixed	46	353584.382	9241617.943	-1.360	B4	
47	353574.005	9241624.878	-0.283	B5	RTK Fixed	47	353574.837	9241625.667	-1.438	B5	
48	353564.929	9241625.886	-0.118	B6	RTK Fixed	48	353565.761	9241626.675	-1.273	B6	
49	353554.559	9241629.097	-0.238	B7	RTK Fixed	49	353555.391	9241629.886	-1.393	B7	
50	353544.628	9241632.028	0.182	B8	RTK Fixed	50	353545.46	9241632.817	-0.973	B8	
51	353536.136	9241637.085	-0.103	B9	RTK Fixed	51	353536.968	9241637.874	-1.258	B9	
52	353525.759	9241644.404	-0.247	B10	RTK Fixed	52	353526.591	9241645.193	-1.402	B10	
53	353519.37	9241649.31	-0.349	B11	RTK Fixed	53	353520.202	9241650.099	-1.504	B11	
1	352649.667	9242663.673	-2.3618	YY131	RTK Fixed	1	352650.499	9242664.462	-3.517	YY131	
2	353808.896	9242049.681	-2.5558	YY1	RTK Fixed	2	353809.728	9242050.47	-3.711	YY1	
3	353357	9241859.807	0.4372	1	RTK Fixed	3	353357.832	9241860.596	-0.718	1	
4	353368.039	9241878.599	0.7592	2	RTK Fixed	4	353368.871	9241879.388	-0.396	2	
5	353374.685	9241894.241	0.7982	3	RTK Fixed	5	353375.517	9241895.03	-0.357	3	
6	353382.437	9241910.805	0.8812	4	RTK Fixed	6	353383.269	9241911.594	-0.274	4	
7	353389.925	9241922.105	0.7892	5	RTK Fixed	7	353390.757	9241922.894	-0.366	5	
8	353397.63	9241935.952	0.7292	6	RTK Fixed	8	353398.462	9241936.741	-0.426	6	
9	353401.077	9241945.27	0.6072	7	RTK Fixed	9	353401.909	9241946.059	-0.548	7	

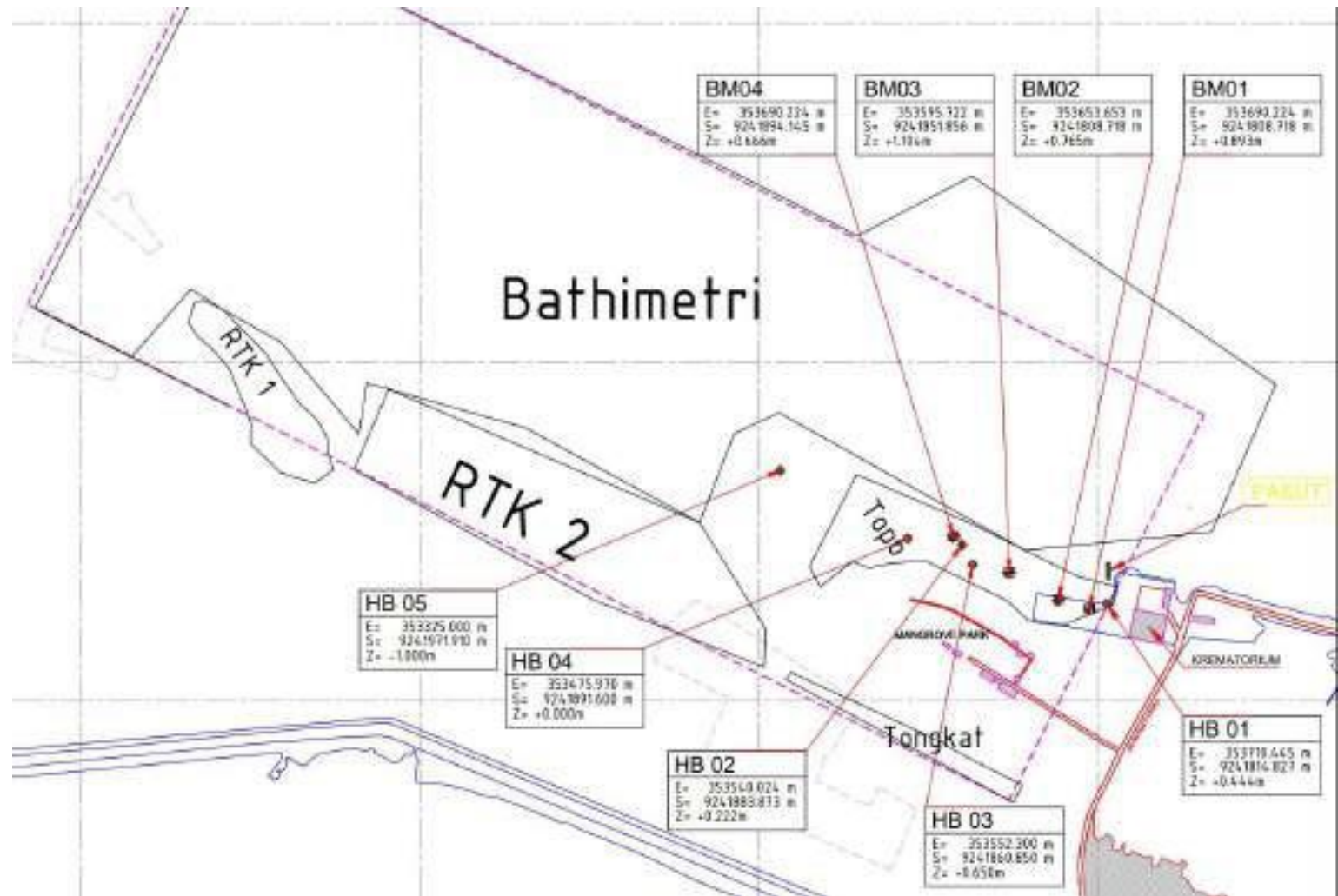


Figure 3.23 Area resulting from the situation measurement with RTK

### 3.9.2 Bathymetric Measurement

The bathymetric survey was carried out on 7-10 August 2022. The bathymetric survey was carried out in the study area of 57.23 ha. The distance between survey lines is 10m. The calibration process with the bar check calibration method was carried out to ensure that the used values of draft transducer and sound speed are correct.

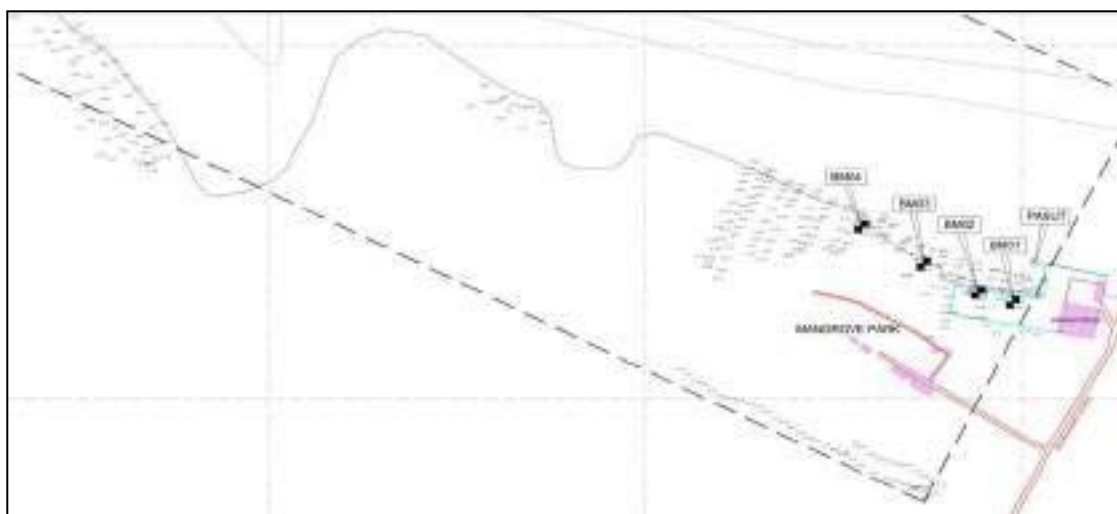
#### a) Staff Survey Method

The bathymetric measurement was carried out by using the stick system and GPS on the stick for the point position.



5.1.1.44 Figure 3.24 Snippet of the documentation of bathymetric measurement with the staff method

The processing of bathymetric data from data acquisition used the Microsoft Excel as a bathymetric processing database. The following are the samples of depth points resulting from the bathymetric measurement in the work area.



5.1.1.45 Figure 3.25 Snippet of the results of bathymetric measurement with the staff method



b) Echosounder Survey Method

Subsequently, the bathymetric measurement was combined by using the Echosounder Garmin 585 while the Ship used is a motorized ship with a small draft capable of maneuvering at a depth of approximately 1 meter. This measurement used a map sounder while the positioning used GPS.



**Figure 3.26 Snippet of the documentation of bathymetric measurement preparation with Echosounder 585**





5.1.1.46 Figure 3.27 Documentation of bathymetric measurement and

manual checking Table 3.15 Snippet of actual depth checking data for

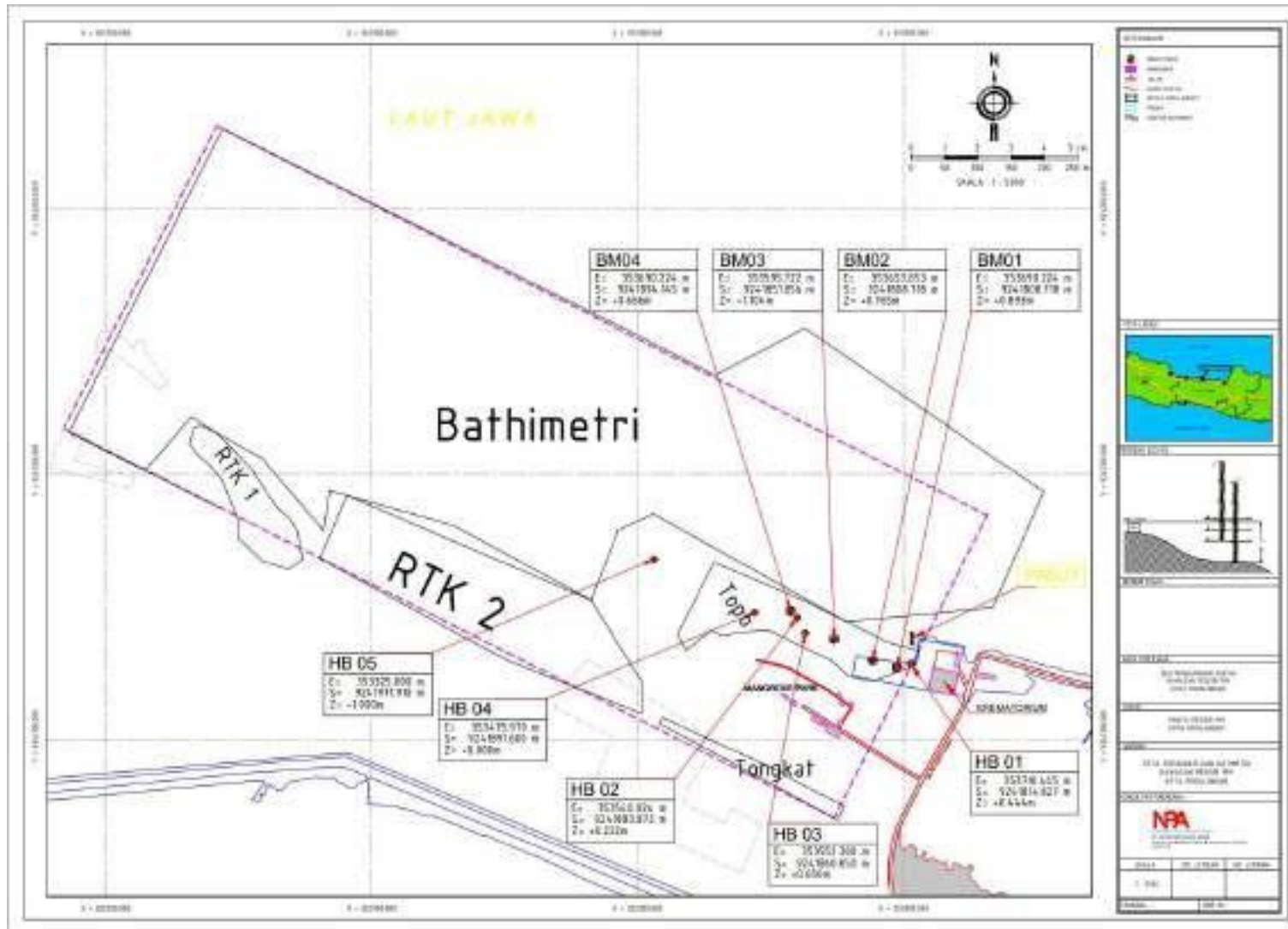
No	Echosounder	Garmin 585	Northing	Depth	Desc	Time	Date
1	353496.1528	9241735.177	-1.30	Existing	10:35:45	06 August 2022	
2	353402.1712	9241792.339	-1.24	Existing	10:40:23	06 August 2022	
3	353312.916	9241836.876	-0.92	Existing	10:54:12	06 August 2022	
4	353205.2318	9241874.76	-0.66	Existing	11:10:21	06 August 2022	
5	353153.4925	9241901.162	-0.63	Existing	11:13:45	06 August 2022	
6	353021.2485	9241938.582	-0.77	Existing	12:35:17	06 August 2022	
7	352902.4741	9242014.166	-0.48	Existing	12:39:30	06 August 2022	
8	352928.7168	9242130.273	-1.03	Existing	12:54:05	06 August 2022	
9	352982.3357	9242242.96	-1.89	Existing	13:12:15	06 August 2022	
10	352882.2703	9242301.874	-2.07	Existing	13:15:00	06 August 2022	
11	352777.3507	9242353.702	-1.51	Existing	13:40:15	06 August 2022	

No.	Easting	Northing	Depth	Desc	Time	Date
12	352675.6329	9242418.265	-2.29	Existing	13:45:12	06 August 2022
13	352659.0624	9242448.121	-2.32	Existing	14:40:45	06 August 2022
14	352649.9699	9242493.041	-2.36	Existing	14:57:10	06 August 2022
15	352681.5097	9242603.733	-2.81	Existing	15:16:15	06 August 2022
16	352714.6076	9242601.86	-2.84	Existing	15:45:12	06 August 2022
17	352723.9721	9242539.18	-2.65	Existing	15:54:15	06 August 2022
18	352776.3709	9242467.129	-2.50	Existing	15:42:05	06 August 2022
19	352803.8126	9242431.564	-2.38	Existing	15:56:21	06 August 2022
20	352877.9897	9242490.071	-2.87	Existing	16:12:10	06 August 2022
21	352884.832	9242466.89	-2.78	Existing	16:17:15	06 August 2022
22	352888.1654	9242426.033	-2.64	Existing	16:26:00	06 August 2022
23	352922.1018	9242429.787	-2.73	Existing	16:31:05	06 August 2022
24	352961.0138	9242477.112	-2.91	Existing	16:43:38	06 August 2022
25	352932.6444	9242399.661	-2.71	Existing	16:59:15	06 August 2022
26	352927.4981	9242367.27	-2.65	Existing	17:14:00	06 August 2022
27	352944.522	9242352.718	-2.59	Existing	8:24:15	06 August 2022
28	352957.4802	9242297.973	-2.28	Existing	8:44:30	06 August 2022
29	352979.7148	9242369.83	-2.64	Existing	9:14:45	07 August 2022
30	353017.4068	9242376.159	-2.70	Existing	9:25:00	07 August 2022





Figure 3.28 Location of the Pekalongan Coastal protection plan study area



5.1.1.47 Figure 3.29 Distribution of study area measurement methods based on field conditions



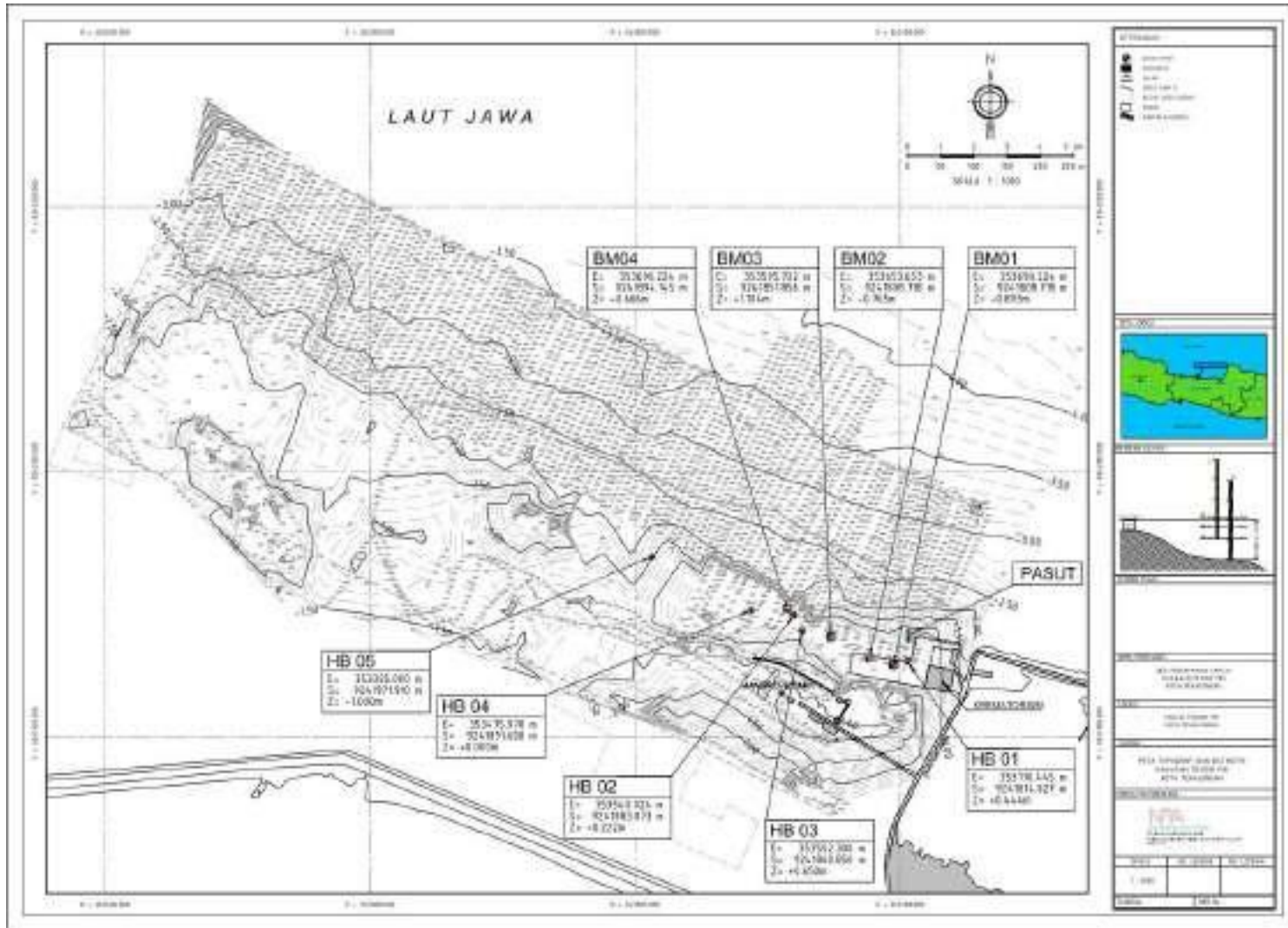
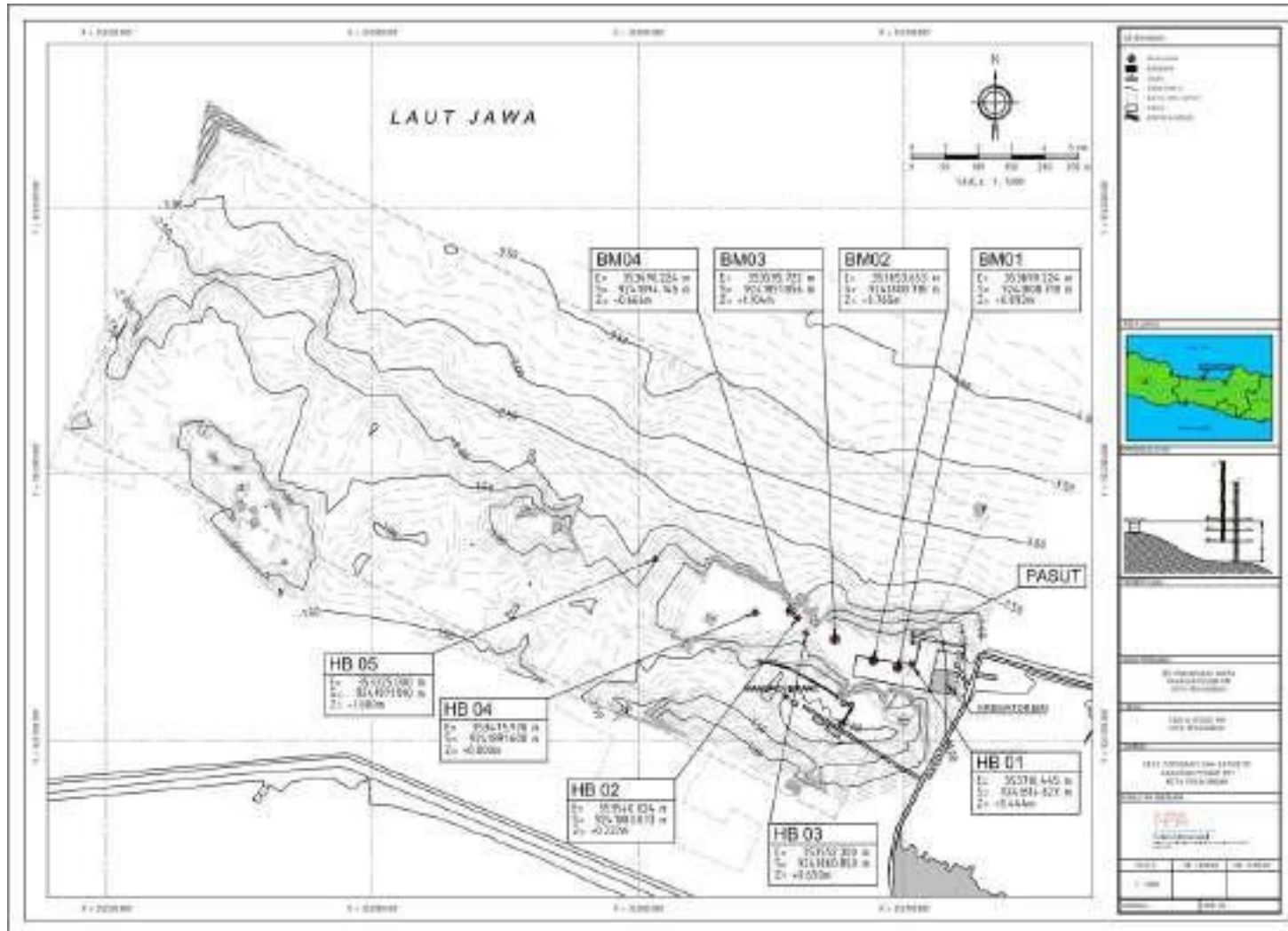


Figure 3.30 Snippet of the Combined Results of Situation and Bathymetric Measurement

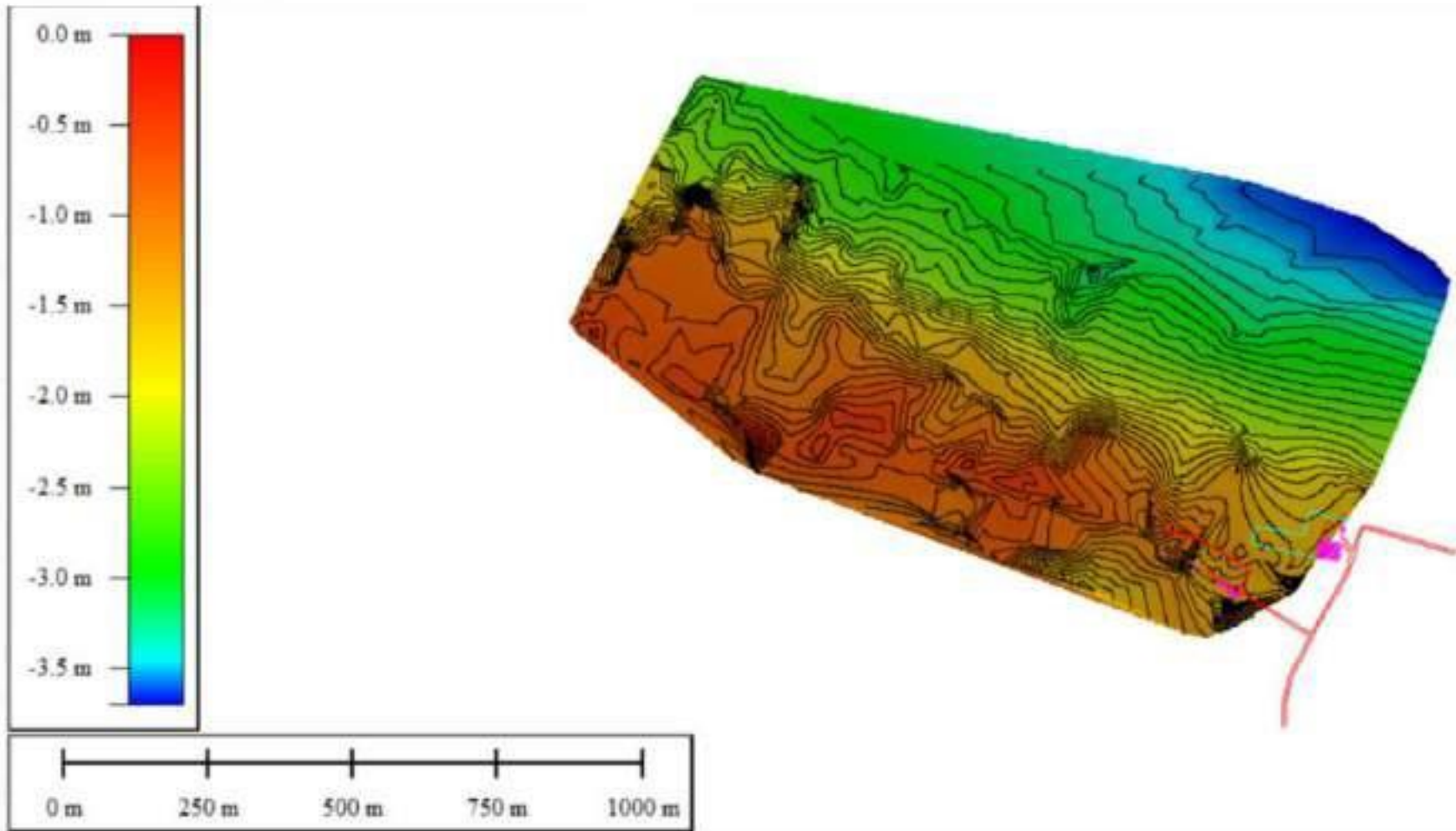


5.1.1.48 Figure 3.31 Snippet of the Results of Situation and Bathymetric Measurement Contour



Figure 3.32 Snippet of the Results of Situation and Bathymetric Measurement Gridding (1)





5.1.1.49 Figure 3.33 Snippet of the Results of Situation and Bathymetric Measurement Gridding (2)

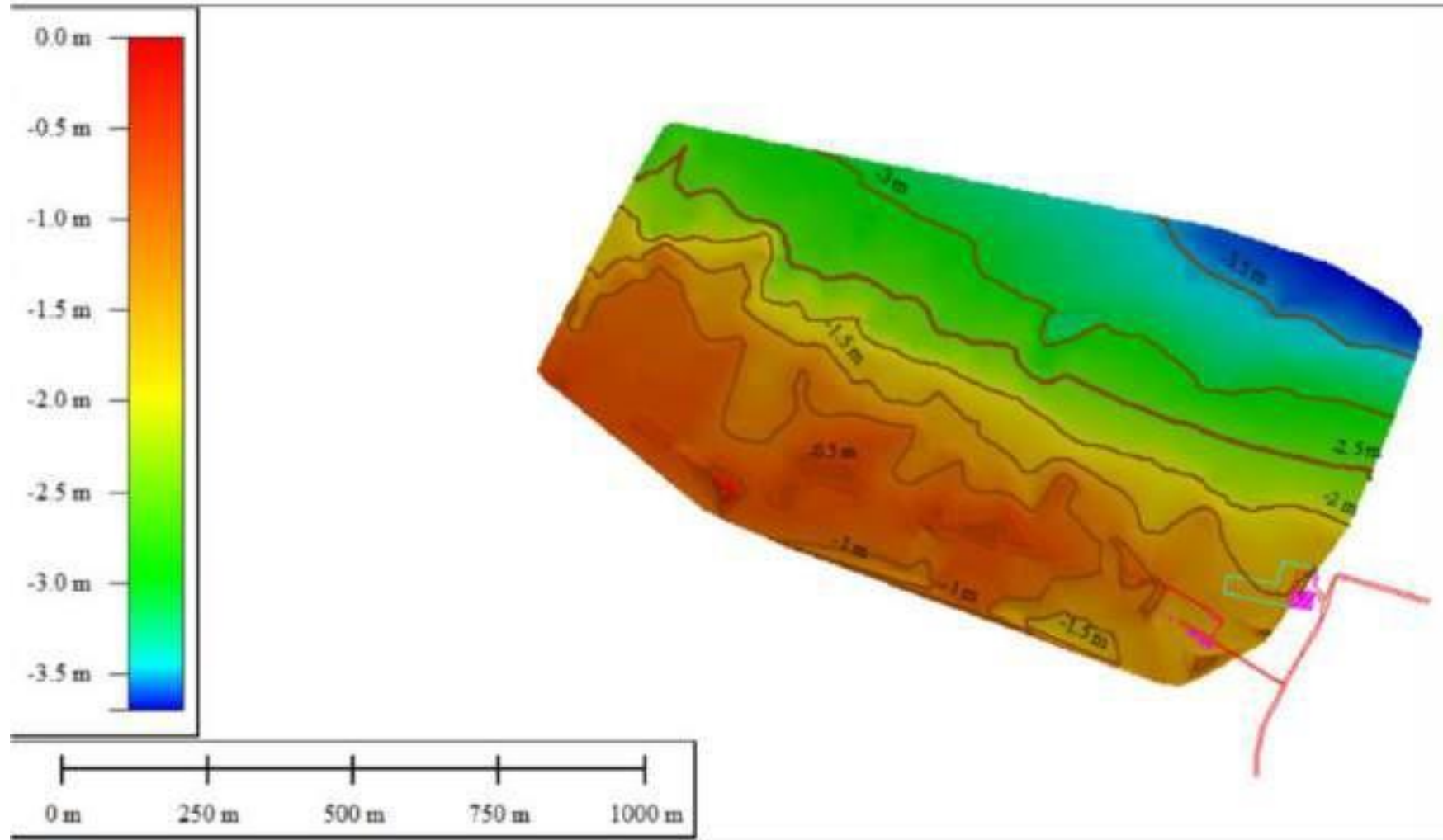
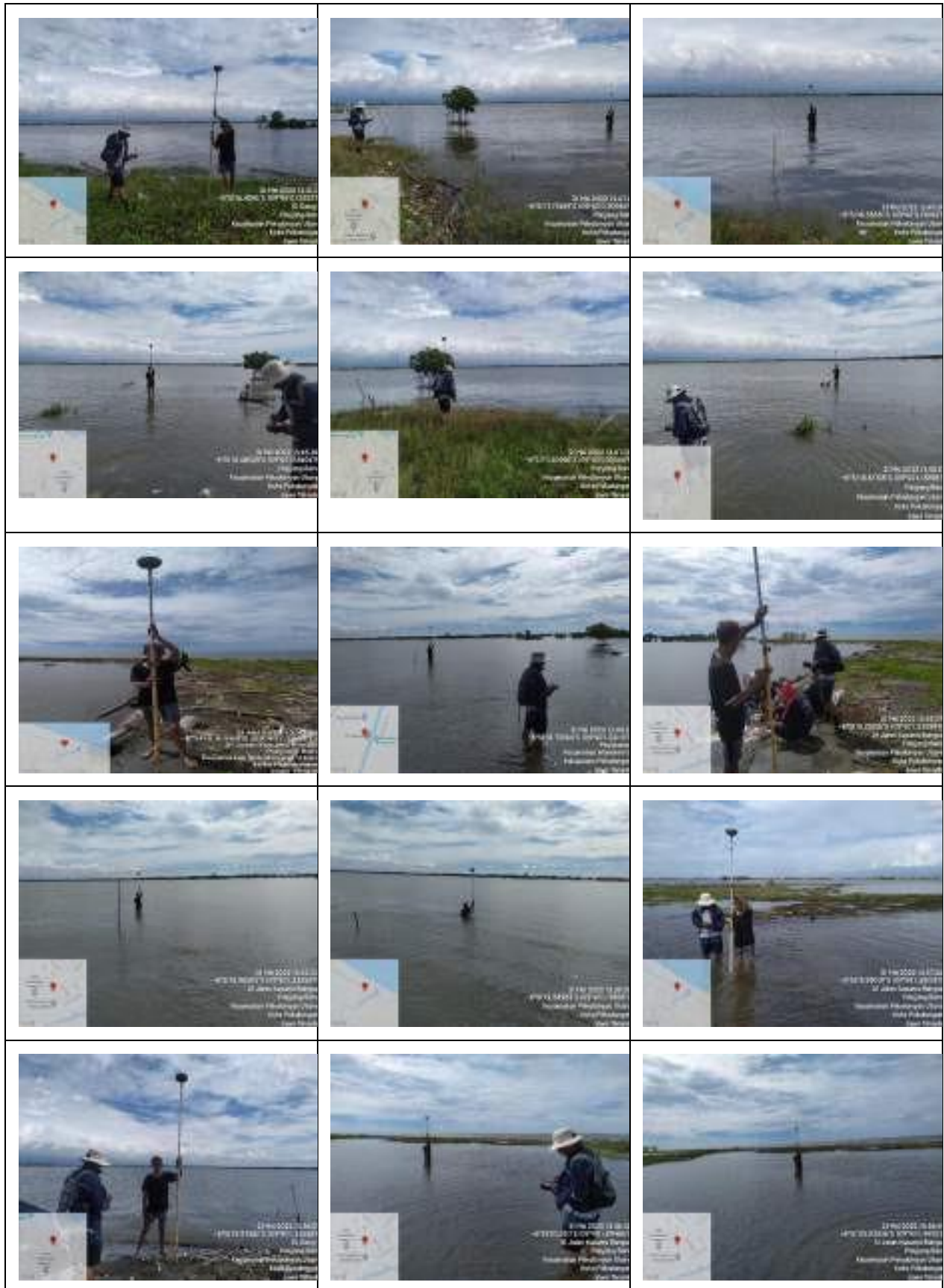
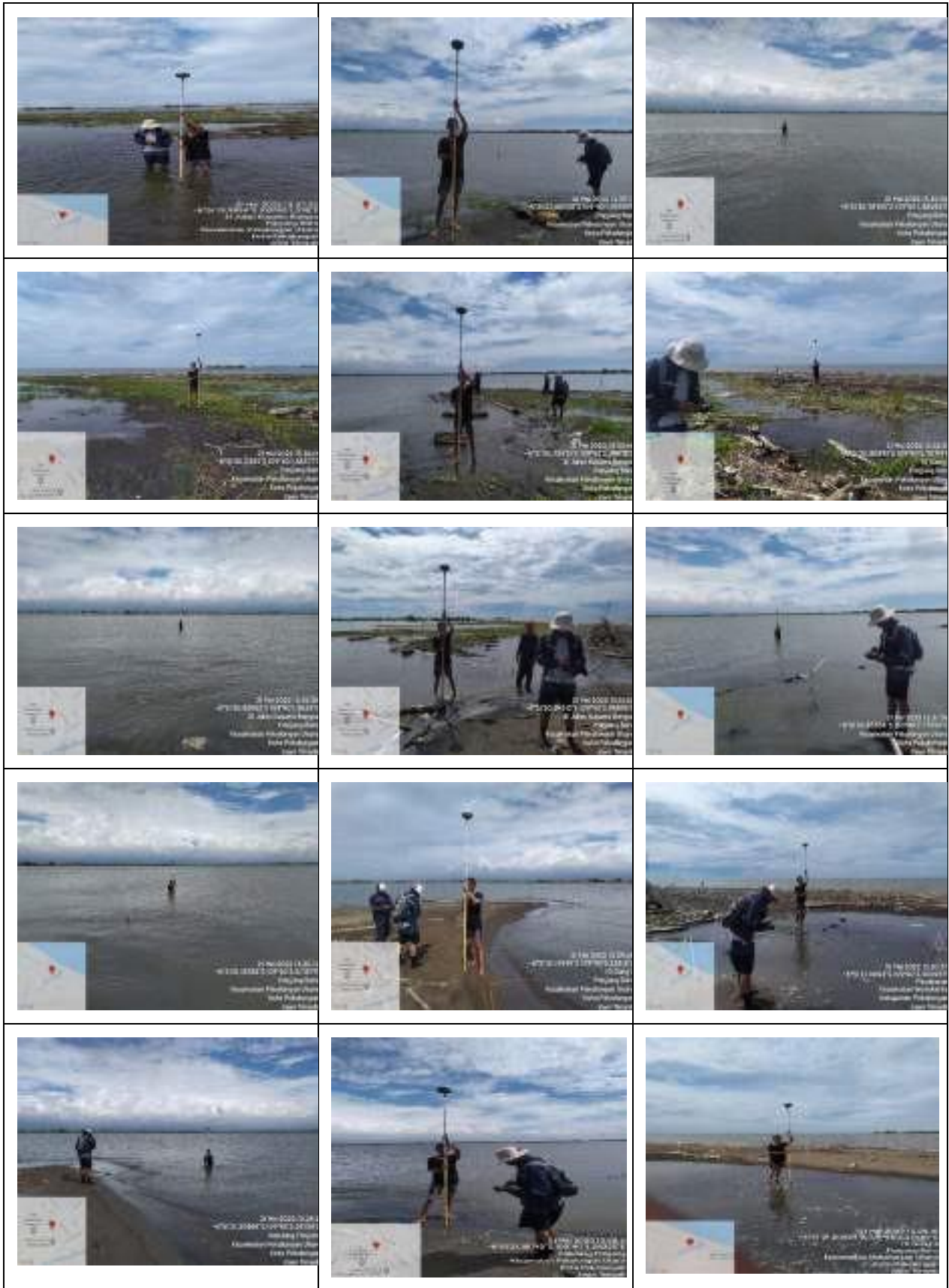


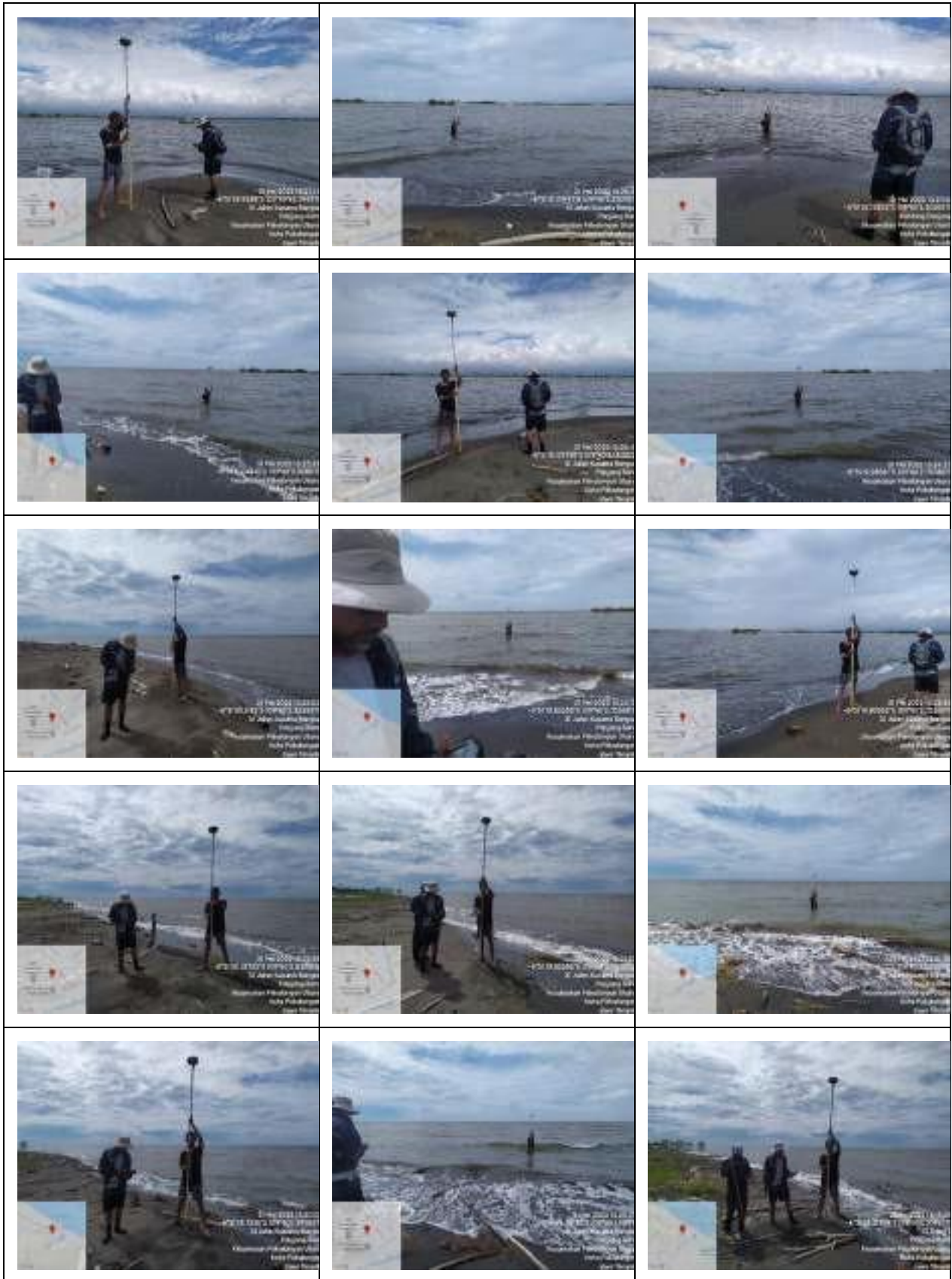
Figure 3.34 Snippet of the Results of Situation and Bathymetric Measurement Gridding (3)

### 3.10 Field Documentation

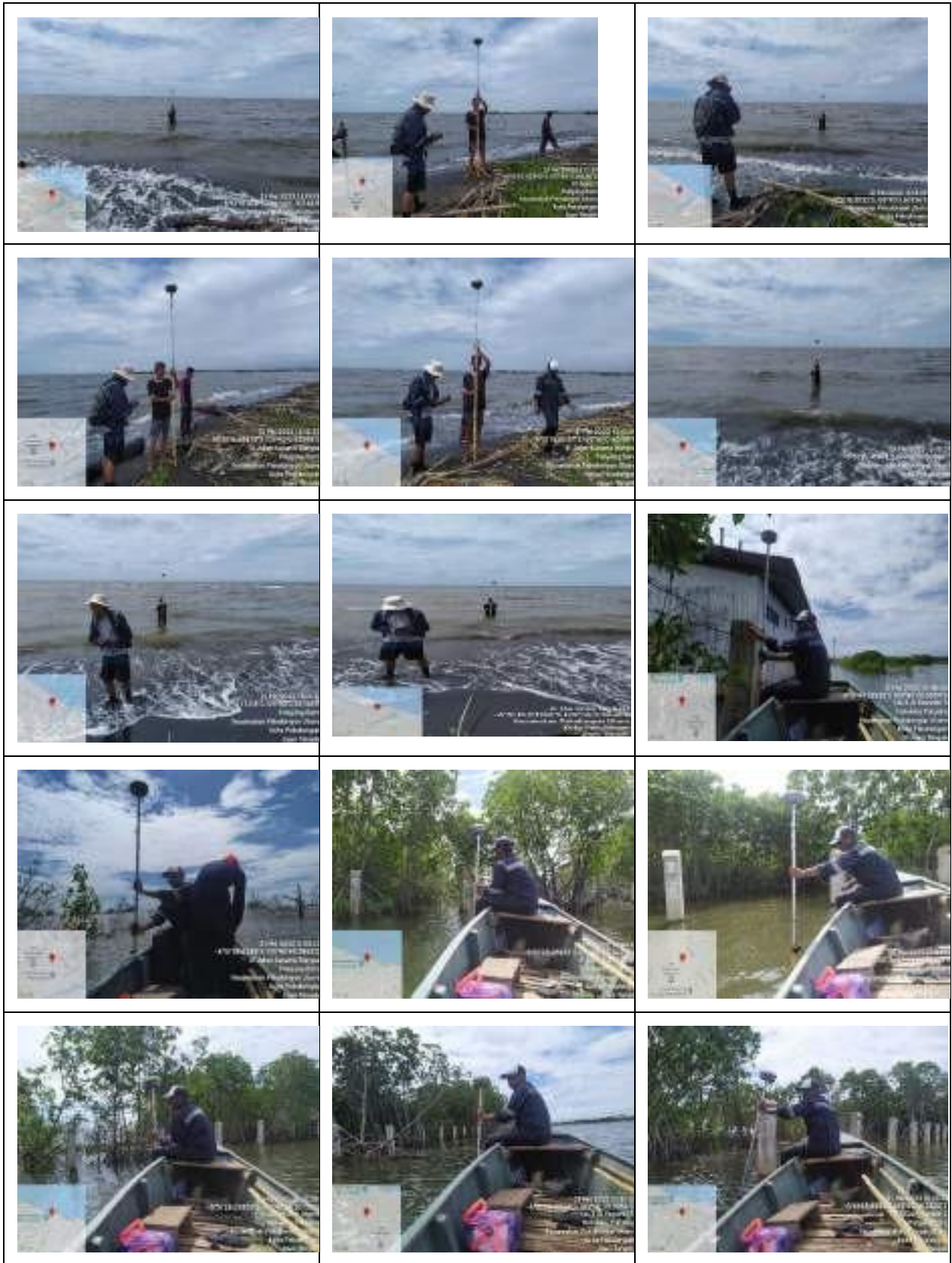








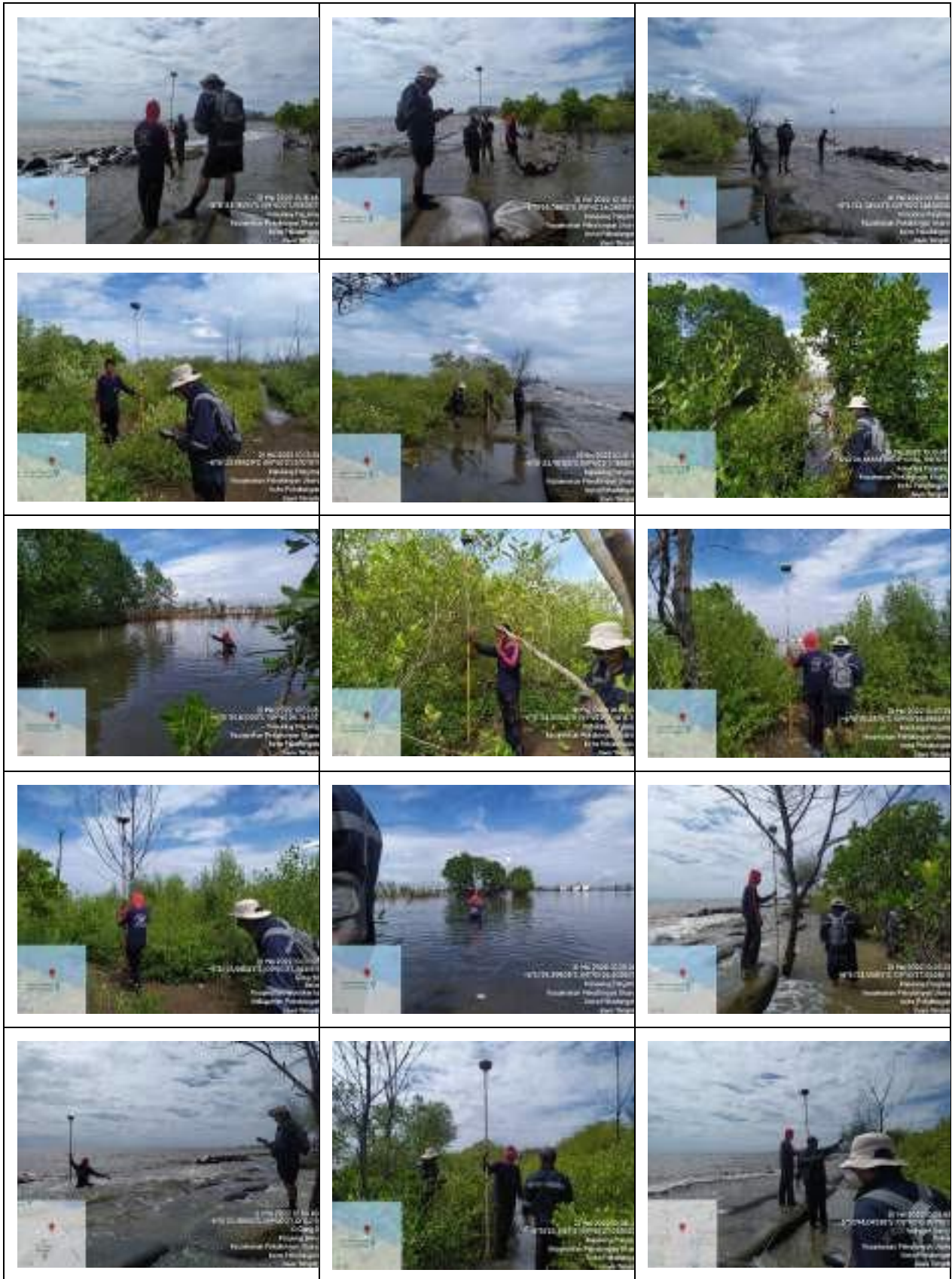


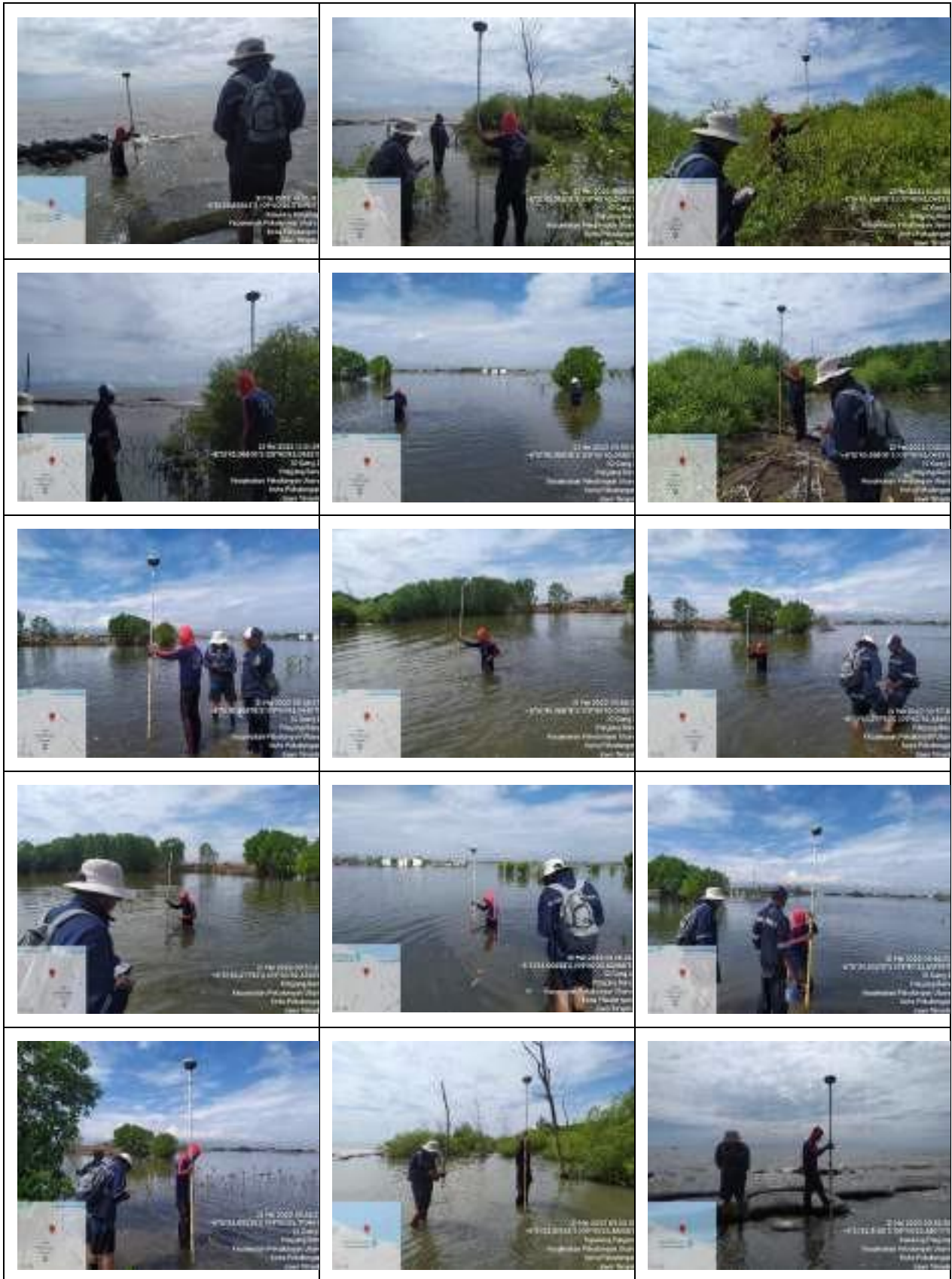




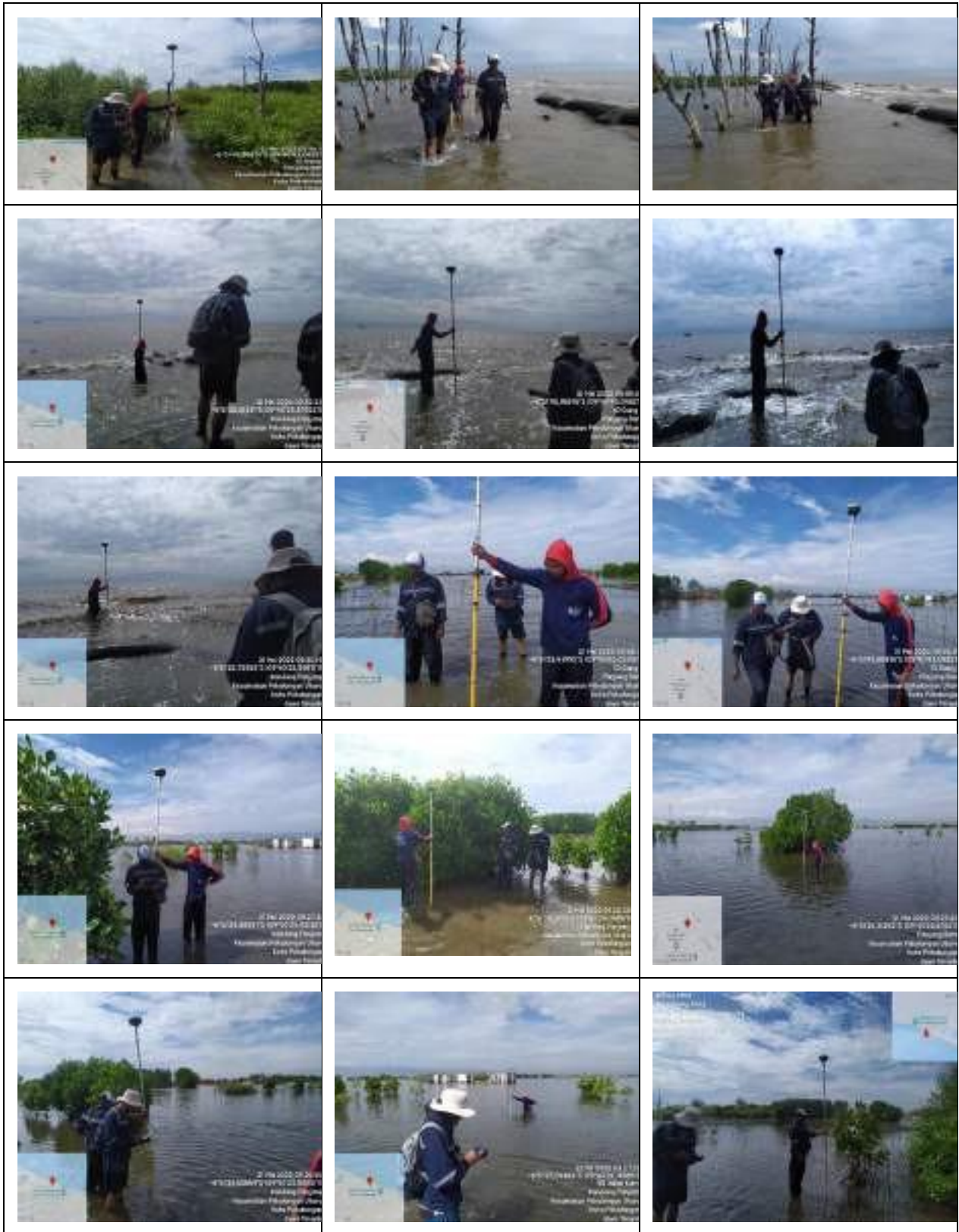


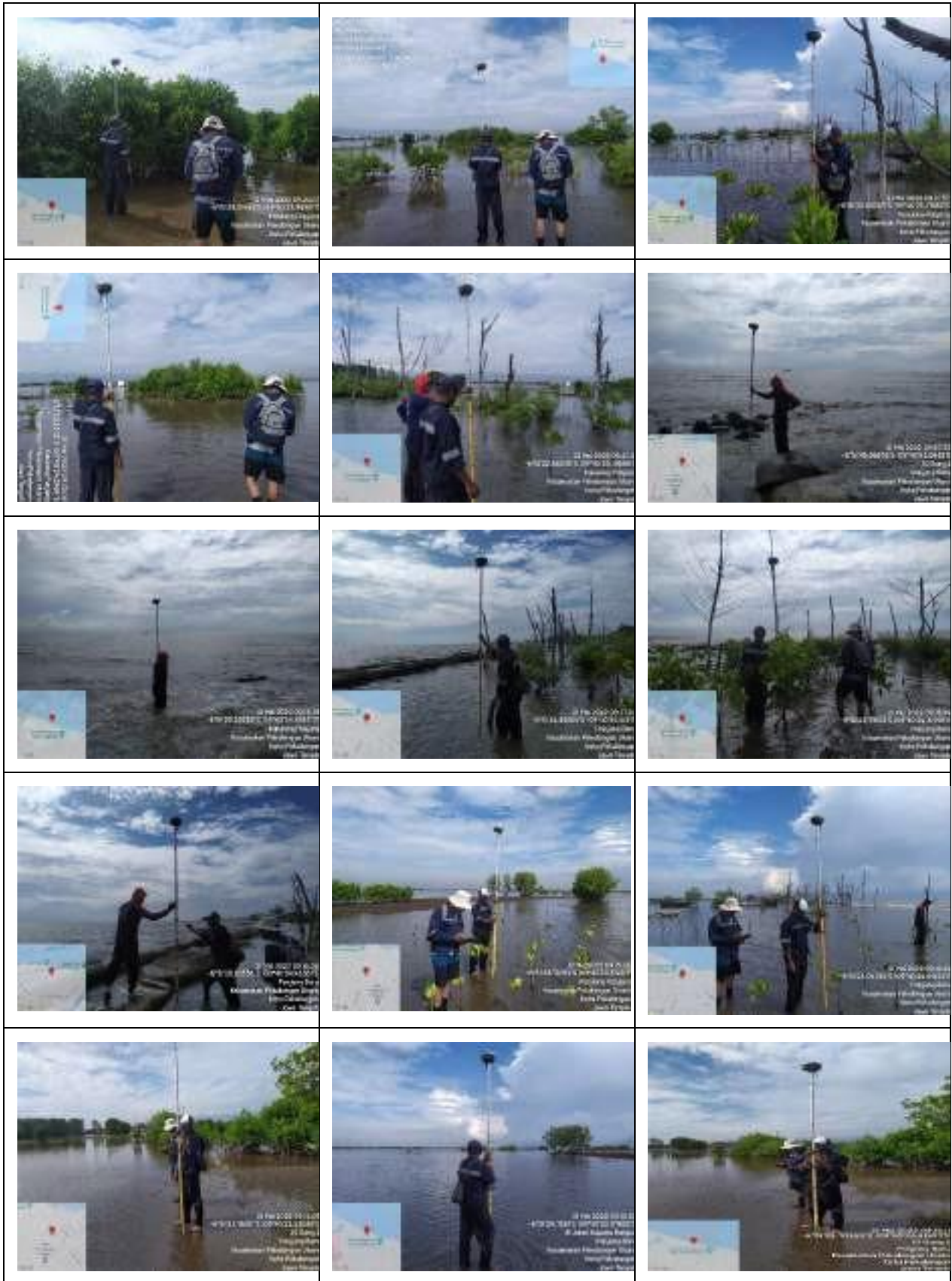




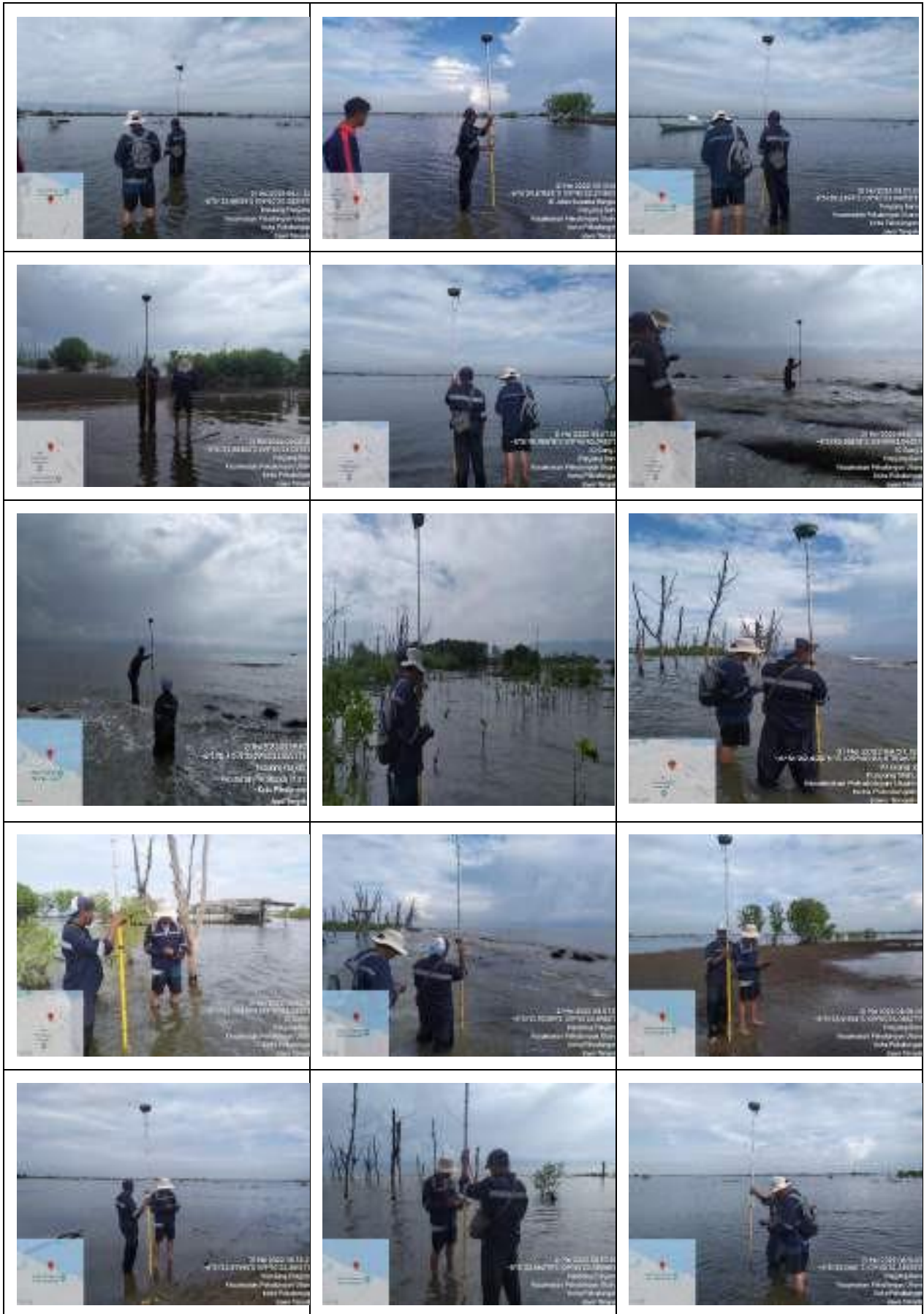


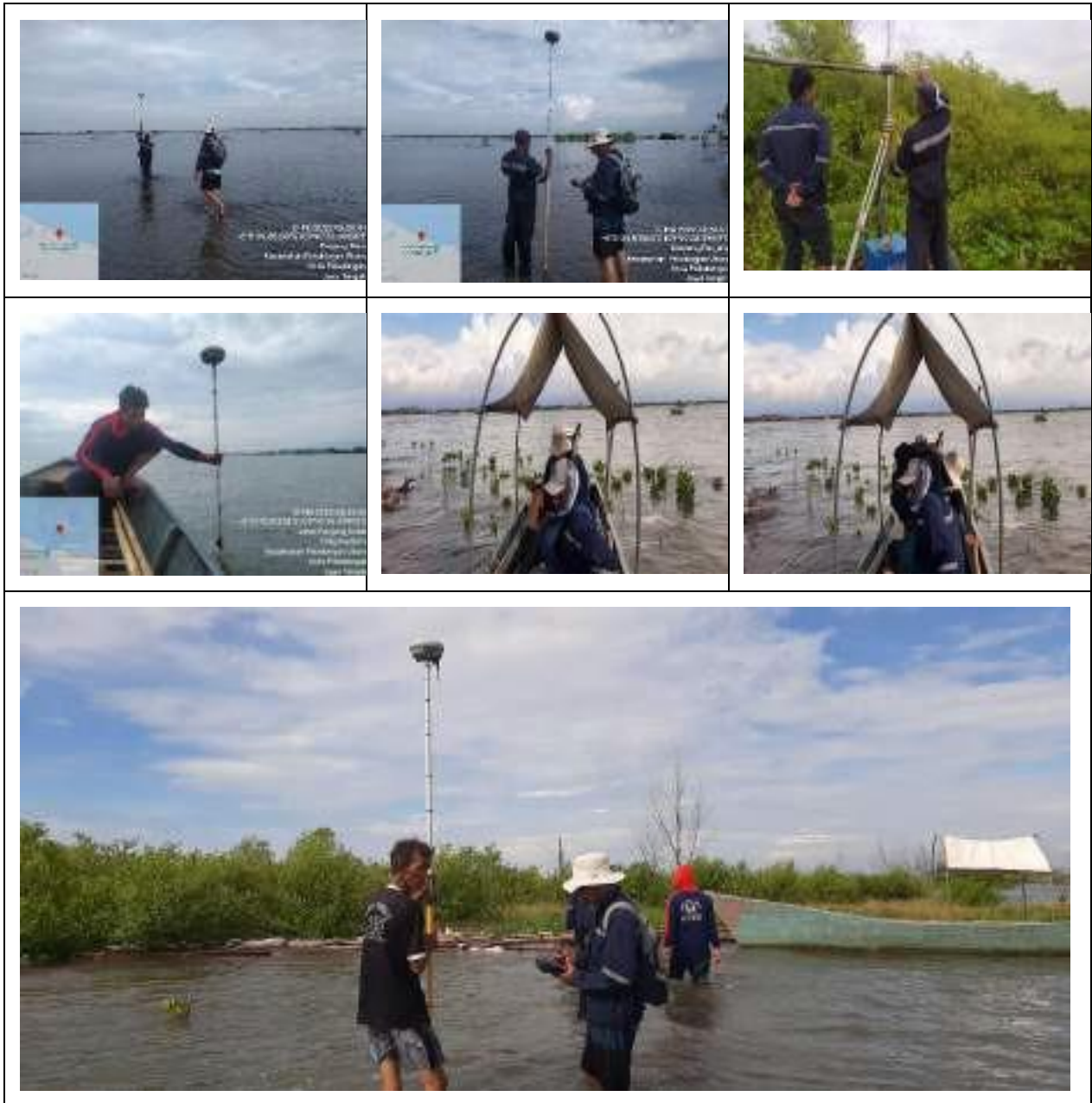
























































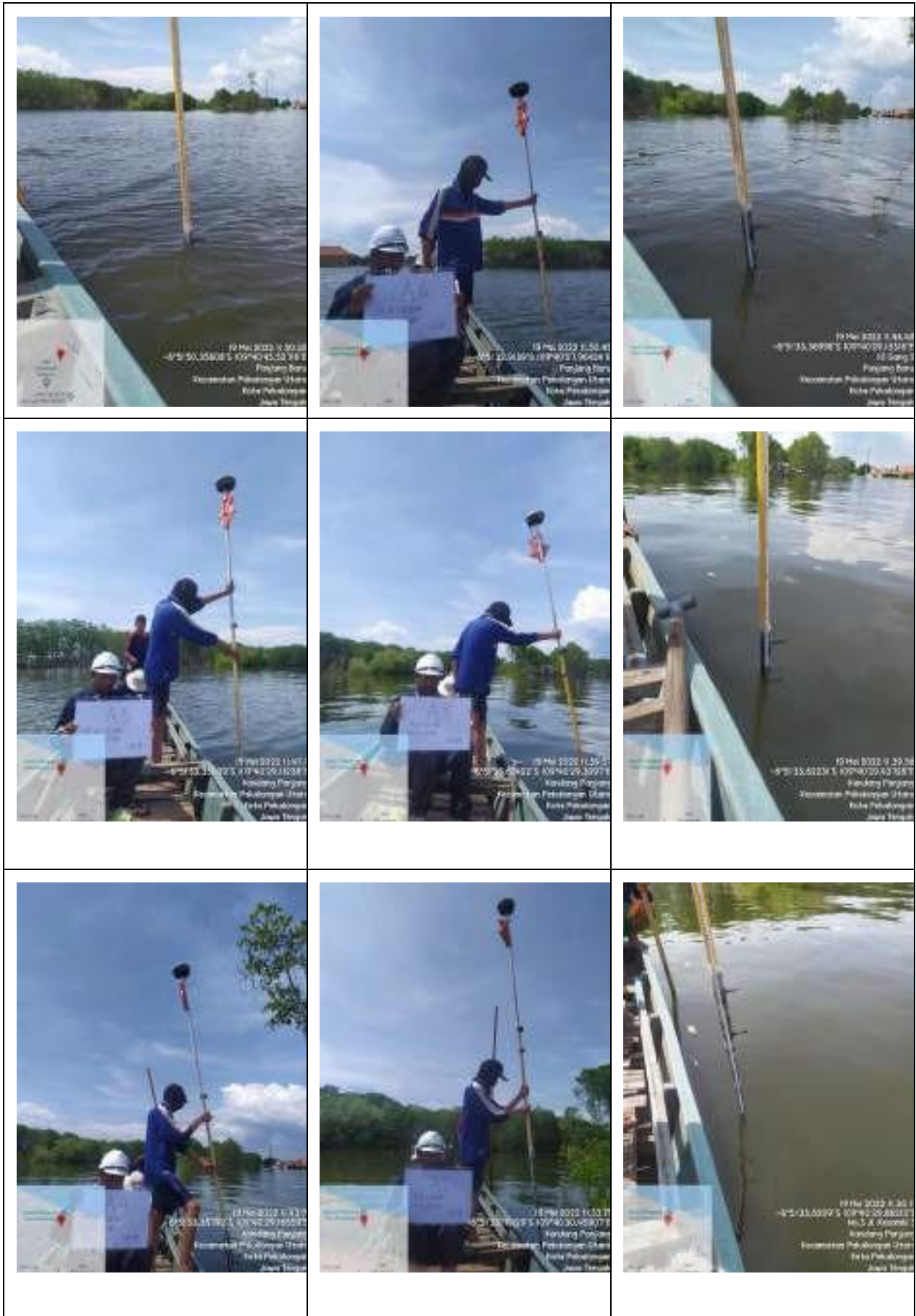


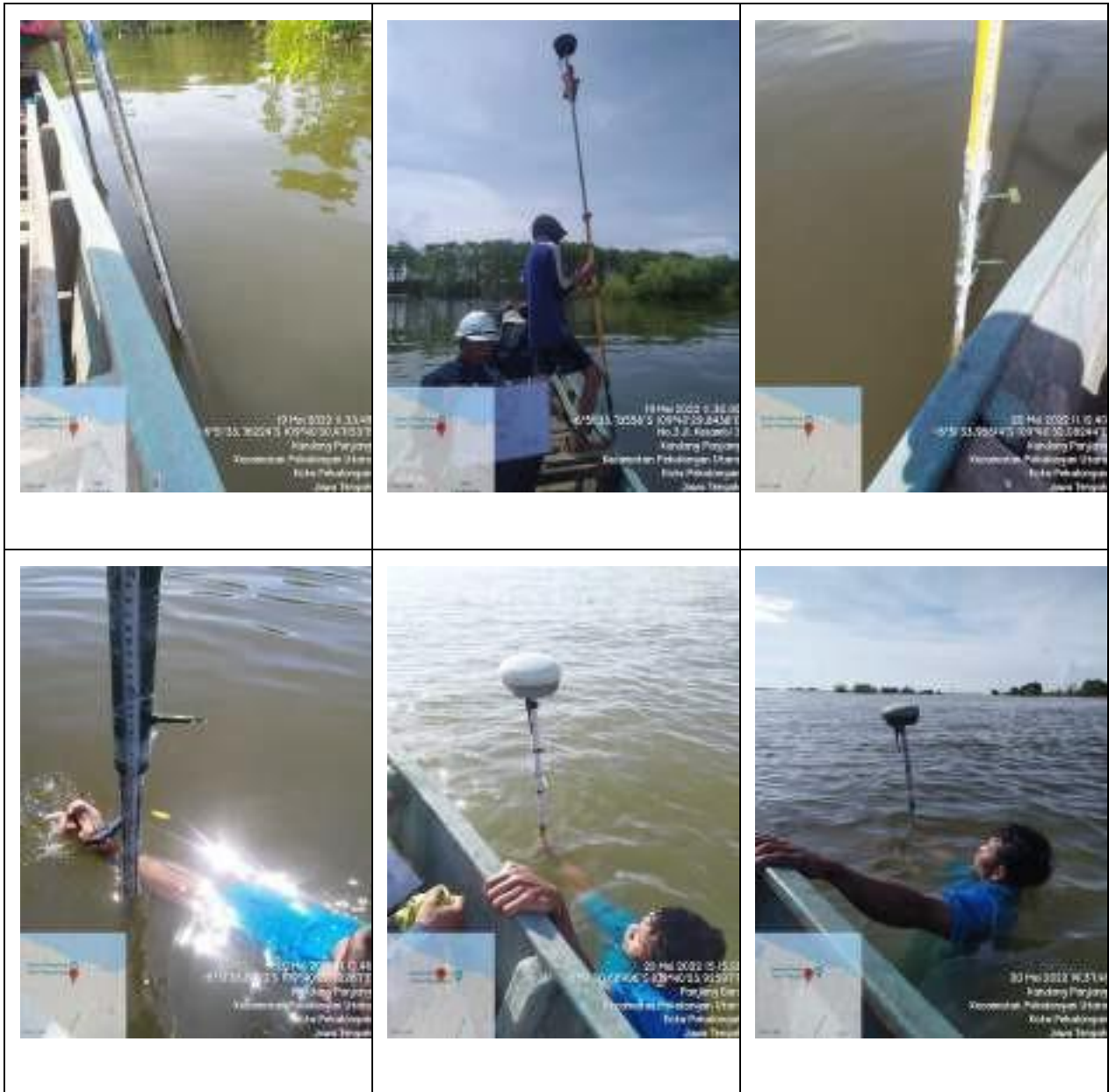






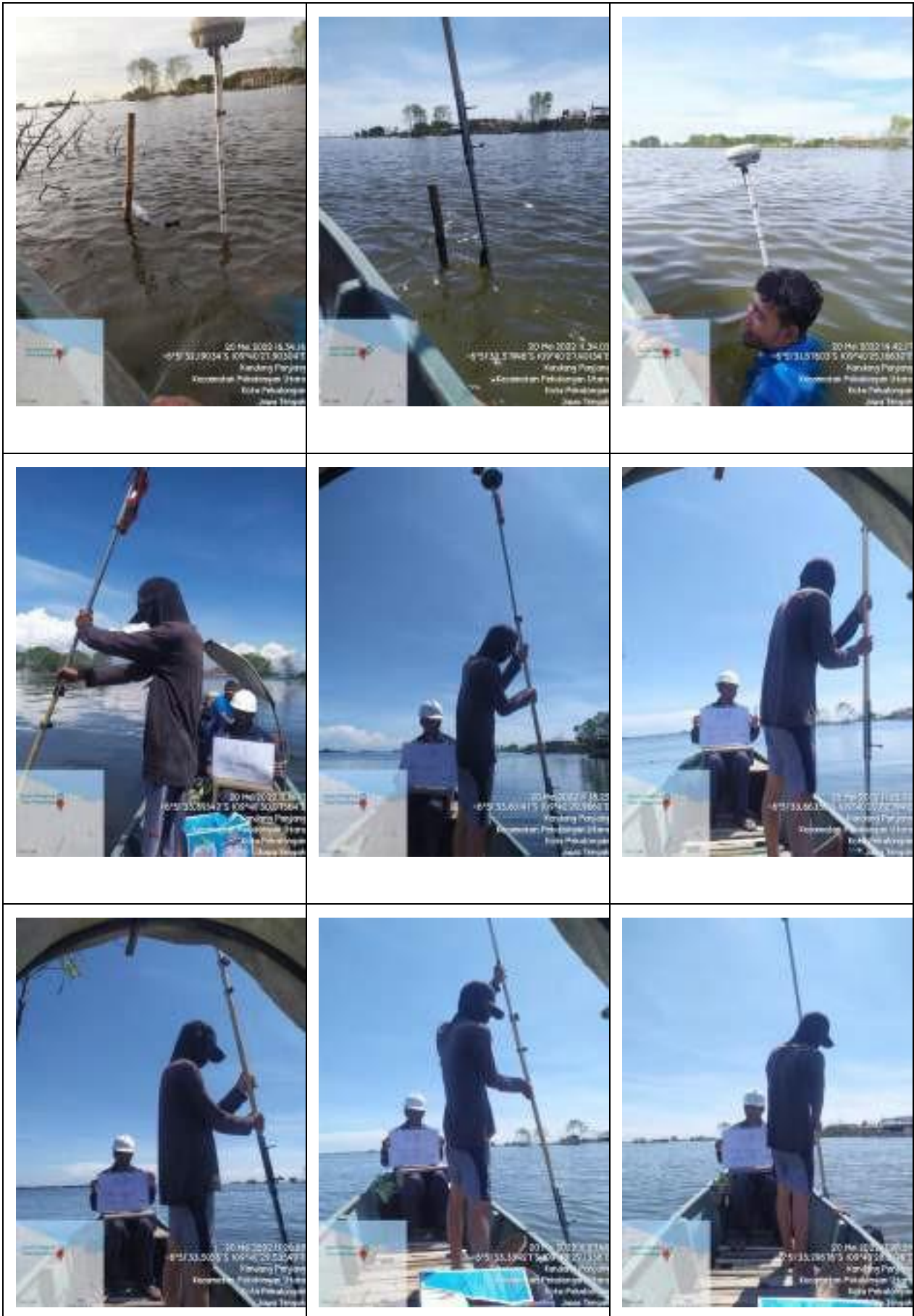




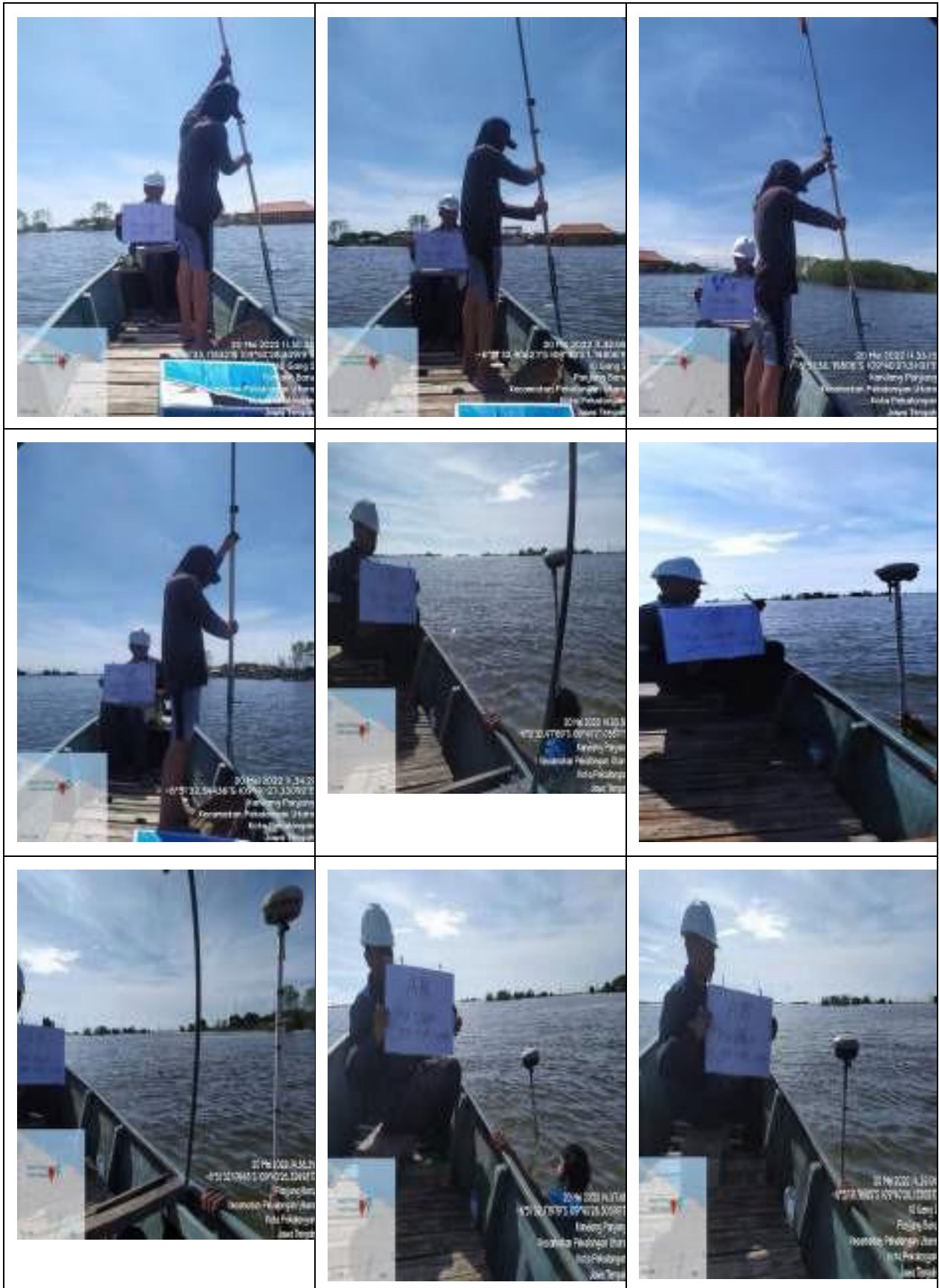


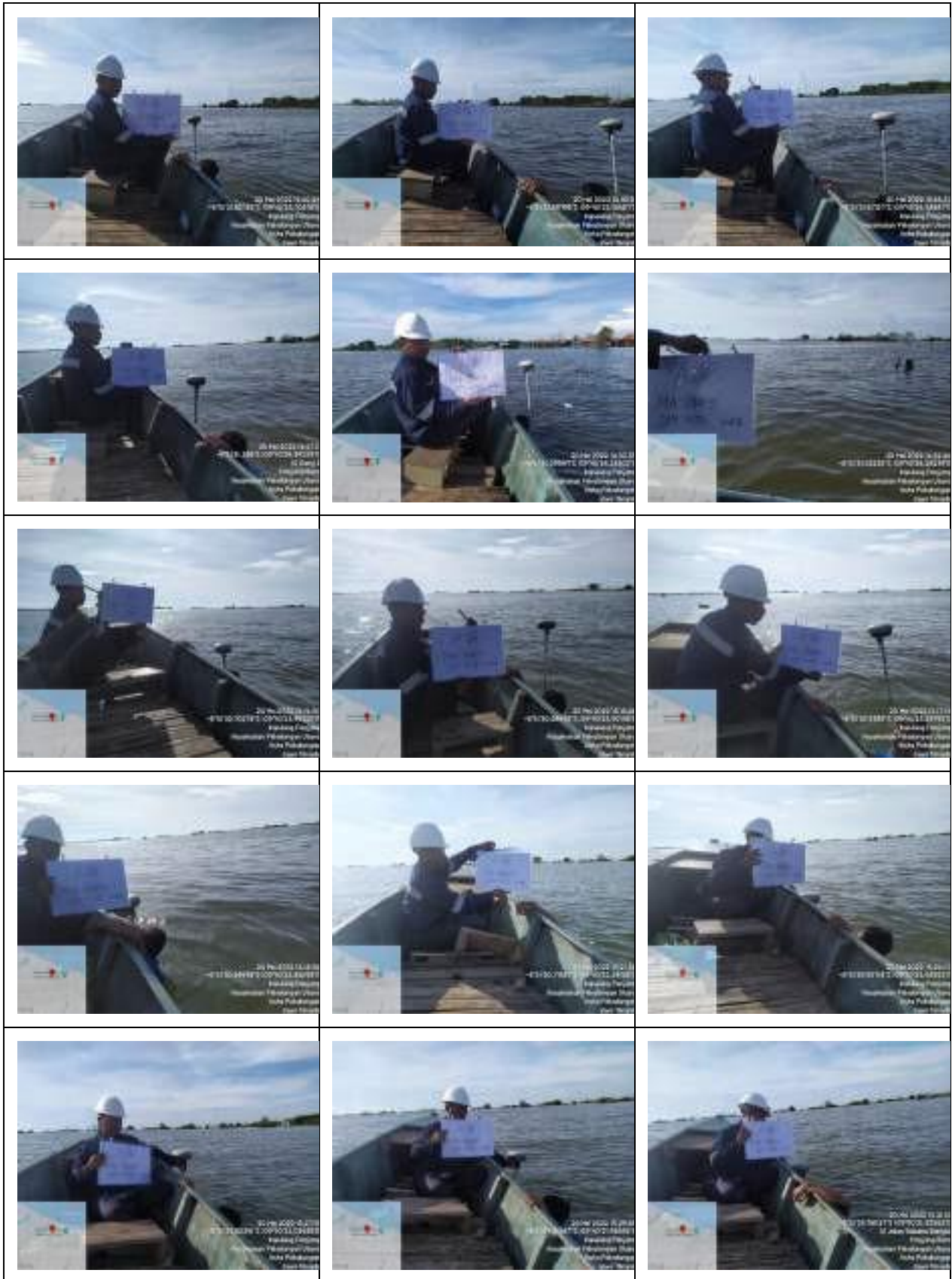




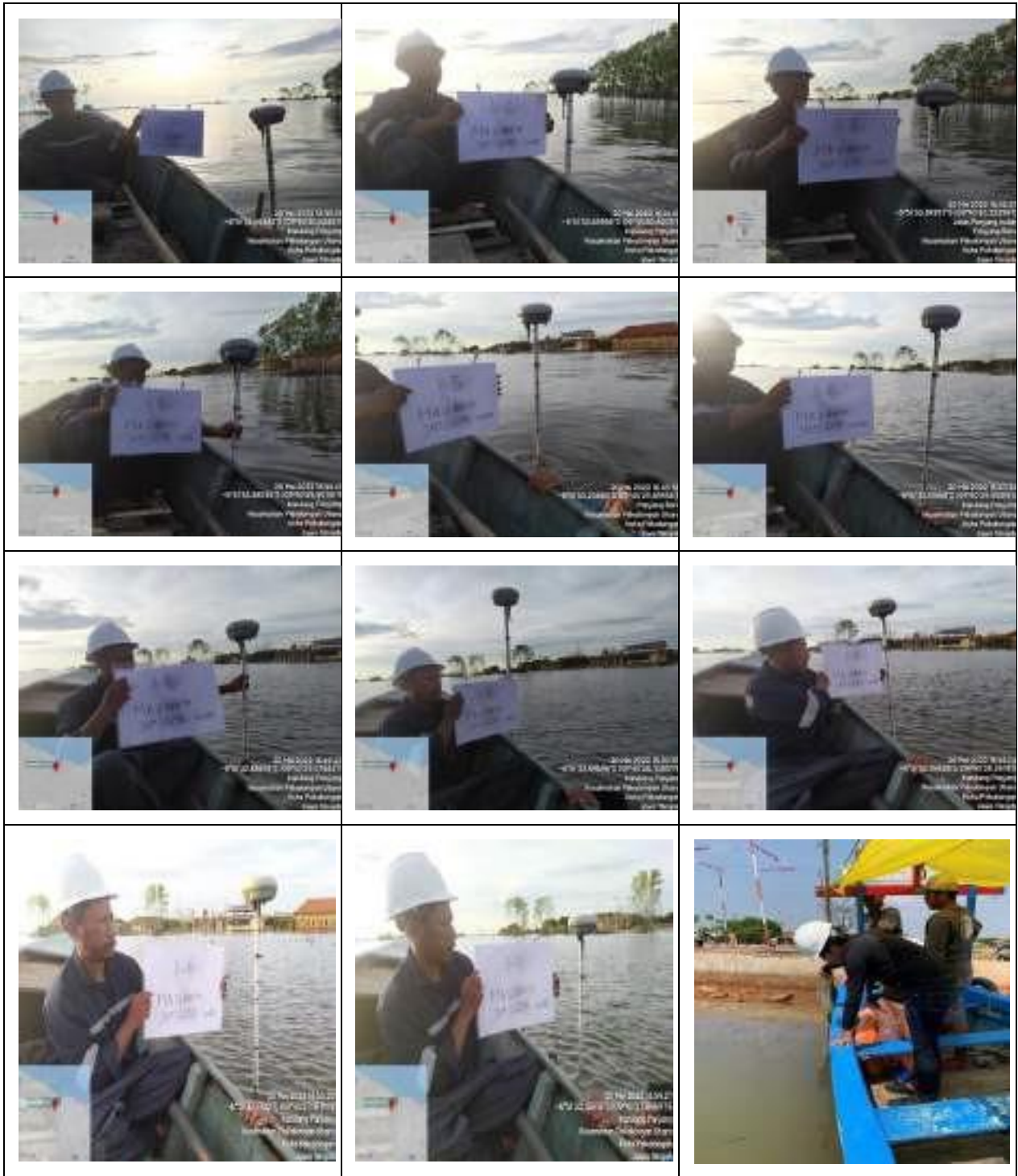


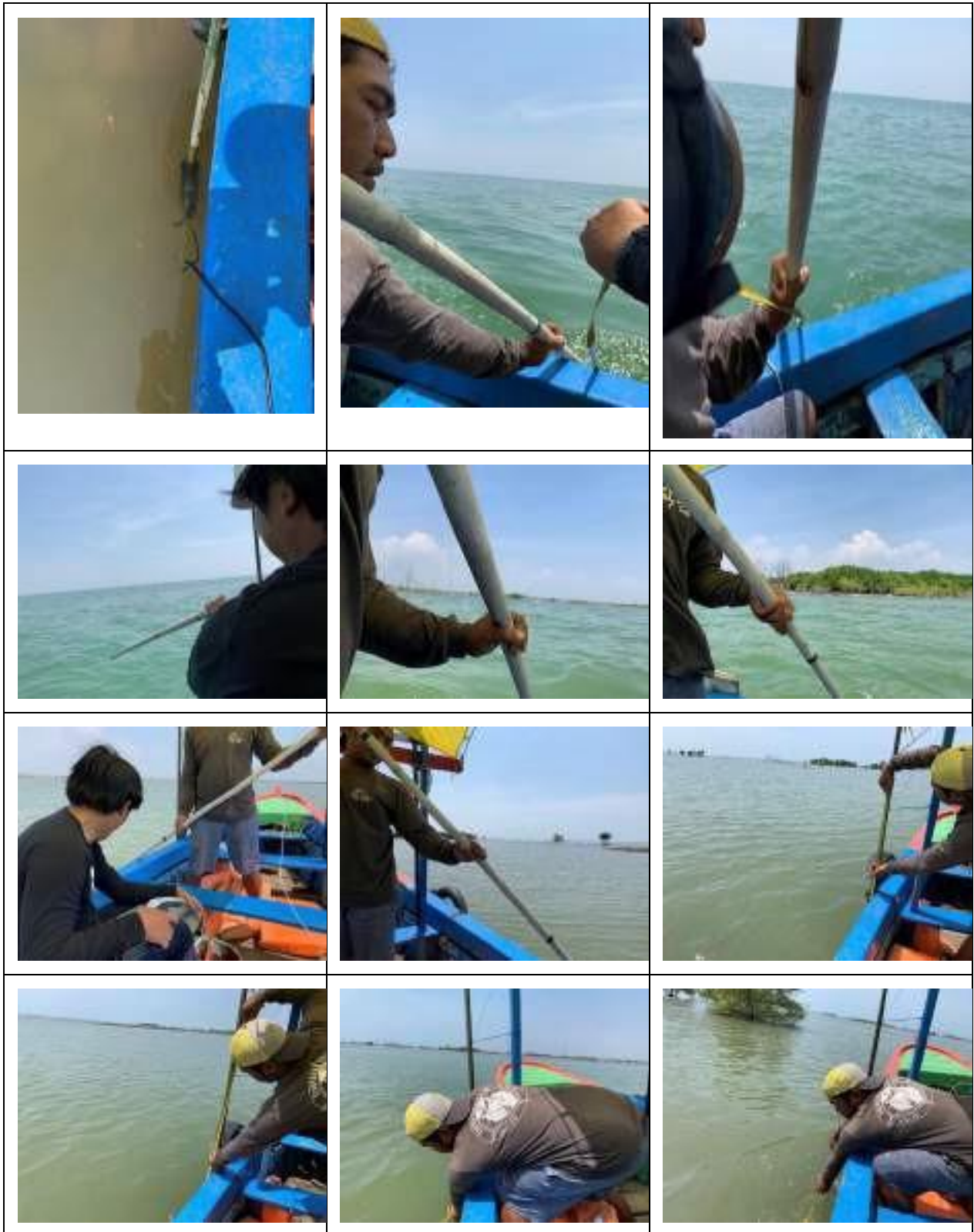




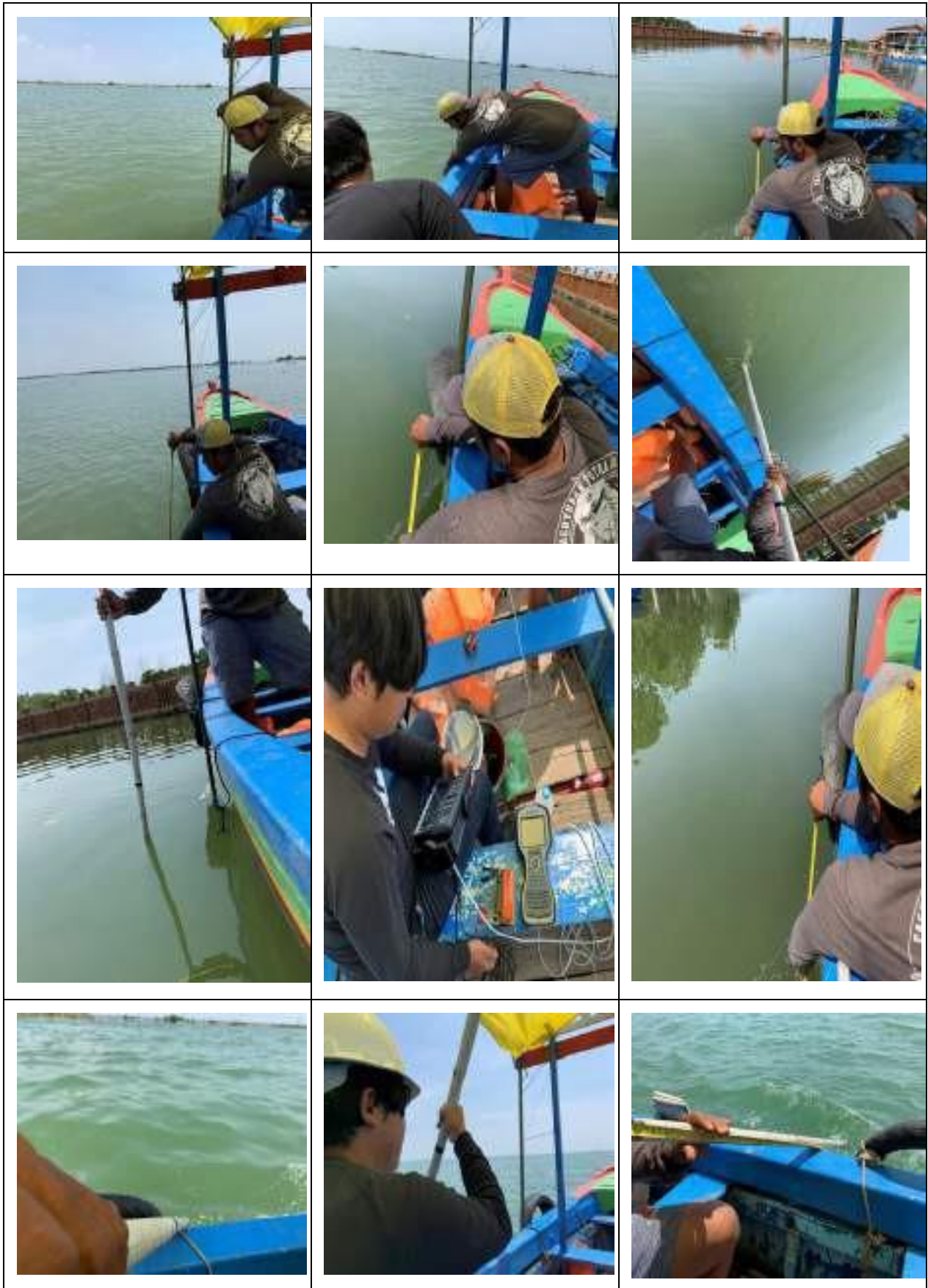


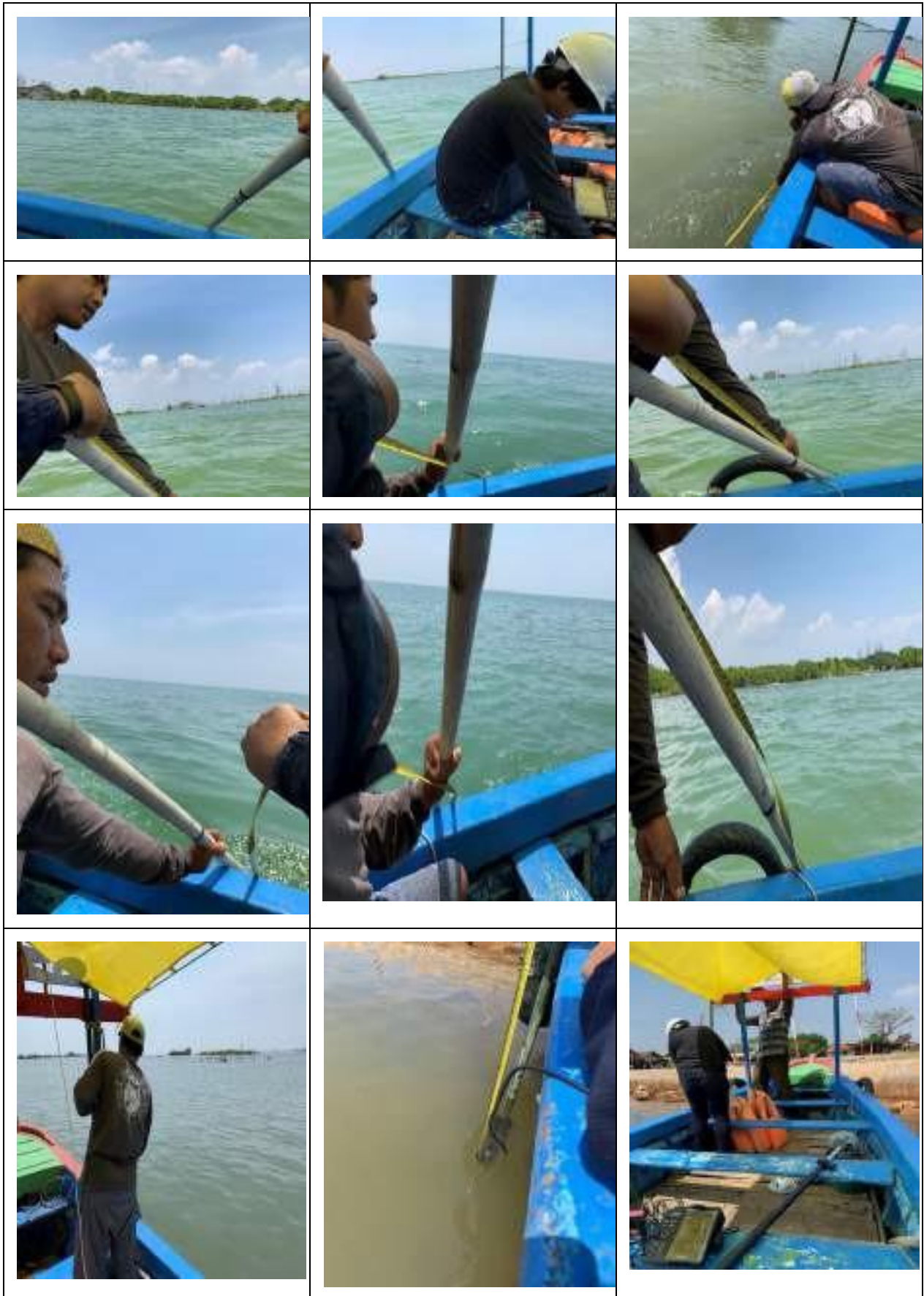
















## **CHAPTER 4 HYDRO-OCEANOGRAPHIC SURVEY**

### **Current speed survey and water as well as sediment sampling.**

#### **4.1 Introduction**

The current measurement survey was carried out to identify the current speed condition during the survey and identify the type of surface base material. This hydro-oceanographic survey activity to support the Detailed Engineering Design work ranks first. However, the implementation in the field has been adjusted to the stages of work that must be carried out at PIM Pekalongan.

#### **4.2 Implementation Method**

##### **4.2.1 Current Observation**

Current was observed with a current meter to determine the characteristics of current in an area or region. The following must be met in observing the ocean current:

- 1) The current observation includes the observation of current speed and direction in areas such as port gates, canals, areas that are often used for anchoring as well as sea and coastal areas the current of which is estimated to affect surface navigation.
- 2) The observation was carried out by using a current meter as needed, for at least 24 hours.
- 3) The observation was carried out during the Spring Tide and Neap Tide.

##### **4.2.2 Sediment and Seawater Sampling**

This observation was intended to identify the type of seabed material or sediment in the survey area. The following must be met in seabed sampling:

- 1) The selection of sampling tool must be able to fulfill the purpose of sampling, for example carried out by grabbing, namely taking samples by using a grab sampler.
- 2) Each station was marked with the GRAB notation and was numbered 1 to n, with n is the number of seabed sampling stations.
- 3) The position of sampling stations was measured by GPS.
- 4) A visual description of sample data was carried out in the field and was photographed for each station to obtain the results of the type of seabed sediment in the survey location.
- 5) Seabed sampling was documented so that the notations given are in accordance with the photos resulting from the visualization.
- 6) The positional approach to the spread of sampling stations was carried out on the workmap.

### 4.3 Results of Survey and Discussion

#### 4.3.1 Current Measurement

The current measurement was carried out simultaneously with the bathymetric measurement at 2 points at depths of 0.2d, 0.6d and 0.8d for 25 hours. The measurement was carried out on 16 May 2022 in the Area.

5.1.1.50 Table 4.1 Coordinates of Current Station Position

Station	Latitude	Longitude	Depth
ST1	6°50'48.00"S	109°40'33.12"E	-6 m
ST2	6°50'47.55"S	109°40'22.72"E	-6 m



Figure 4.1 Current Observation Location

(Source: *Google Earth* with adjustments, 2022)

The tool used in this current measurement is a current meter with the Valeport specifications, as shown in Figure 4.2.



### 5.1.1.51 Figure 4.2 Current Tool Used



**Figure 4.3 Current Observation Documentation**

Data was processed using the Microsoft Excel while graph plotting used Currentrose.

c) **Current Measurement at Station 1**

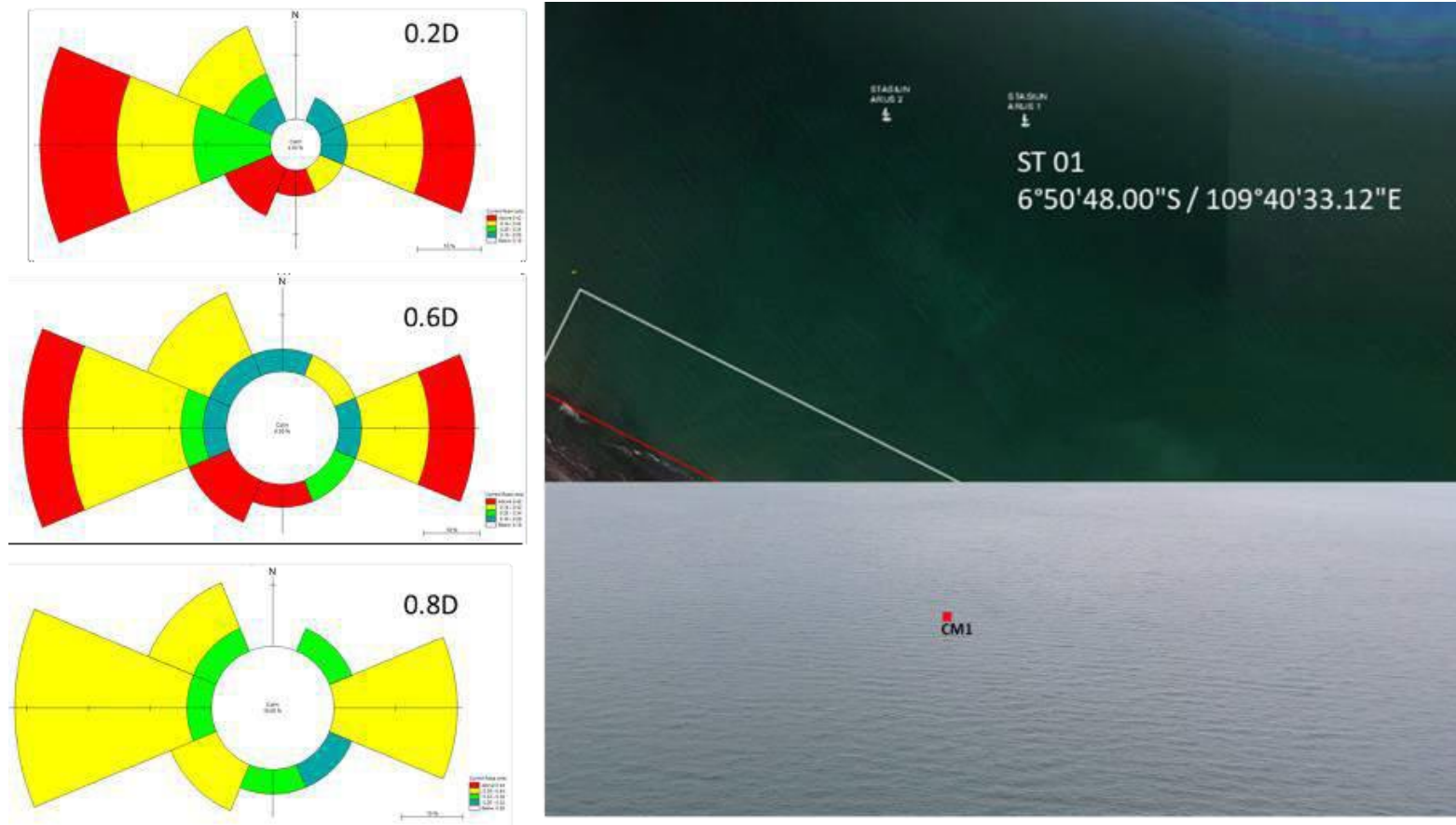
The results of current measurement at station 1 are shown in Table 4.2.

**5.1.1.52 Table 4.2 Results of Current Measurement at Station 1**

No	Date	Time	Observation Data							Speed Conversion					
			Depth					Tide (m)	0.2D	Dir	0.6D	Dir	0.8D	Dir	
			0.2	Directi on	0.6	Directi on	0.8		Directi on	(m/s)	(deg)	(m/s)	(deg)	(m/s)	(deg)
1	5/15/2022	16:00	13	270	15	270	16	270	1.17	0.3547 1	270	0.4080 5	270	0.43472	270
2	5/15/2022	17:00	14	270	14	270	16	270	1.18	0.3813 8	270	0.3813 8	270	0.43472	270
3	5/15/2022	18:00	14	320	14	320	14	320	1.19	0.3813 8	320	0.3813 8	320	0.38138	320
4	5/15/2022	19:00	11	320	13	320	13	320	1.09	0.3013 7	320	0.3547 1	320	0.35471	320
5	5/15/2022	20:00	14	290	14	290	16	290	1.06	0.3813 8	290	0.3813 8	290	0.43472	290
6	5/15/2022	21:00	12	290	15	290	15	290	0.94	0.3280 4	290	0.4080 5	290	0.40805	290
7	5/15/2022	22:00	6	340	9	340	9	340	0.85	0.1680 2	340	0.2480 3	340	0.24803	340
8	5/15/2022	23:00	9	320	9	320	9	320	0.78	0.2480 3	320	0.2480 3	320	0.24803	320
9	5/16/2022	0:00	8	40	13	40	13	40	0.51	0.2213 6	40	0.3547 1	40	0.35471	40
10	5/16/2022	1:00	7	90	8	90	8	90	0.51	0.1946 9	90	0.2213 6	90	0.22136	90
11	5/16/2022	2:00	14	90	14	90	14	90	0.62	0.3813 8	90	0.3813 8	90	0.38138	90
12	5/16/2022	3:00	13	90	15	90	15	90	0.63	0.3547 1	90	0.4080 5	90	0.40805	90
13	5/16/2022	4:00	15	90	16	90	15	90	0.78	0.4080 5	90	0.4347 2	90	0.40805	90
14	5/16/2022	5:00	16	90	15	90	16	90	0.96	0.4347 2	90	0.4080 5	90	0.43472	90
15	5/16/2022	6:00	15	120	10	120	10	120	0.96	0.4080 5	120	0.2747	120	0.2747	120
16	5/16/2022	7:00	16	190	16	190	13	190	0.98	0.4347 2	190	0.4347 2	190	0.35471	190

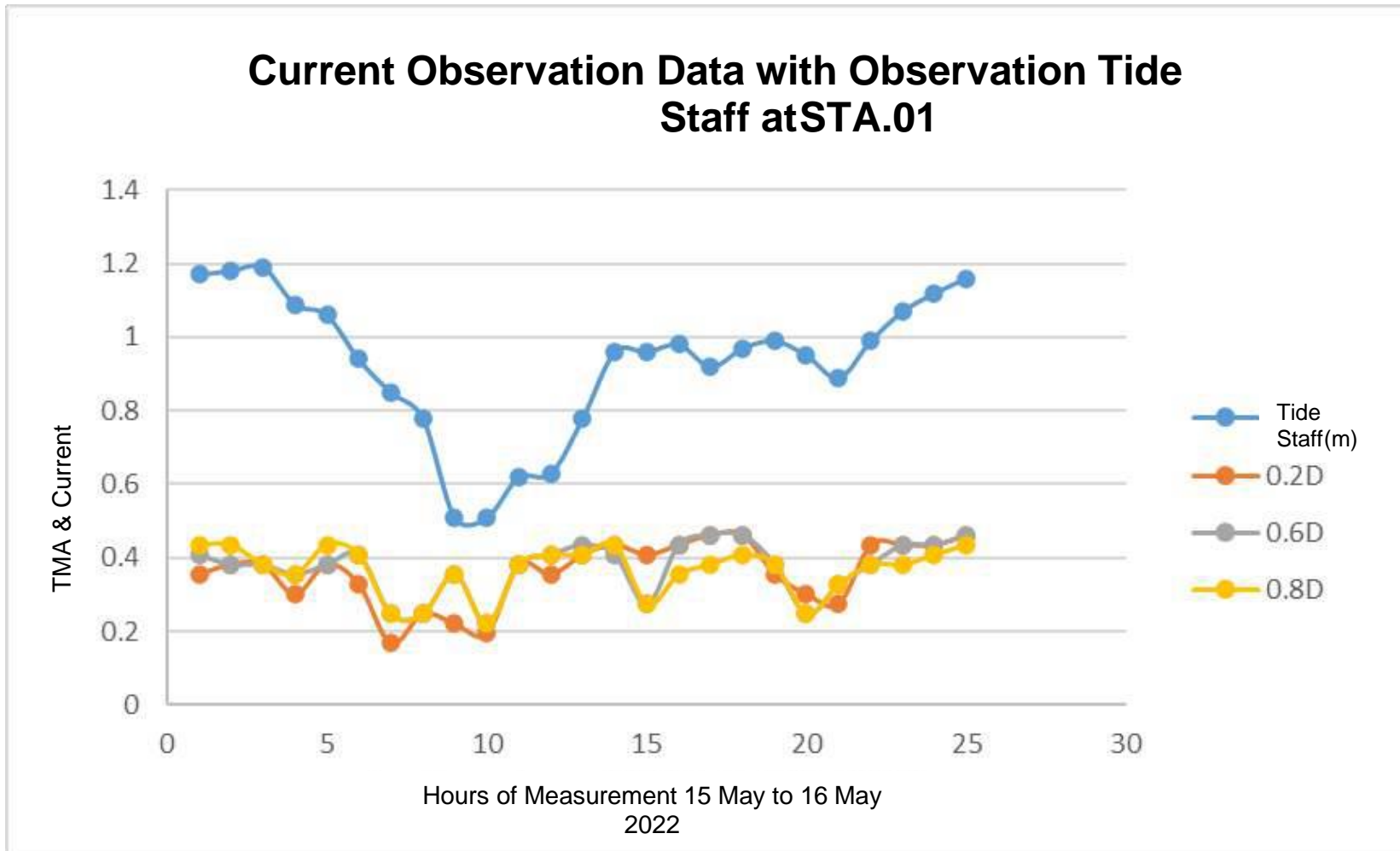
17	5/16/2022	8:00	17	80	17	80	14	80	0.92	0.46139	80	0.46139	80	0.38138	
18	5/16/2022	9:00	17	270	17	270	15	270	0.97	0.46139	270	0.46139	270	0.40805	270
19	5/16/2022	10:00	13	310	14	310	14	310	0.99	0.35471	310	0.38138	310	0.38138	310
20	5/16/2022	11:00	11	290	9	290	9	290	0.95	0.30137	290	0.24803	290	0.24803	290
21	5/16/2022	12:00	10	280	12	280	12	280	0.89	0.2747	280	0.32804	280	0.32804	280
22	5/16/2022	13:00	16	270	14	270	14	270	0.99	0.43472	270	0.38138	270	0.38138	270
23	5/16/2022	14:00	16	270	16	270	14	270	1.07	0.43472	270	0.43472	270	0.38138	270
24	5/16/2022	15:00	16	220	16	220	15	220	1.12	0.43472	220	0.43472	220	0.40805	220
25	5/16/2022	16:00	17	220	17	220	16	220	1.16	0.46139	220	0.46139	220	0.43472	220
									Max	0.46139	Max	0.46139	Max	0.43472	
									Ave	0.16802	Ave	0.22136	Ave	0.22136	





**Figure 4.4 Current Rose at Station 1**

In the results of current processing and current rose plotting above at station 1 in the survey area, the current speed ranges from 0.16 to 0.46m/s with the dominant current direction from east to west and vice versa.



5.1.1.53 Figure 4.5 Current Observation Data with an Observation Tide Staff at STA.01



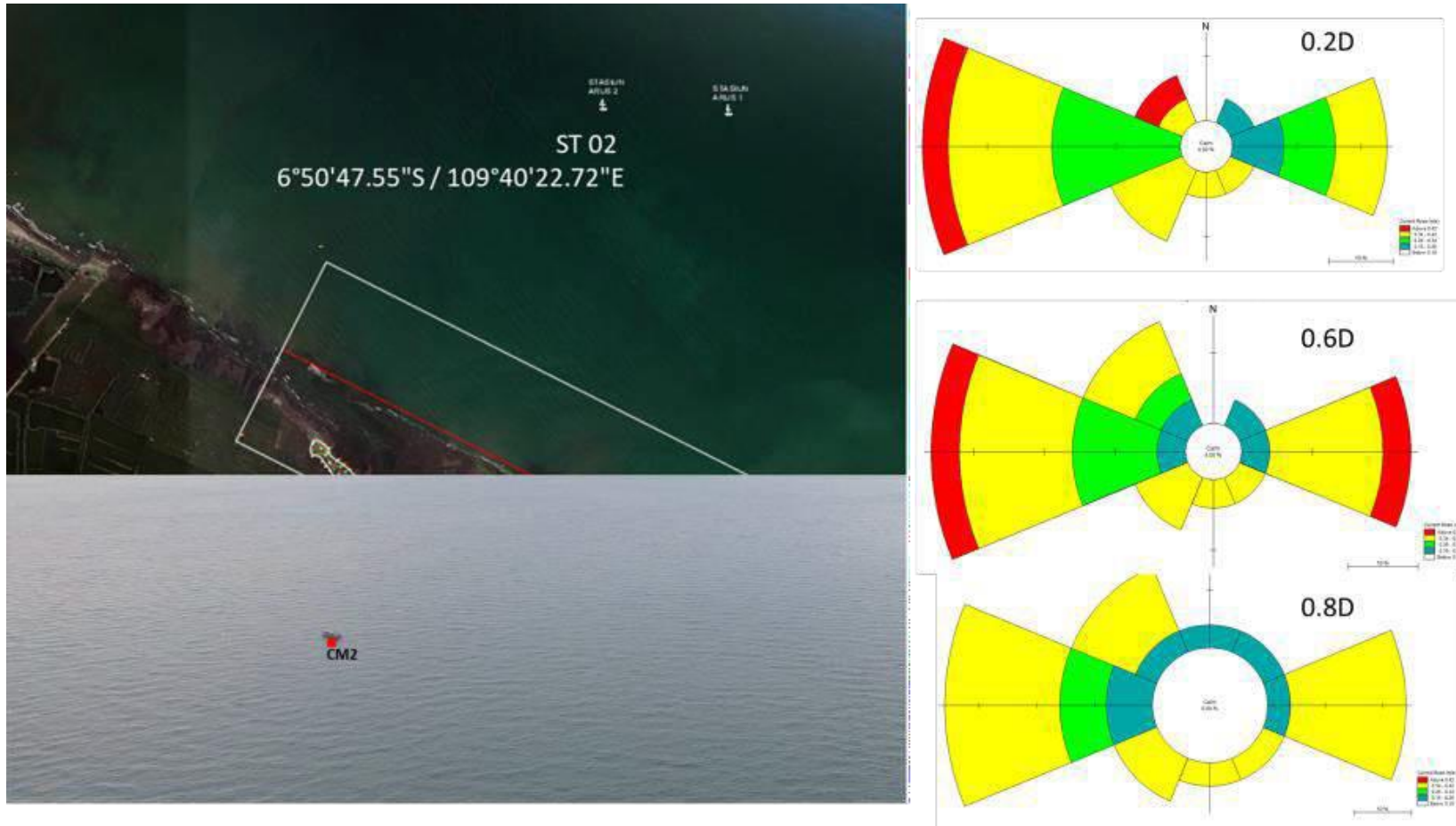
**d) Current Measurement at Station 2**

The results of current measurement at station 2 are shown in Table 4.3.

**5.1.1.54 Table 4.3 Results of Current Measurement at Station 2**

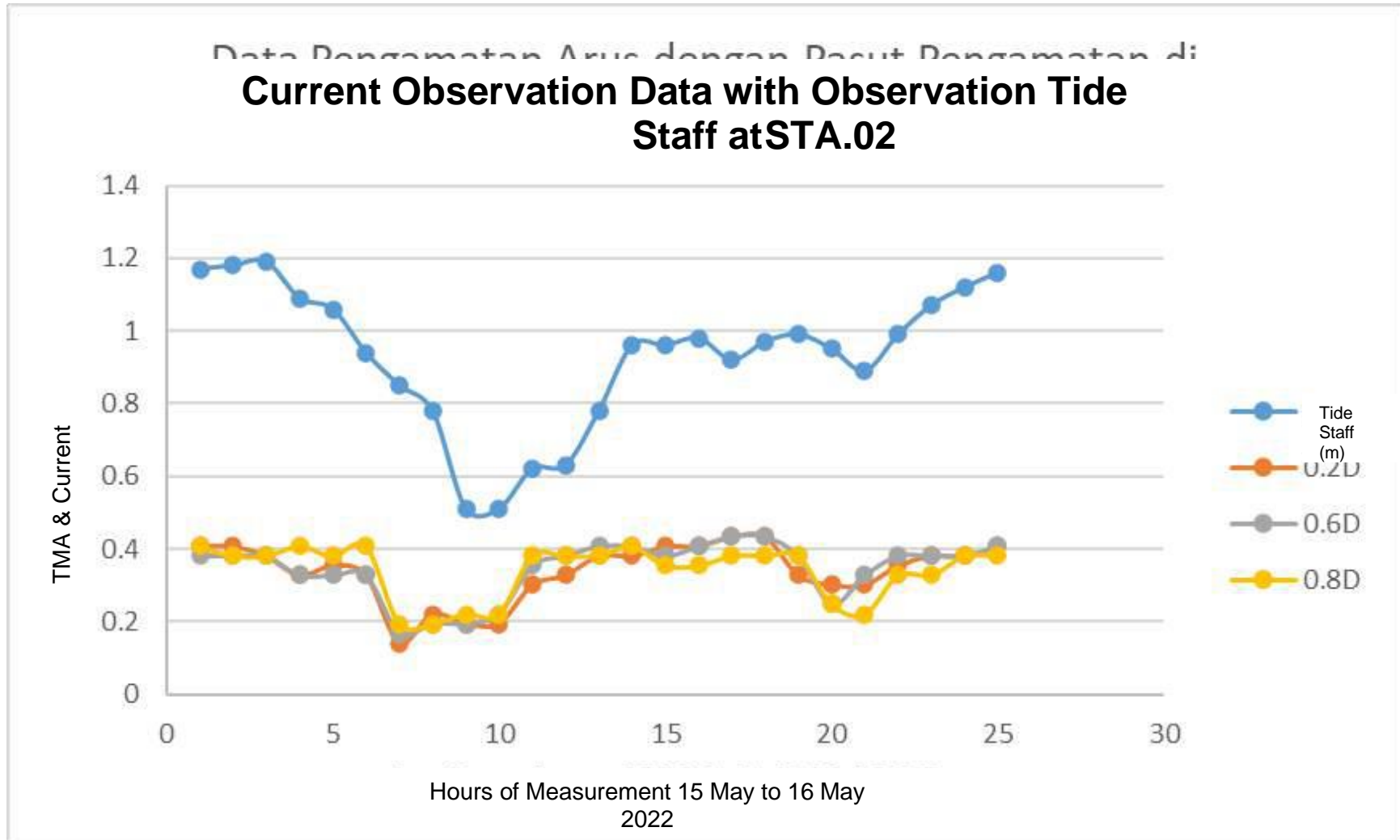
No	Date	Time	Observation Data							Speed Conversion						
			Depth							Tide (m)	0.2D	Dir	0.6D	Dir	0.8D	Dir
			0.2	Direction	0.6	Direction	0.8	Direction	(m/s)		(deg)	(m/s)	(deg)	(m/s)	(deg)	
1	5/15/2022	16:00	15	270	14	270	15	270	1.17	0.41	270.00	0.38	270.00	0.41	270.00	
2	5/15/2022	17:00	15	270	14	270	14	270	1.18	0.41	270.00	0.38	270.00	0.38	270.00	
3	5/15/2022	18:00	14	320	14	320	14	320	1.19	0.38	320.00	0.38	320.00	0.38	320.00	
4	5/15/2022	19:00	12	290	12	320	15	320	1.09	0.33	290.00	0.33	320.00	0.41	320.00	
5	5/15/2022	20:00	13	270	12	290	14	290	1.06	0.35	270.00	0.33	290.00	0.38	290.00	
6	5/15/2022	21:00	12	290	12	290	15	290	0.94	0.33	290.00	0.33	290.00	0.41	290.00	
7	5/15/2022	22:00	5	340	6	340	7	340	0.85	0.14	340.00	0.17	340.00	0.19	340.00	
8	5/15/2022	23:00	8	30	7	320	7	320	0.78	0.22	30.00	0.19	320.00	0.19	320.00	
9	5/16/2022	0:00	7	80	7	40	8	40	0.51	0.19	80.00	0.19	40.00	0.22	40.00	
10	5/16/2022	1:00	7	90	8	90	8	90	0.51	0.19	90.00	0.22	90.00	0.22	90.00	
11	5/16/2022	2:00	11	90	13	90	14	90	0.62	0.30	90.00	0.35	90.00	0.38	90.00	
12	5/16/2022	3:00	12	90	14	90	14	90	0.63	0.33	90.00	0.38	90.00	0.38	90.00	
13	5/16/2022	4:00	14	90	15	90	14	90	0.78	0.38	90.00	0.41	90.00	0.38	90.00	
14	5/16/2022	5:00	14	120	15	90	15	90	0.96	0.38	120.00	0.41	90.00	0.41	90.00	
15	5/16/2022	6:00	15	180	14	120	13	120	0.96	0.41	180.00	0.38	120.00	0.35	120.00	
16	5/16/2022	7:00	15	80	15	190	13	190	0.98	0.41	80.00	0.41	190.00	0.35	190.00	
17	5/16/2022	8:00	16	270	16	80	14	80	0.92	0.43	270.00	0.43	80.00	0.38	80.00	
18	5/16/2022	9:00	16	310	16	270	14	270	0.97	0.43	310.00	0.43	270.00	0.38	270.00	
19	5/16/2022	10:00	12	290	14	310	14	310	0.99	0.33	290.00	0.38	310.00	0.38	310.00	

20	5/16/2022	11:00	11	280	9	290	9	290	0.95	0.30	280.0 0	0.25	290.0 0	0.25	290.0 0
21	5/16/2022	12:00	11	270	12	280	8	280	0.89	0.30	270.0 0	0.33	280.0 0	0.22	280.0 0
22	5/16/2022	13:00	13	270	14	270	12	270	0.99	0.35	270.0 0	0.38	270.0 0	0.33	270.0 0
23	5/16/2022	14:00	14	205	14	270	12	270	1.07	0.38	205.0 0	0.38	270.0 0	0.33	270.0 0
24	5/16/2022	15:00	14	220	14	220	14	220	1.12	0.38	220.0 0	0.38	220.0 0	0.38	220.0 0
25	5/16/2022	16:00	15	221	15	220	14	220	1.16	0.41	221.0 0	0.41	220.0 0	0.38	220.0 0
									Max	0.4347 2	Max	0.4347 2	Max	0.4080 5	
									Ave	0.1413 5	Ave	0.1680 2	Ave	0.1946 9	



**Figure 4.6 Graph of Current Direction and Speed at Station 2**

In the results of current processing and current rose plotting above at station 2 in the survey area, the current speed ranges from 0.14 to 0.43m/s with the dominant current direction from east to west and vice versa.



**Figure 4.7 Current Observation Data with an Observation Tide Staff at STA.02**

### 4.3.2 Water and Suspended Load Sampling

Sediment and seawater sampling was carried out on 16 May 2022. Sediment samples were taken from 2 points with 3 depths considered representing the entire work location.

5.1.1.55 Table 4.4 Coordinates of the position of water and sediment sampling stations

Station	Latitude	Longitude	Depth
ST1	6°50'48.00"S	109°40'33.12"E	-6 m
ST2	6°50'47.55"S	109°40'22.72"E	-6 m



(Source: Google Earth with adjustments, 2022)

5.1.1.56 Figure 4.8 Water and Sediment Sampling Location

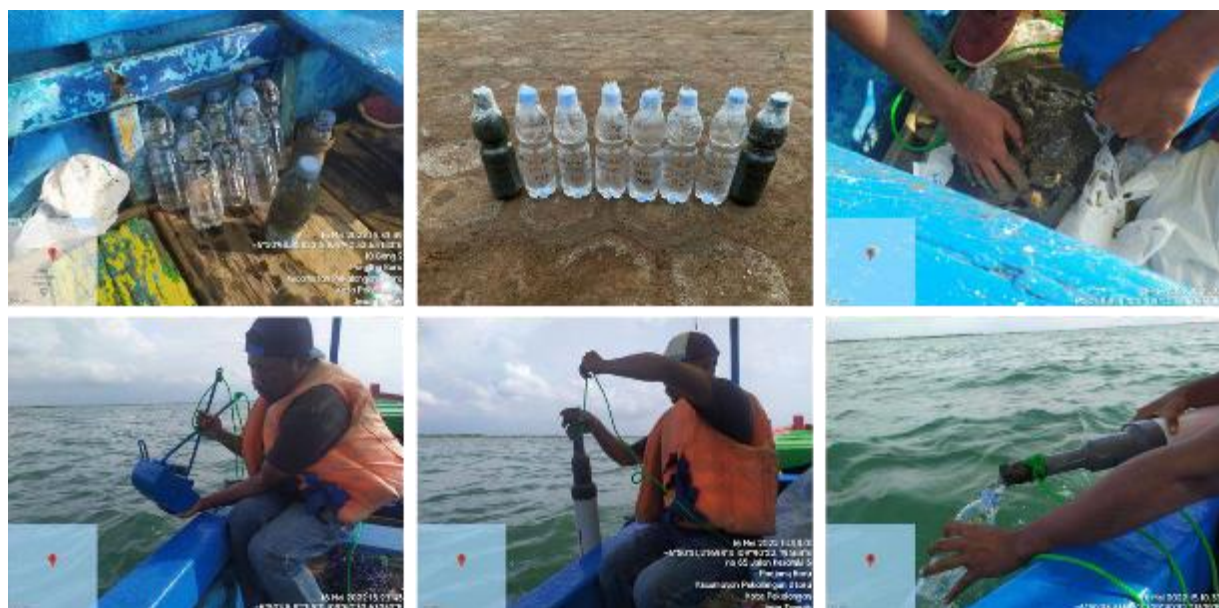


Figure 4.9 Water and Sediment Sampling



### 5.1.1.57 Table 4.5 Results of Base Sediment Sample Analysis



Laboratorium Geoteknik Saekkan  
Kompleks Megabratra No.129  
Cijawura - Buah Batu  
Kota Bandung - Jawa Barat



Sampel No : 1/SG-E/S/01/2022  
Pekerjaan : Kajian Pengamanan Pantai Kawasan PIM  
Tanggal Masuk : 30/05/2022  
Lokasi : Pekalongan  
ANALISA SARINGAN DAN HIDROMETER  
No. Contoh : ST-01  
Berat contoh : 100 gr

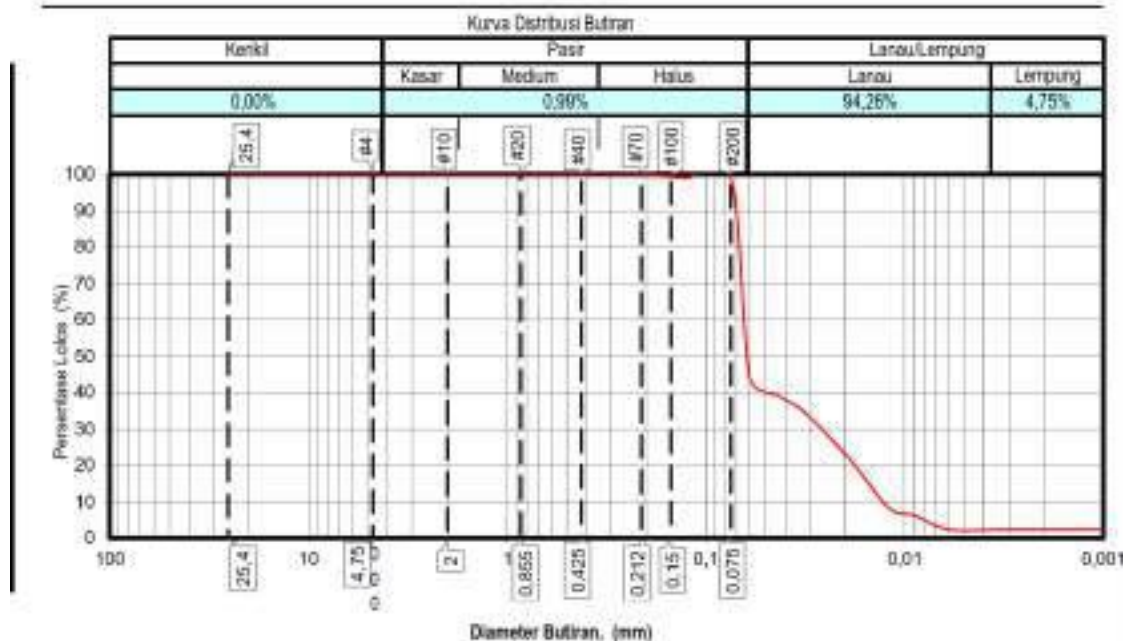
Dikerjakan : Aditya CP  
Diperiksa : Fitra K  
Tanggal Peliksa : 01/06/2022

Saringan	Berat Tertahan	Jumlah Tertahan	Persentase		Persentase Lewat Terhadap Seluruh Contoh
			Tertahan	Lewat	
1	0,00	0,00	0,00	100	
4	0,00	0,00	0,00	100	
10	0,00	0,00	0,00	100	
20	0,00	0,00	0,00	100	
40	0,04	0,04	0,04	99,96	
75	0,04	0,06	0,08	99,92	
100	0,77	0,85	0,85	99,15	
200	0,14	0,99	0,99	99,01	

Pukul	Waktu (menit)	Suhu T °C	Pembacaan Hidro	Diameter (mm)	Koreksi Suhu	Pembacaan Terkoreksi	Kalibrasi (s)	Persentase Mengendap	Persentase Mengendap Terhadap Contoh
0									
0,5	28	42	0,06000	2,4	44,4	1,07	44,4		43,96
1	28	37	0,04300	2,4	39,4	1,07	39,4		39,01
2	28	32	0,03100	2,4	34,4	1,07	34,4		34,06
5	28	21	0,02000	2,4	23,4	1,07	23,4		23,17
15	28	6	0,01200	2,4	8,4	1,07	8,4		8,32
30	28	4	0,00900	2,4	6,4	1,07	6,4		6,34
60	28	0	0,00600	2,4	2,4	1,07	2,4		2,38
240	27	0	0,00300	2,4	2,4	1,07	2,4		2,38
1440	27	0	0,00100	2,4	2,4	1,07	2,4		2,38



Laboratorium Geoteknik Saekkan  
Kompleks Megabratra No.129  
Cijawura - Buah Batu  
Kota Bandung - Jawa Barat



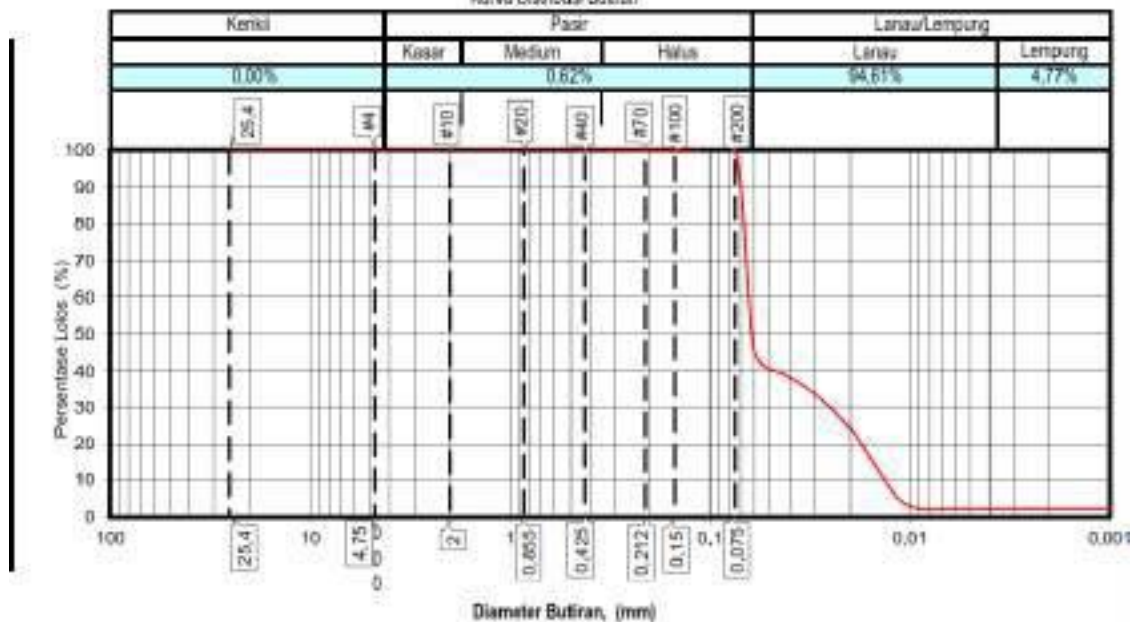
Sampel No : 1/SG-EIS/III/2022  
Pekerjaan : Kajian Pengamanan Pantai Kawasan PIM  
Tanggal Masuk : 30/05/2022  
Lokasi : Pekalongan  
ANALISA SARANGAN DAN HIDROMETER  
No. Contoh : ST - 62  
Berat contoh : 100 gr

Dikejakan : Aditya CP  
Diperiksa : Fira K  
Tanggal Periksa : 01/06/2022

Saringan	Berat Tertahan	Jumlah Tertahan	Persentase		Persentase Lolos Terhadap Seluruh Contoh
			Tertahan	Lolos	
1	0,00	0,00	0,00	100	
4	0,00	0,00	0,00	100	
10	0,00	0,00	0,00	100	
20	0,00	0,00	0,00	100	
40	0,04	0,04	0,04	99,96	
75	0,18	0,22	0,22	99,78	
100	0,23	0,45	0,45	99,55	
200	0,17	0,62	0,62	99,38	

Pukul	Waktu (menit)	Suhu T °C	Pembacaan Hidro	Diameter (mm)	Koreksi Suhu	Pembacaan Terkoreksi	Kalibrasi (a)	Persentase Mengendap	Persentase Mengendap Terhadap Contoh
	0								
	0,5	26	43	0,08000	2,4	45,4	1,07	45,4	45,12
	1	26	37	0,04300	2,4	35,4	1,07	35,4	35,16
	2	26	32	0,03100	2,4	34,4	1,07	34,4	34,15
	5	26	22	0,02000	2,4	24,4	1,07	24,4	24,25
	15	26	4	0,01200	2,4	6,4	1,07	6,4	6,36
	30	26	0	0,00600	2,4	2,4	1,07	2,4	2,30
	60	26	0	0,00600	2,4	2,4	1,07	2,4	2,30
	240	27	0	0,00300	2,4	2,4	1,07	2,4	2,30
	1440	27	0	0,00100	2,4	2,4	1,07	2,4	2,30

Kurva Distribusi Butiran






		SUMMARY OF LABORATORY TEST RESULT OF TEST SOIL SAMPLES		
		SOILS & MATERIALS LABORATORY		
<b>Kajian Pengamanan Pantai Kawasan PIM</b>				
SAMPLE LOCATION		Pekalongan		
SAMPLE NUMBER			ST-01	ST-02
<b>GRADATION</b>	GRAVEL	(%)	0,00	0,00
	SAND	(%)	0,99	0,62
	SILT	(%)	64,26	94,81
	CLAY	(%)	4,75	4,77
	GRADING PASS NO. 10 (2,00 mm)	(%)	100	100
	GRADING PASS NO. 40 (0,425 mm)	(%)	99,96	99,96
	GRADING PASS NO. 200 (0,075 mm)	(%)	99,01	99,38




Fira Nurra Rahmawati ST., MT

Table 4.134 Results of Suspended Load



**LABORATORIUM PENGENDALIAN KUALITAS LINGKUNGAN  
PERUMDA TIRTAWENING KOTA BANDUNG**

Jl. Atlas No. 6 Lt. 2 Antapami, Bandung. ☎ (022) 7219399 / (022) 87707500  
 www.lab-pkl.co.id ✉ pemasaran@lab-pkl.co.id



**TIRTASME**  
PERSERIKATAN PERUSAHAAN

### SERTIFIKAT HASIL PENGUJIAN (Certificate of Testing Result)

**NOMOR SERTIFIKAT : 01848.22.03261**

1. NOMOR ORDER	: 01848/V/2022
2. PEMBERI ORDER	: PT NFA JAKARTA
3. CONTOH UJI DARI	: PT NFA
4. JENIS CONTOH UJI	: AIR LAUT
5. JUMLAH CONTOH UJI	: 4 CONTOH UJI
6. REFERENSI	: KEMENLUM NO. 51 TAHUN 2004 LAMP. 1 TENTANG BAKU MUTU AIR LAUT UNTUK PERUBAHAN PELASURAN
7. KETERANGAN CONTOH UJI	: CONTOH UJI DIXRIM OLEN PELANGGAN
8. TANGGAL PENGAMBILAN CONTOH UJI	: 24 MEI 2022
9. TANGGAL PENERIMAAN	: 24 MEI 2022
10. TANGGAL LAPORAN	: 09 JUNI 2022
11. JUMLAH HALAMAN	: 2 HALAMAN ( TERMASUK HALAMAN MUKA )


Maksimal pengisian limbah hanya berlaku untuk contoh uji yang bertanggulatan.  
 Ditinjau mengenai metode laporan pengujian tanpa ada dari LPKL/POAM Tirtawening Kota Bandung.  
 Maksimal jasa pengujian lingkungan seperti : air, udara, tanah, limbah, tidak ada dll.  
 Tidak terakreditasi oleh KAN No. LP-214-EDN dan terdaftar sebagai Lab. Lingkungan oleh Kementerian.  
 No. Reg 0462/LP/CARUNG-1/LAK/KEM  
 F-T-PP-7.8-001-R00

Hal | Dst | 2




**LABORATORIUM PENGENDALIAN  
KUALITAS LINGKUNGAN**

Table 4.135 Results of Suspended Load



**LABORATORIUM PENGENDALIAN KUALITAS LINGKUNGAN  
PERUMDA TIRTAWENING KOTA BANDUNG**

● Jl. Atlas No. 6 Lt. 2 Antapani, Bandung ● (022) 7219399 / (022) 87787500  
● www.lab-pkl.co.id ● pemsaran@lab-pkl.co.id




**LAPORAN HASIL PENGUJIAN  
(Testing Result Report)**

**HASIL PENGUJIAN KUALITAS AIR**

1. NOMOR IDENTIFIKAT : 0104622.03041  
 2. KOSE CONTOH UJI : T-4-AC-PIL  
 3. CONTOH UJI DARI : PT NIPA  
     Jakarta  
 4. JENIS CONTOH UJI : Air Laut  
 5. LOKASI PENGAMBILAN CONTOH UJI : Pantai Panyang Paledongan  
 6. STIK PENGAMBILAN CONTOH UJI : -  
 7. METODE PENGAMBILAN CONTOH UJI : -  
 8. BAKU MUTU : Kapitan/U No. 51 Tahun 2004 Lamp. 1 Tentang Baku Mutu Air Laut  
     Untuk Perairan Pelabuhan  
 9. TANGGAL PENERIMAAN : 24 Mei 2022  
 10. TANGGAL PENGESAHAN : 24 Mei-06 Juni 2022

NO	CONTOH UJI Sample	PARAMETER Parameter	BAKU MUTU Specification	HASIL PENGUJIAN Testing Result	METODA ACUAN Method of Reference
1	STA 01 / 0,2 D	Fosfat anorganik total (TSP)	80	26,00	SNI 6893-2019
2	STA 01 / 0,4 D			24,00	
3	STA 01 / 0,8 D			24,00	
4	STA 02 / 0,2 D			22,00	
5	STA 02 / 0,4 D			22,00	
6	STA 02 / 0,8 D			24,00	



LABORATORIUM PENGENDALIAN KUALITAS LINGKUNGAN  
Nawa Pancadasa Abadi, S.T.

Hasil pengujian tersebut hanya berlaku untuk contoh uji yang bersangkutan.  
 Dengan menggunakan laporan pengujian tanpa izin dari LQKL PERUMDA Tirtawening Kota Bandung  
 Melayani jasa pengujian lingkungan seperti: air, udara, tanah, biologi, dsb.  
 Telah terakreditasi oleh KAN No. CP.328-03R dan terregistrasi sebagai Lab. Lingkungan oleh BAKOSURTANAL  
 No. Reg 0042/133/LABLING-LQKL/NDM  
**F-T-PP-7.8-001-R00**





# CHAPTER 5 BENCHMARK DESCRIPTION

## 5.1 Introduction

The installation of benchmarks was intended to establish a permanent point in the Survey area, the coordinates of which were then determined by means of the Global Navigation Satellite System (GNSS) or commonly known as GPS. This benchmark position was then used as a reference point to determine the position (coordinates) of all measurement points, so that they can be depicted on a map. To determine the azimuth direction of all measurement points, a pair of benchmarks, namely a main benchmark and a secondary benchmark, was built in each location. The main and secondary benchmarks are in the form of concrete stakes measuring 40

× 40 × 40 cm<sup>3</sup>, were planted at a depth of +/- 60 cm underground, and were built in a safe place where the possibility of being moved is very small. 4 benchmarks measuring 40x40x100 cm<sup>3</sup> were made and planted at a depth of 100 cm. The following is the field documentation in making BM. The Benchmarks (BM) were made on 15 May 2021.





NORTH



SOUTH



WEST



EAST

BM02



NORTH



SOUTH



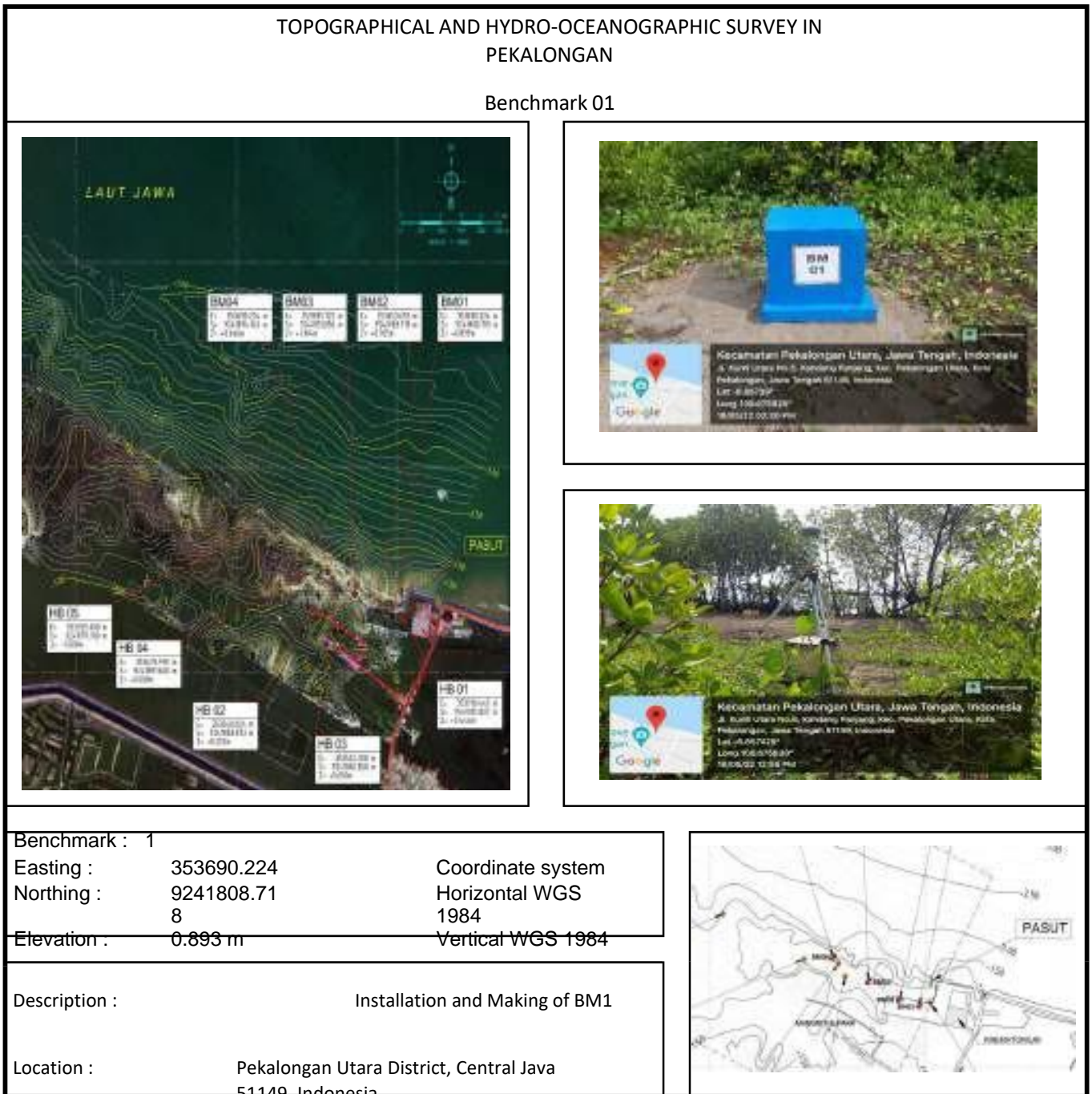


5.1.1.58

Figure 5.1 Results of making GPS01 and GPS02 Benchmarks in the Pekalongan Coastal Protection Study Area



## 5.2 Benchmark Description



5.1.1.59 Figure 5.2 Description of BM 01

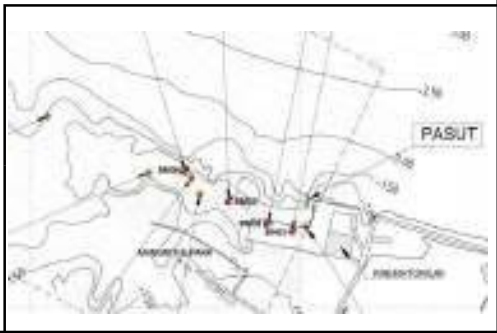
TOPOGRAPHICAL AND HYDRO-OCEANOGRAPHIC SURVEY IN PEKALONGAN

Benchmark 02



Benchmark :	2	
Easting :	353653.653	Coordinate system
Northing :	9241819.545	Horizontal WGS 1984
Elevation :	0.765 m	Vertical WGS 1984

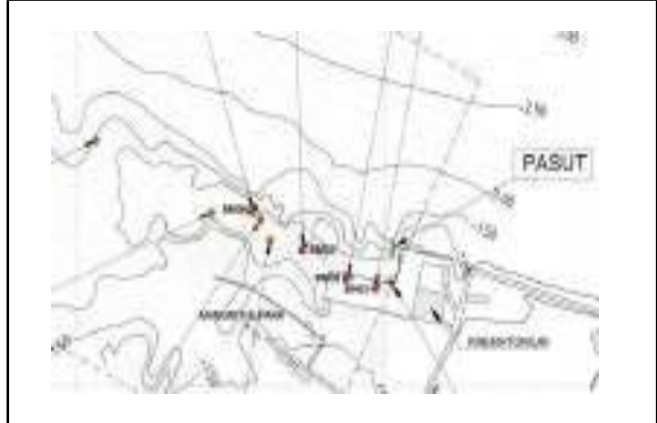
Description :	Installation and Making of BM2
Location :	Pekalongan Utara District, Central Java 51149, Indonesia



5.1.1.60 Figure 5.3 Description of BM 02

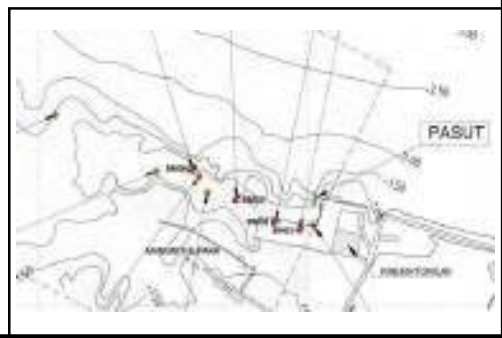
TOPOGRAPHICAL AND HYDRO-OCEANOGRAPHIC SURVEY IN  
PEKALONGAN

Benchmark 03



Benchmark :	3	
Easting :	353595.722	Coordinate system
Northing :	9241851.856	Horizontal WGS 1984
Elevation :	1.104 m	Vertical WGS 1984

Description :	Installation and Making of BM2
Location :	Pekalongan Utara District, Central Java 51140, Indonesia

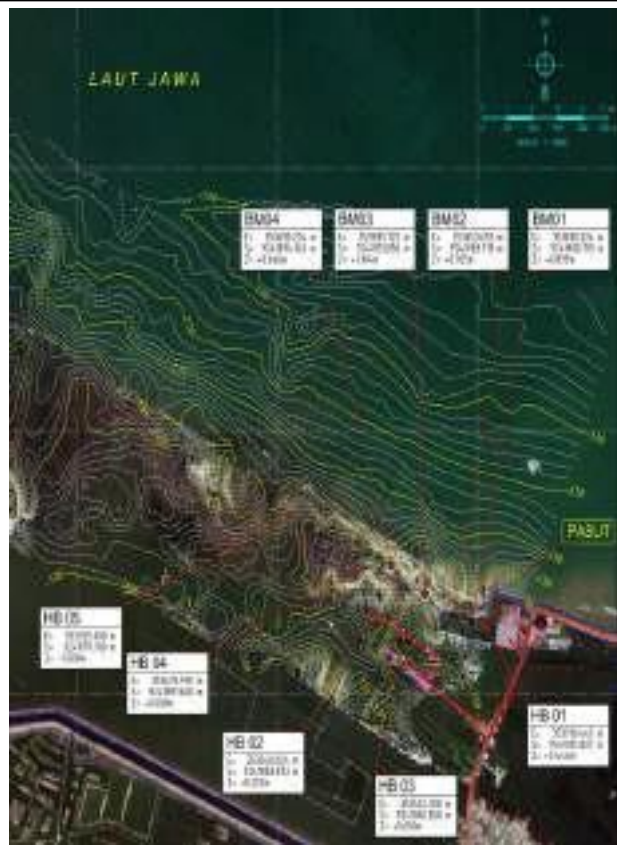


5.1.1.61 Figure 5.4 Description of BM 03



TOPOGRAPHICAL AND HYDRO-OCEANOGRAPHIC SURVEY IN PEKALONGAN

Benchmark 04



Benchmark :	4	
Easting :	353530.077	Coordinate system
Northing :	9241894.145	Horizontal WGS 1984
Elevation :	0.666 m	Vertical WGS 1984

Description : Installation and Making of BM2

Location : Pekalongan Utara District, Central Java 51149, Indonesia



Figure 5.5 Description of BM 04



## CHAPTER 6 GEOTECHNICALSURVEY

### 6.1 Introduction

In the context of building construction, it is necessary to know the subgrade layer. The subgrade layer is in the form of original soil that is formed naturally. The carrying capacity of subgrade is uneven in areas with very different types of soil layers. Different soil layers will affect the differential settlement of the construction, so it is necessary to know the soil layers carefully and take action to improve the soil layers. Thorough soil investigation can be carried out by using a drill in the form of Hand Boring.

Hand Boring is the simplest and most economical boring method at shallow depths. This is done by pressing and turning the auger into the subgrade. The drilling capability of the auger is limited, is only suitable for shallow depths, and is not suitable for drilling below the groundwater table. The advantages of auger drilling are: simple, easy to operate and minimal soil disturbance.

### 6.2 Purpose and Objective

The purpose and objective of this activity are among others:

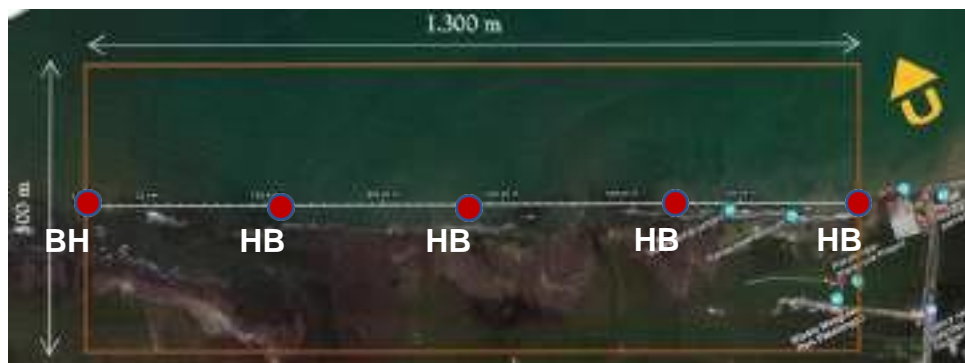
- 1) Knowing the profile and characteristics of soil layers and groundwater table.
- 2) Knowing the depth for sampling original and non-original soil.
- 3) Collecting information/data to describe the soil profile.
- 4) Sampling soil in its original state for laboratory research.

### 6.3 Scope of Work

The Hand Boring survey was carried out at 5 points in the corridor of the work location to a depth of 8 meters. Undisturbed soil samples were not required, but all of the bored soil must be systematically put in strong sample boxes (core boxes) so that they can be safely and securely transported out of town if necessary



## 6.4 Work Location



**Figure 6.1 Orientation map of the planned hand boring implementation location**

## 6.5 Personnel

**Table 6.1 List of Involved Personnel**

No.	Name of Personnel	Position
1	Mujianto	Survey Coordinator
2	Tri Budi Santoso	Surveyor
3	M Suganda	Surveyor
4	Jajang Suparman	Surveyor

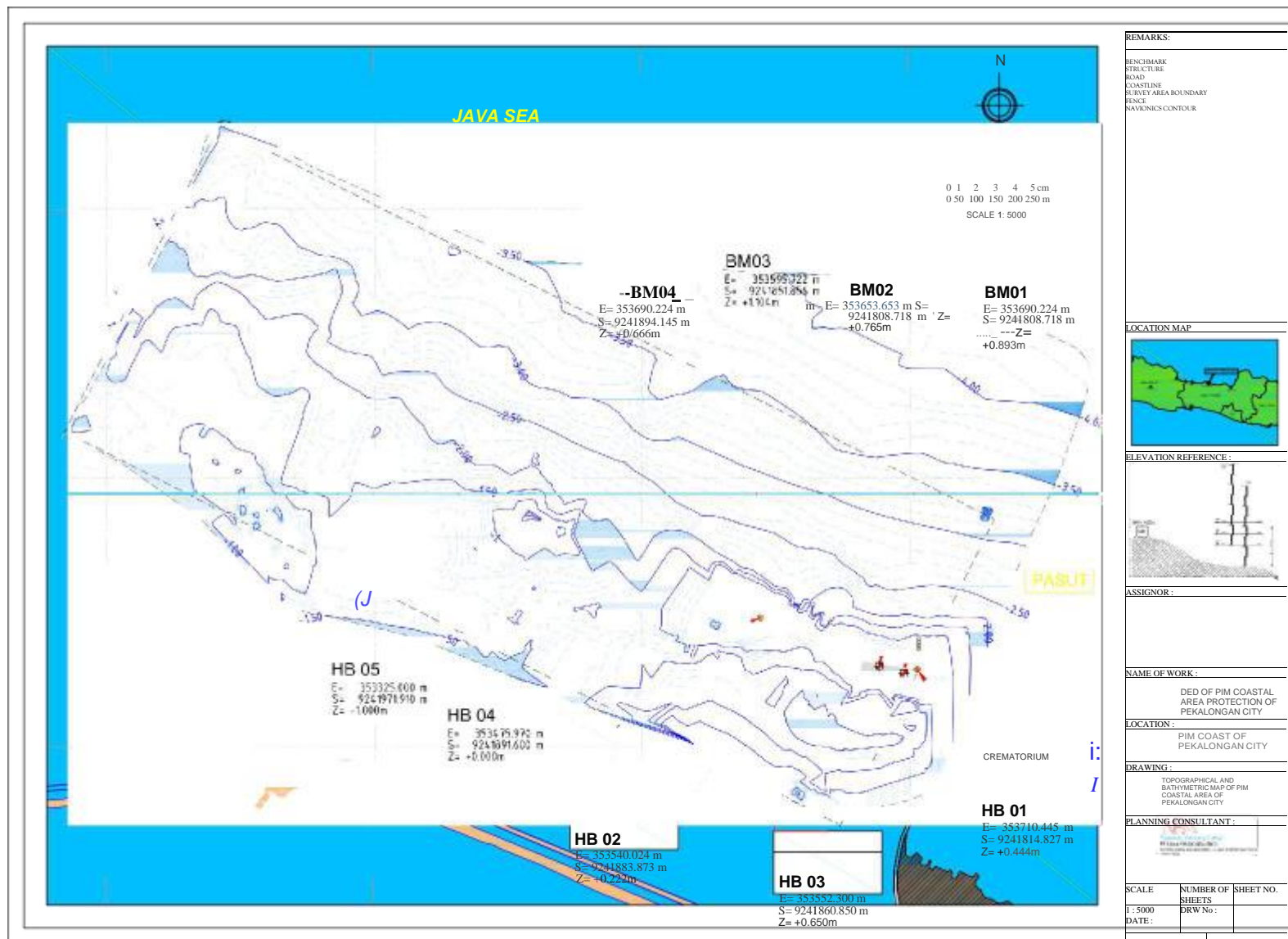
## 6.6 Survey Implementation

### 6.6.1 Survey Period

- 1) The site condition is still subject to coastal flooding until now, causing field data collection in accordance with the indicative plan as shown in Figure 6.1 to be not fully implemented. Due to the condition, it could only be carried out at 2 points (BH 01 and BH02) in the period of 13-15 May 2022.
- 2) Given the condition of the site which continues to be inundated up to 80%, upon agreement with the Partnership, the Consultant proceeded with the next 3 points up to the furthest condition that can be carried out with reference to the alignment of the survey plan. Hand boring implementation for 3 points (HB03, HB 04, and HB 05) was carried out on 30 – 31 July 2022.



5.1.1.62 Figure 6.2 Visual condition of the planned hand boring activity location



5.1.1.63

Figure 6.3 Coordinates of the hand boring implementation location

### 6.6.2 Hand Boring

In the TOR, it is stated that drilling is carried out by using 1 (one) hand or manual drill. Up to a depth of 8 meters, undisturbed soil samples were taken by using a tube with a diameter of 76 mm and a length of 50 cm. These undisturbed soil samples were described in accordance with the Unified Soil Classification System (USCS) and were plotted in the drilling log.



Figure 6.4 Hand boring tools used



5.1.1.64 Figure 6.5 Boring process





**Figure 6.6 Boring process**



**5.1.1.65 Figure 6.7 Identification of HB 01 boring point**



**Figure 6.8 Identification of HB 02 boring point**



5.1.1.66 Figure 6.9 Identification of HB 03 boring point



Figure 6.10 Identification of HB 04 boring point

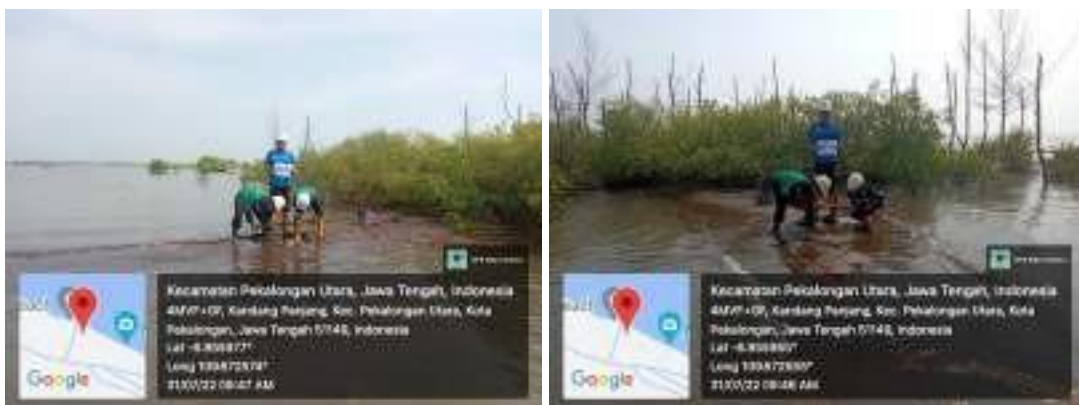


Figure 6.11 Identification of HB 05 boring point



### 6.6.3 Soil Sampling

Undisturbed samples (undisturbed soil samples) were taken by using a thin wall tube with a diameter of 63.5mm. The depth of this undisturbed soil sampling is represented in the drilling log.



**Figure 6.12 Undisturbed sample**

### 6.6.4 Laboratory Testing

#### 1) *Atterberg Limits*

Standard : SNI 05-6414-2002

Atterberg developed a method to describe the consistency of fine-grained soil at various moisture contents. Based on the amount of water in the soil, soil can be divided into 4 basic states : solid, semi-solid, plastic, and liquid.

Each grade has a different density and soil behavior as well as technical properties. The limits of difference between each form can be determined based on changes in soil habit. Atterberg can be used between silt and clay, which can be divided further into several parts in each type.

#### 2) *Hydrometry*

Standard : SNI 3423:2008

The hydrometer analysis testing aimed at determining the grain size distribution for soil that does not contain soil grains retained by sieve no. 200. This testing was carried out by analyzing the sediment using a hydrometer.

3) *Consolidation Test*

Standard : SNI 2812:2011

The purpose of the consolidation test is to apply a gradual load to the soil and measure the change in volume (or change in height) of the soil sample over time. The objective of the consolidation test is to determine the compressibility of soil and its consolidation characteristics being a function of soil permeability.

4) *Triaxial Test*

Standard : SNI 03-2455-2004

triaxial testing is the testing of cylindrical cohesive soil specimens wrapped in watertight rubber which are given pressure in all directions and given axial pressure until an avalanche occurs (SNI 03-4813-1998).

5) *Direct Shears*

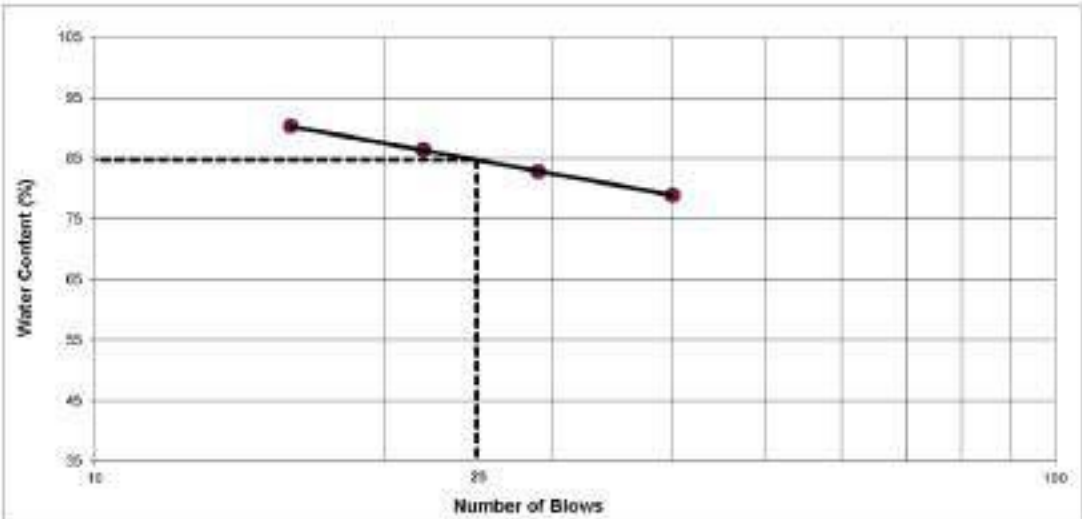
Standard : SNI 3420:2016

The basic principle of this testing is to apply a shear/horizontal load to soil samples through the shear ring/box at a constant speed until the soil collapses. Meanwhile, the soil is also given a vertical load of a constant magnitude during the testing. During the testing, readings of the strain dials were carried out at the same intervals and simultaneously, readings of the shear dial loads were carried out at the corresponding strain readings, so that a graph of the occurring relationship between strain and shear pressure can be described.

## 6.7 Laboratory Result

### 6.7.1 Atterberg Limits

**Table 6.2 Results of Atterberg Limits test HB 03**

Project:		Rencana Bangunan					
Job No.		Date	4-Aug-2022				
Tested By	Hans	Checked By	Whd				
<b>ATTERBERG LIMITS</b> ASTM D 4318							
Location	: Pekalongan - Jawa Tengah	Sample No.	: 1				
Bore Hole No.	: HB - 3	Sample Type	: UDS				
Sample Depth	: 6.00 - 6.50 m	Soil Description	: Silty CLAY				
<b>LIQUID LIMIT</b>		<b>PLASTIC LIMIT</b>					
No. of Blows	40	29	22	15			
Container No.	55	37	49	43	51	67	
Wt. Container + Wet Soil	g	15.41	14.52	15.12	15.09	9.31	9.88
Wt. Container + Dry Soil	g	10.61	9.99	10.22	10.07	6.11	6.56
Wt. Water	g	4.80	4.53	4.90	5.02	1.18	1.32
Wt. Container	g	4.51	4.52	4.55	4.51	4.51	4.55
Wt. Dry Soil (Ws)	g	6.08	5.47	5.67	5.56	3.60	4.01
Water Content (w)	%	78.95	82.82	86.42	90.29	32.78	32.92
<b>FLOW CURVE</b>							
							
<b>RESULT SUMMARY</b>							
LIQUID LIMIT	%	84.76					
PLASTIC LIMIT	%	32.85					
PLASTICITY INDEX	%	51.91					
CLASSIFICATION		CH					

**Table 6.3 Results of Atterberg Limits test HB 04**

	Project	Rencana Bangunan		
	Job No.	Date	4-Aug-2022	
	Tested By	Hans	Checked By	Whd

**ATTERBERG LIMITS**  
ASTM D 4318

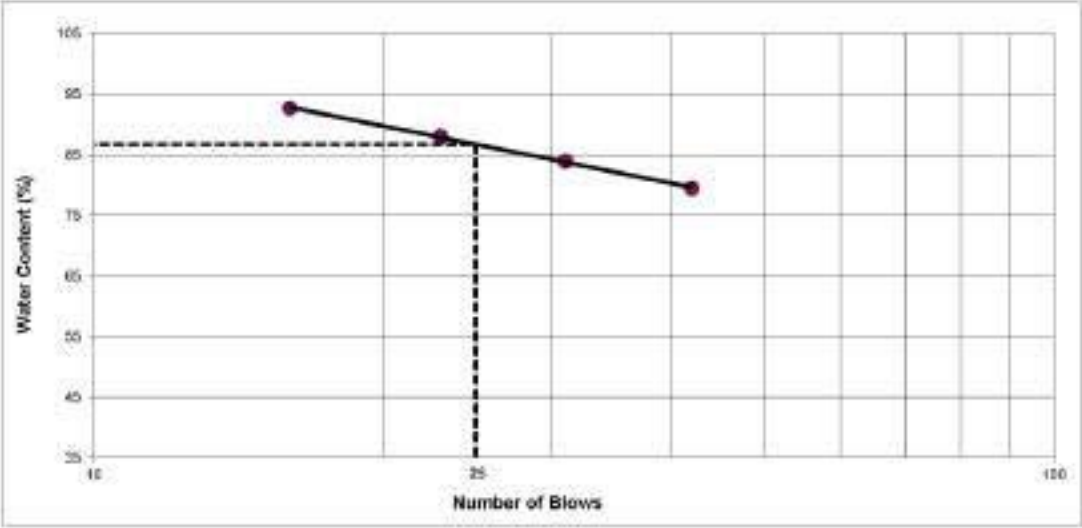
Location : Pekalongan - Jawa Tengah	Sample No. : 1
Bore Hole No. : HB - 4	Sample Type : US
Sample Depth : 6.00 - 6.50 m	Soil Description : Silty CLAY

LIQUID LIMIT	PLASTIC LIMIT						
No. of Blows	42	31	23	15			
Container No.	25	7	13	19	1	31	
Wt. Container + Wet Soil	6	16.11	15.75	14.31	14.12	10.02	9.18
Wt. Container + Dry Soil	6	10.99	10.63	9.76	9.53	8.63	8.02
Wt. Water	6	5.12	5.12	4.57	4.59	1.39	1.17
Wt. Container	6	4.55	4.53	4.55	4.58	4.52	4.59
Wt. Dry Soil (Ws)	6	6.44	6.30	5.39	4.95	4.13	3.43
Water Content (w)	%	79.50	83.93	88.05	92.73	33.82	34.01

**FLOW CURVE**

**RESULT SUMMARY**

LIQUID LIMIT	%	86.78
PLASTIC LIMIT	%	33.93
PLASTICITY INDEX	%	52.86
CLASSIFICATION		CH

**Table 6.4 Results of Atterberg Limits test HB 05**

	Project:	Rencana Bangunan		
	Job No.:		Date:	4-Aug-2022
	Tested By:	Hans	Checked By:	Whd

**ATTERBERG LIMITS**  
ASTM D 4318

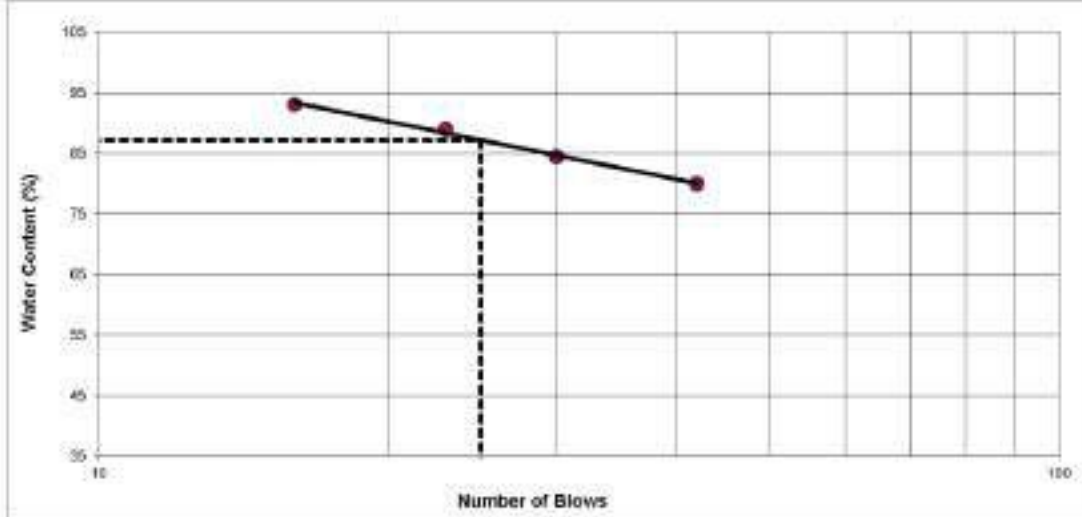
Location : Pekalongan - Jawa Tengah	Sample No. : 1
Bore Hole No. : HB - 5	Sample Type : UDS
Sample Depth : 6.00 - 6.50 m	Soil Description : Silty CLAY

	LIQUID LIMIT				PLASTIC LIMIT		
No. of Blows	42	30	23	15			
Container No.	85	91	73	103	79	97	
Wt. Container + Wet Soil	0	16.18	15.66	14.52	14.10	9.51	9.30
Wt. Container + Dry Soil	6	11.02	10.56	9.85	9.51	8.25	8.11
Wt. Water	6	5.16	5.10	4.67	4.59	1.26	1.19
Wt. Container	6	4.57	4.52	4.60	4.58	4.57	4.59
Wt. Dry Soil (W <sub>d</sub> )	6	6.45	6.00	5.25	4.93	3.68	3.52
Water Content (w)	%	80.00	84.48	88.95	93.10	34.24	33.81

**FLOW CURVE**

**RESULT SUMMARY**

LIQUID LIMIT	%	87.22
PLASTIC LIMIT	%	34.03
PLASTICITY INDEX	%	53.19
CLASSIFICATION		CH

6.7.2 H

5.1.1.67 d Table 6.5 Results of Hydrometric test HB 01

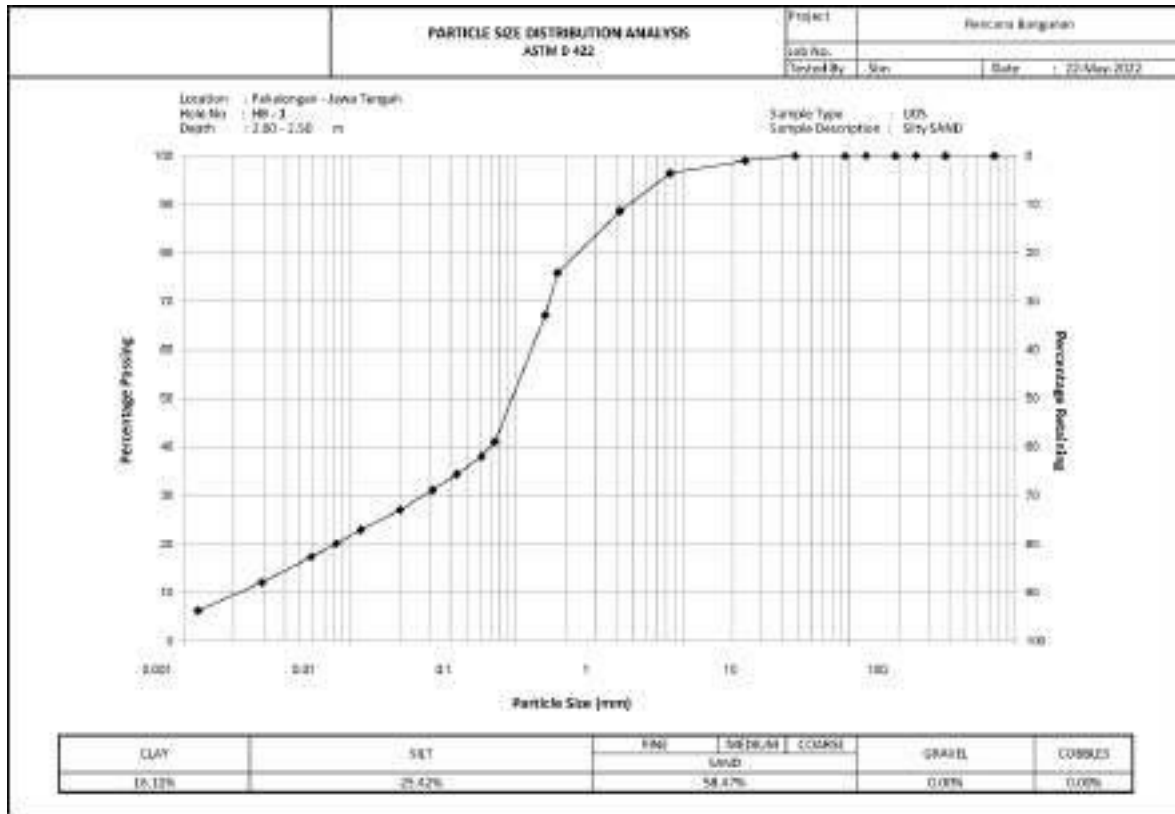
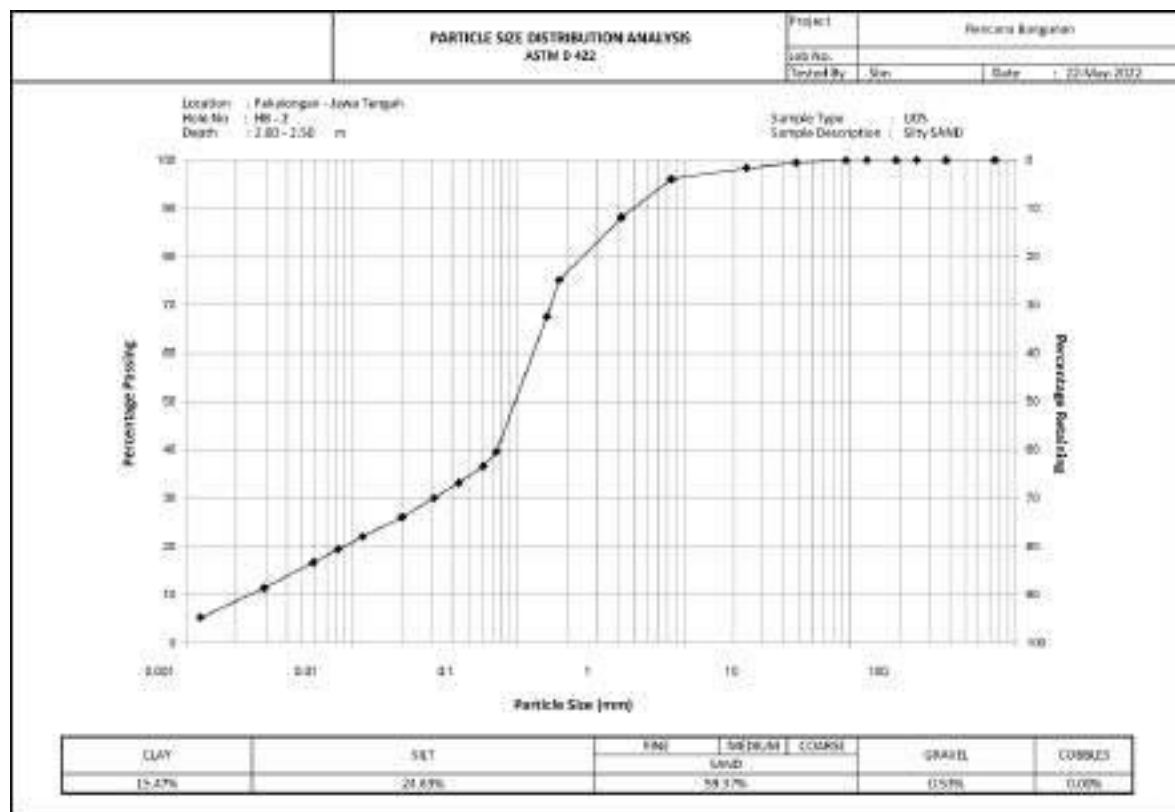
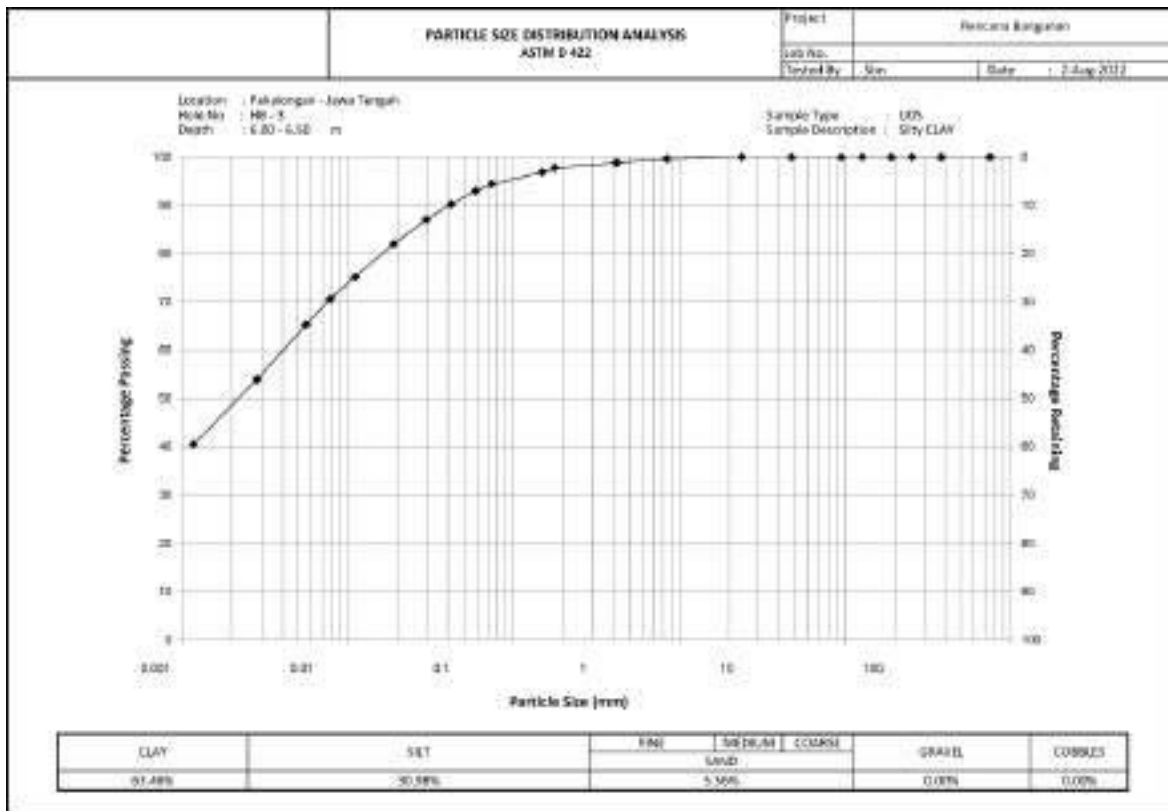


Table 5.6.6 Results of hydrometric test HB 02

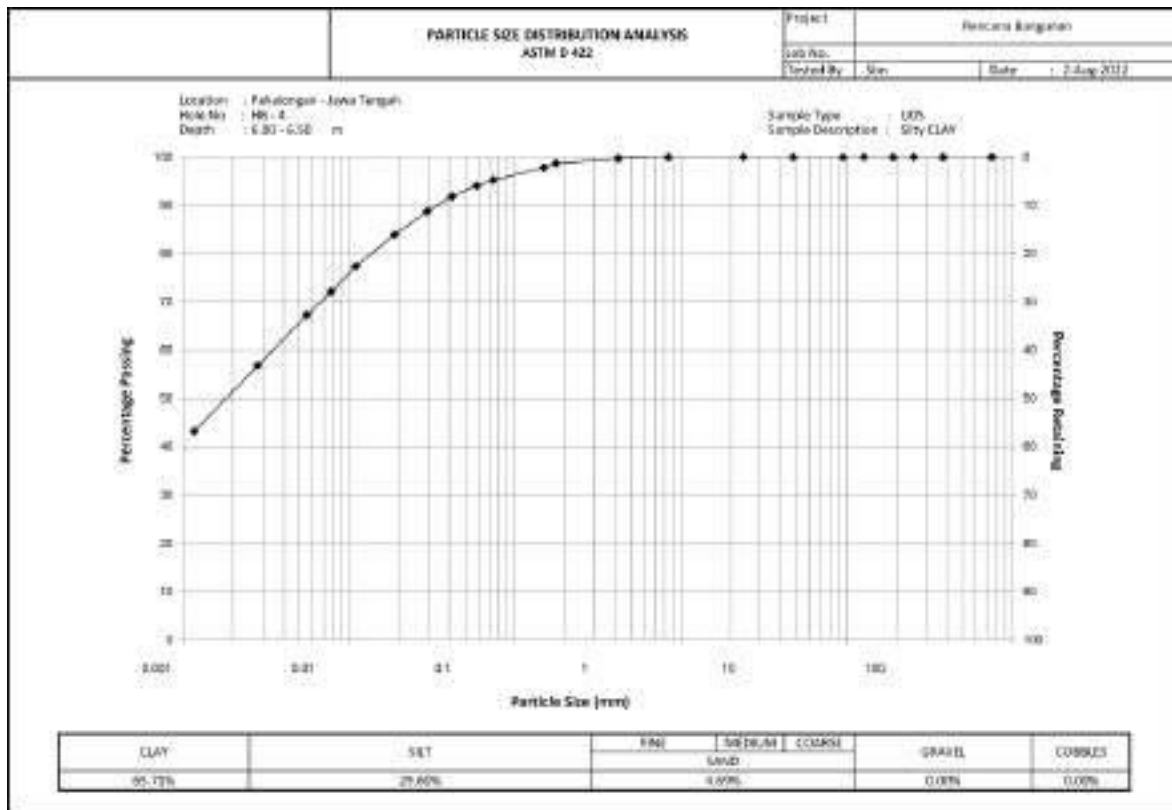




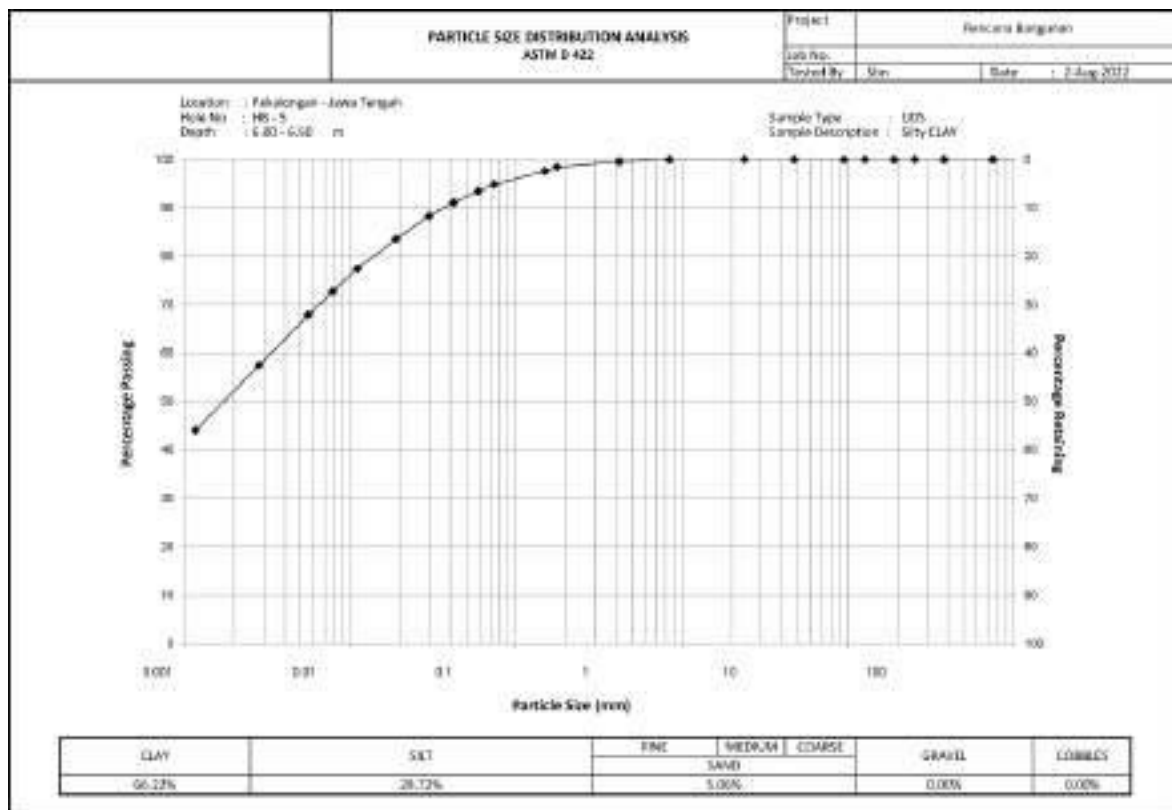
**Table 6.158 Results of**



**Table 6.159 Results of**

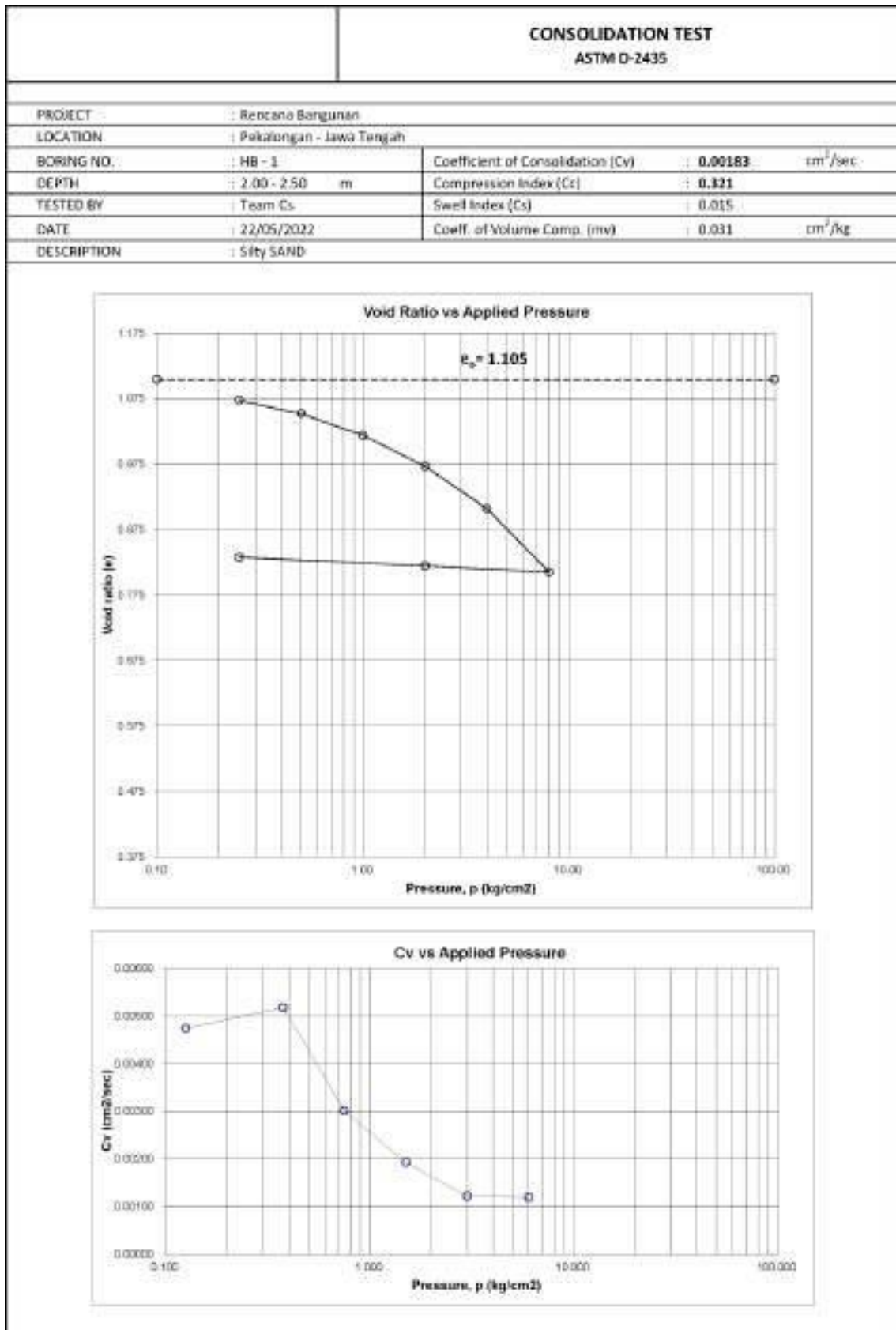


**Table 5.6.9 Results of Hydrometric test HB 05**

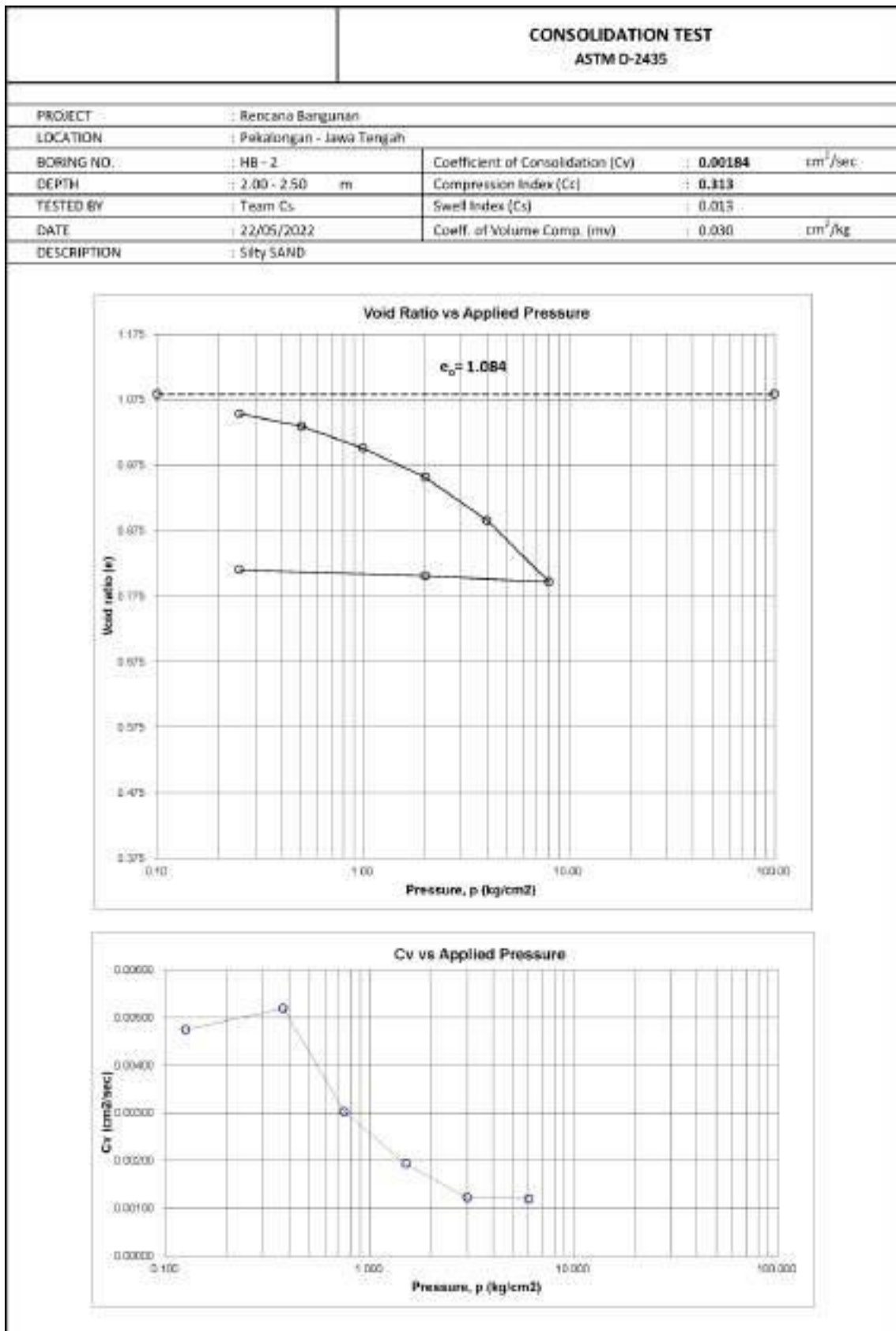


### 6.7.3 Consolidation Test

**Table 6.10 Results of Consolidation Test HB 01**



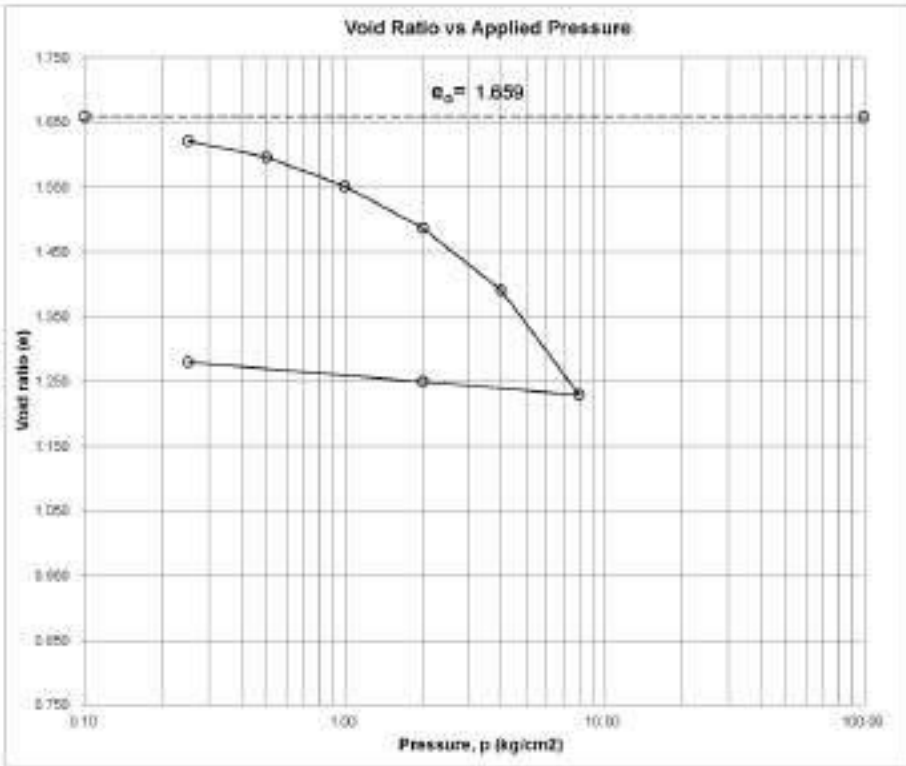
**Table 6.161 Results of**



**Table 6.162 Results of**

CONSOLIDATION TEST				
PROJECT	: Rencana Bangunan			
LOCATION	: Pekalongan - Jawa Tengah			
BORE HOLE NO	: HB - 3	Coefficient of Consolidation (Cv)	: 0.00148	cm <sup>2</sup> /sec
SAMPLE DEPTH	: 6.00 - 6.50 m	Compression Index (Cc)	: 0.538	
TESTED BY	: Yudi cs	Swoll Index (Cs)	: 0.034	
DATE	: 82/02/2022	Coeff. of Volume Comp. (mv)	: 0.032	cm <sup>3</sup> /kg
DESCRIPTION	: Silty CLAY			

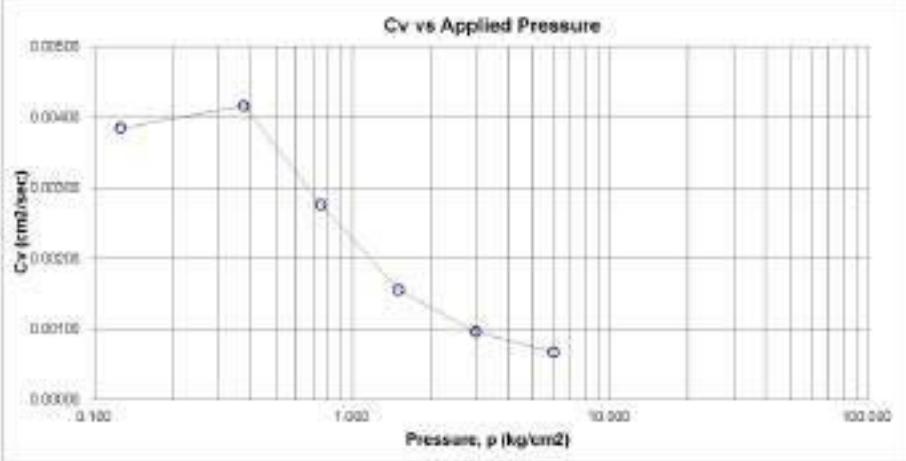
  



**Void Ratio vs Applied Pressure**

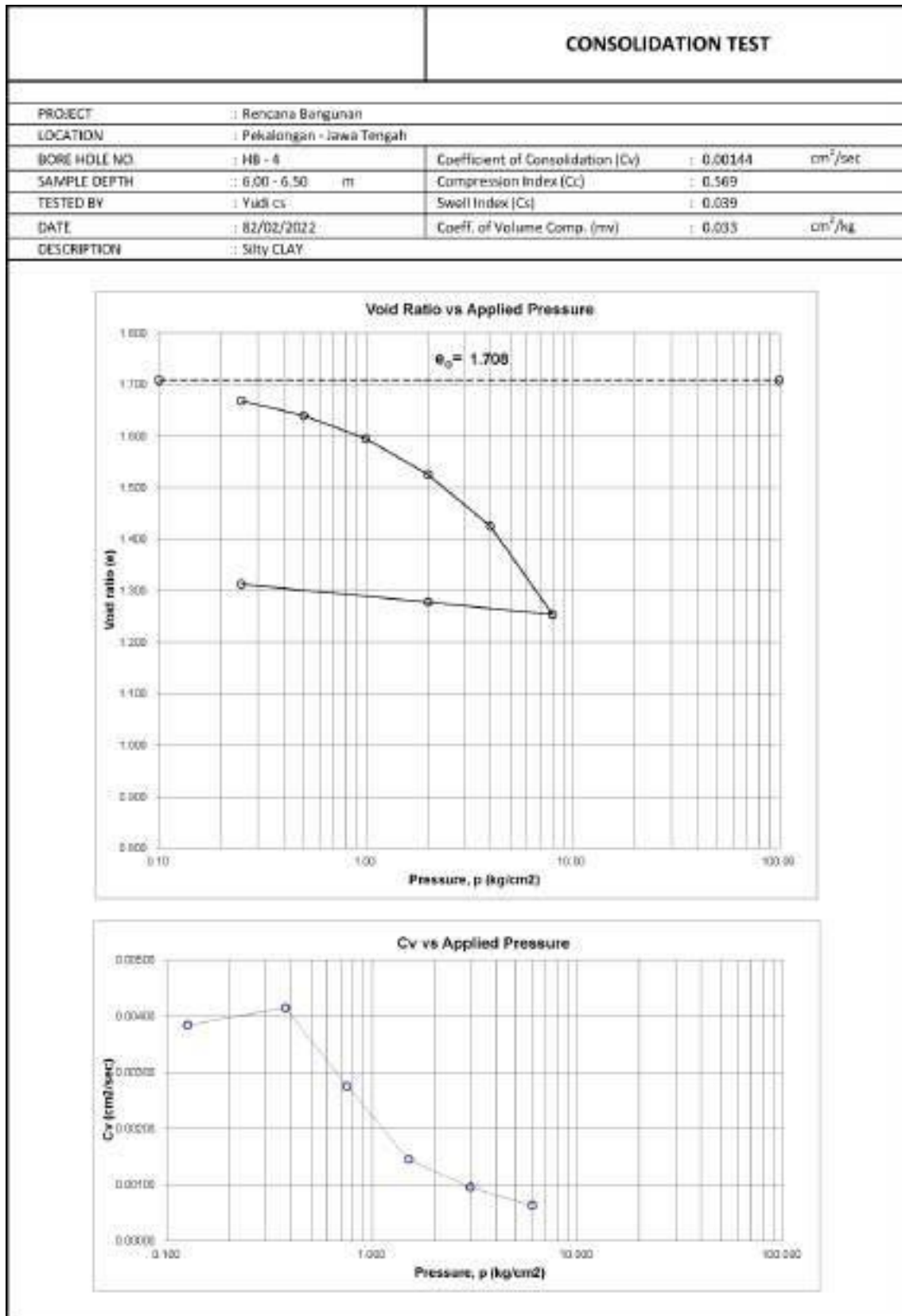
$e_{s0} = 1.659$



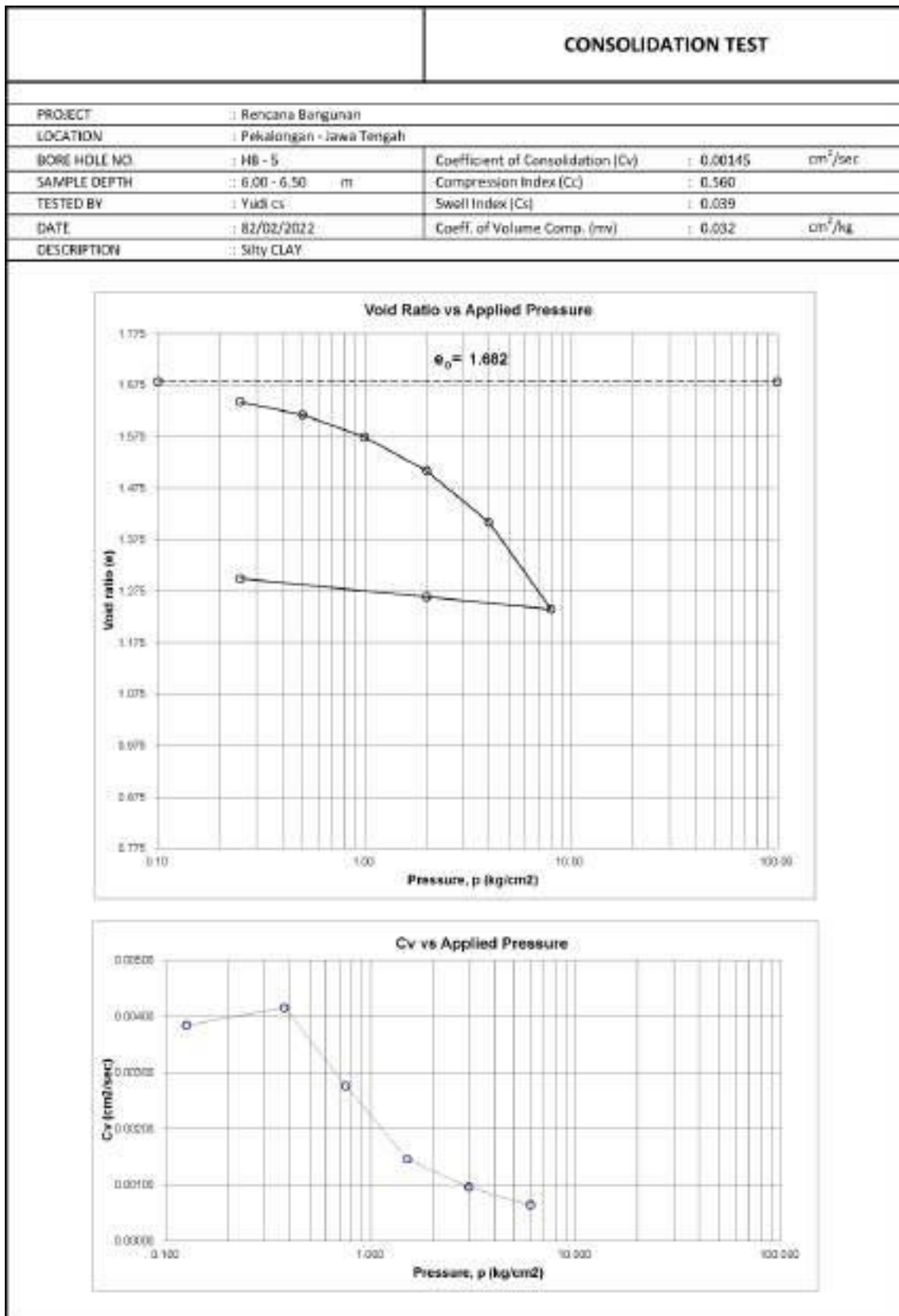
**Cv vs Applied Pressure**

**Table 6.13 Results of**





**Table 6.14 Results of Consolidation Test HB 05**

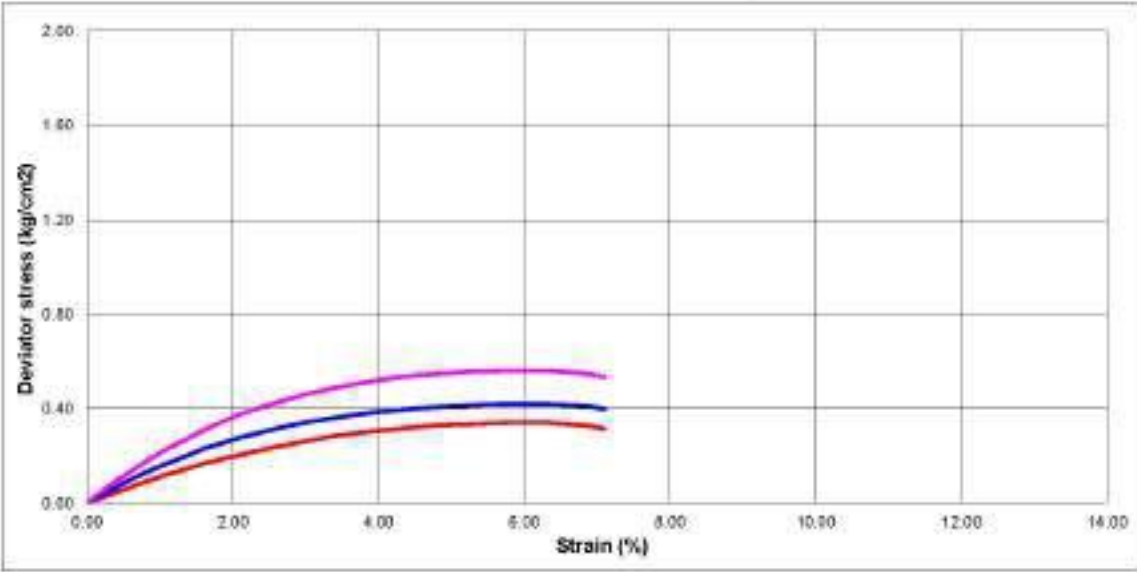
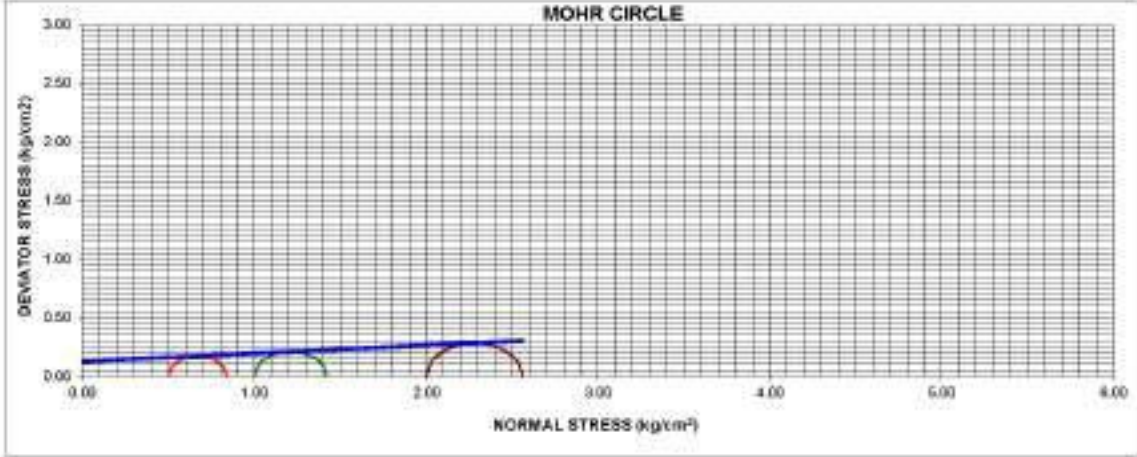


### 6.7.4 Triaxial Test

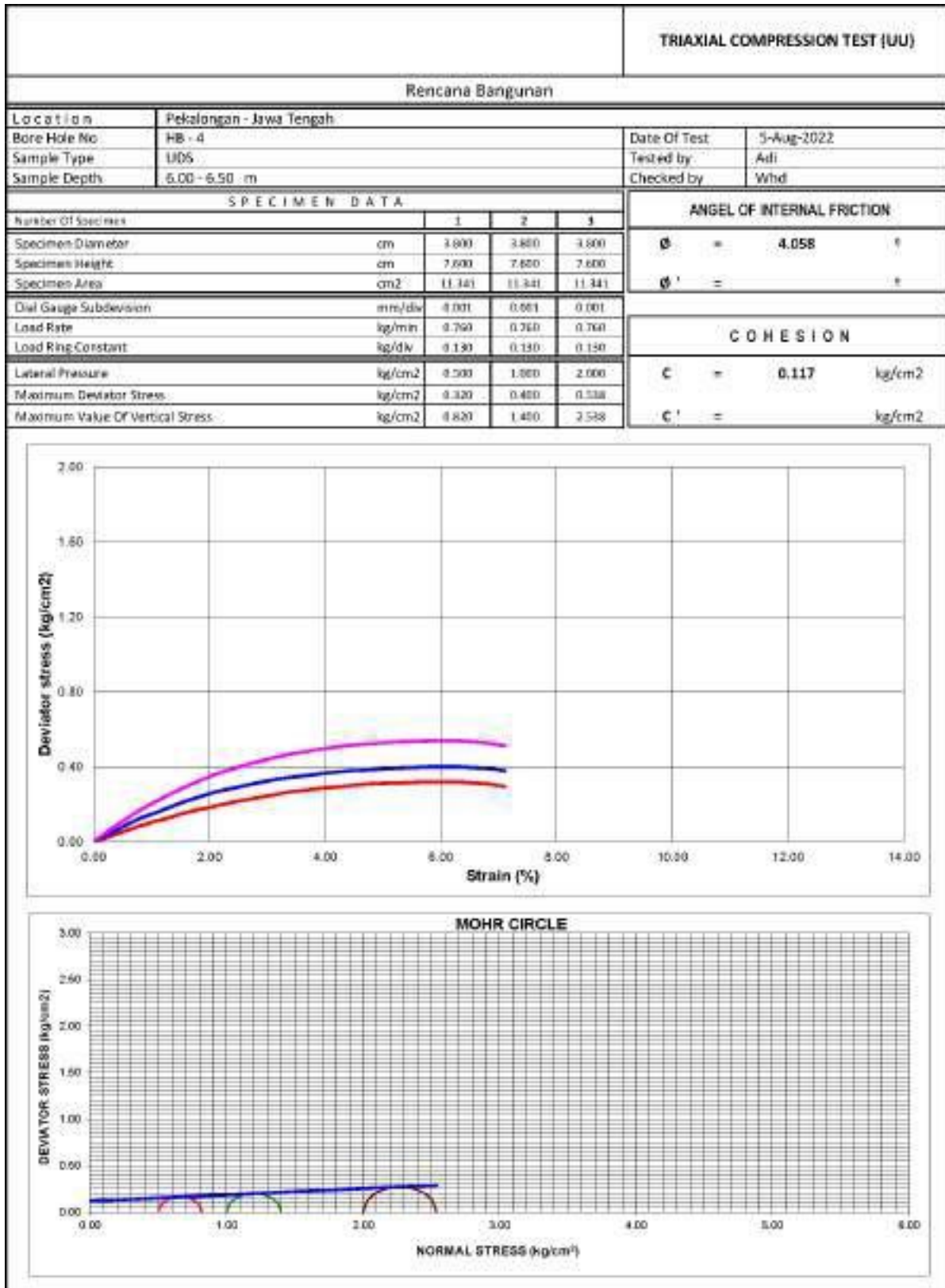
**Table 6.15 Results of Triaxial Test HB 03**

				TRIAxIAL COMPRESSION TEST (UU)	
Rencana Bangunan					
Location	Pekalongan - Iraw Tengah			Date Of Test	5-Aug-2022
Bore Hole No	HB - 3			Tested by	Adi
Sample Type	UDS			Checked by	Whd
Sample Depth	6.00 - 6.50 m				
SPECIMEN DATA				ANGEL OF INTERNAL FRICTION	
Number Of Specimens		1	2	3	
Specimen Diameter	cm	3.800	3.800	3.800	$\phi = 4.111$ °
Specimen Height	cm	7.600	7.600	7.600	$\phi' =$ °
Specimen Area	cm <sup>2</sup>	11.441	11.441	11.441	
Dial Gauge Subdivision	mm/div	0.001	0.001	0.001	
Load Rate	kg/min	0.700	0.700	0.700	
Load Ring Constant	kg/div	0.130	0.130	0.130	
Lateral Pressure	kg/cm <sup>2</sup>	0.500	1.000	2.000	<b>C = 0.126</b> kg/cm <sup>2</sup>
Maximum Deviator Stress	kg/cm <sup>2</sup>	0.540	0.420	0.360	<b>C' =</b> kg/cm <sup>2</sup>
Maximum Value Of Vertical Stress	kg/cm <sup>2</sup>	0.840	1.420	2.561	

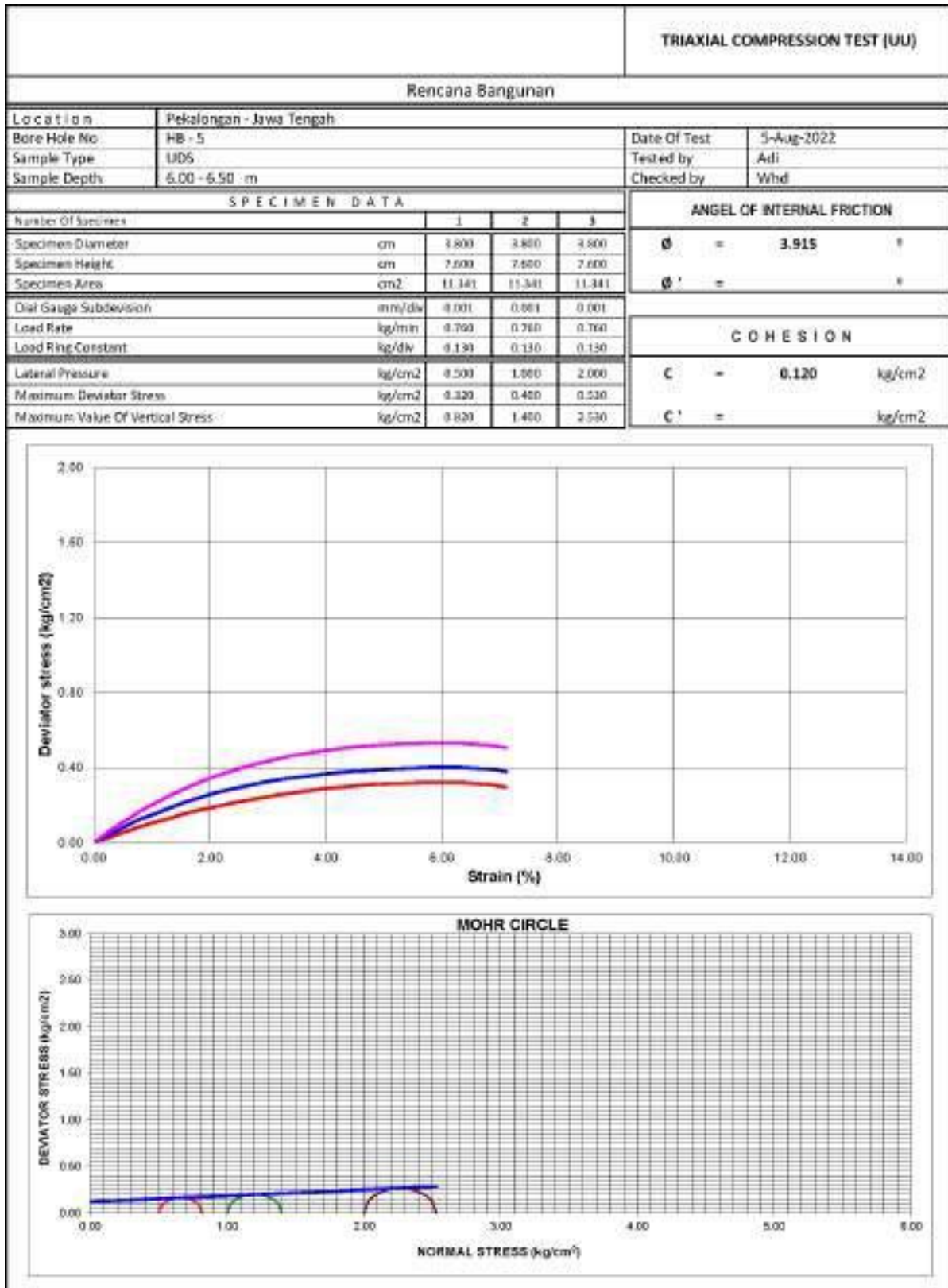
  

**Table 6.166 Results of Triaxial**



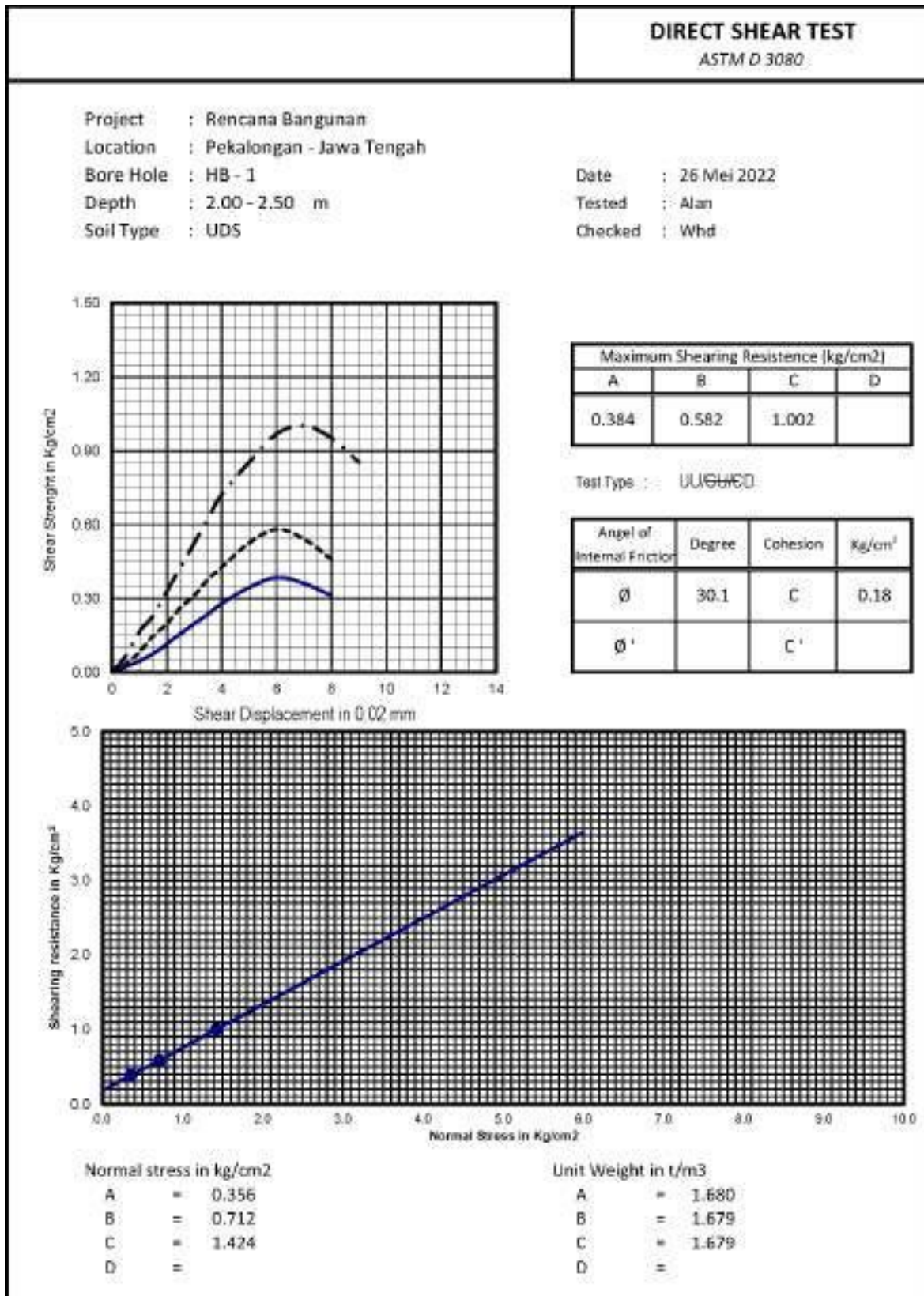
**Table 6.167 Results of Triaxial**



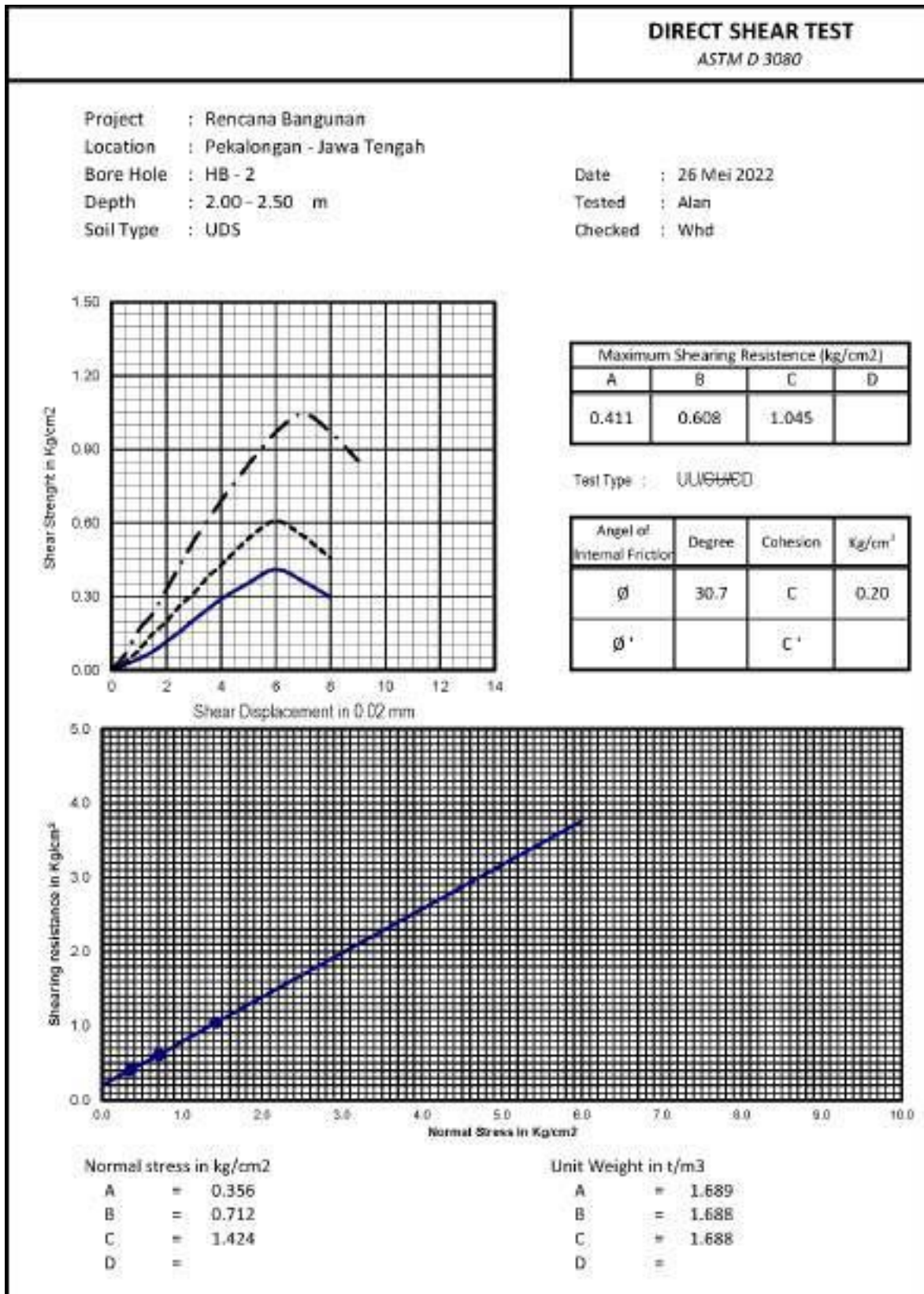


### 6.7.5 Direct Shears

**Table 6.18 Results of Direct Shears HB 01**



**Table 6.19 Results of Direct Shears HB 02**





## 6.8 Summary and Bore Log

### 6.8.1 Summary of Laboratory Result

**Table 6.20 Summary of Soil Test Results at the Laboratory**

PROJECT	Preparation of DED (Detailed Engineering Design) of PIM Coastal Area Protection in Pekalongan City						
LOCATION	Pekalongan - Central Java						
BORE HOLE NO.	Unit	HB - 1	HB - 2	HB - 3	HB - 4	HB - 5	
SAMPLE DEPTH	m	2.00 - 2.50	2.00 - 2.50	6.00 - 6.50	6.00 - 6.50	6.00 - 6.50	
SAMPLE TYPE		UDS	UDS	UDS	UDS	UDS	
INDEX PROPERTIES	<b>VOLUME WEIGHT</b>						
	Specific Gravity ( G <sub>s</sub> )		2.628	2.630	2.598	2.596	2.596
	Natural Water Content ( w )	in %	34.54	33.86	59.23	61.35	60.37
	Bulk Density ( g m )	in t/m <sup>3</sup>	1.680	1.689	1.556	1.547	1.552
	Dry Density ( g d )	in t/m <sup>3</sup>	1.249	1.262	0.977	0.959	0.968
	Void Ratio ( e )		1.105	1.084	1.659	1.708	1.682
	Porosity ( n )		0.525	0.520	0.624	0.631	0.627
	Degree of Saturation ( S <sub>r</sub> )	in %	82.18	82.17	92.75	93.23	93.18
	<b>ATTERBERG LIMITS</b>						
	Liquid Limits ( LL )	in %	NP	NP	84.76	86.78	87.22
	Plastic Limits ( PL )	in %	NP	NP	32.85	33.92	34.03
	Plasticity Index ( PI )	in %	NP	NP	51.91	52.86	53.19
	<b>HYDROMETER ANALYSIS</b>						
	Gravel	in %	0.00	0.53	0.00	0.00	0.00
Sand	in %	58.47	59.37	5.56	4.69	5.06	
Silt	in %	25.42	24.63	30.98	29.60	28.72	
Clay	in %	16.11	15.47	63.46	65.71	66.22	
ENGINEERING PROPERTIES	<b>CONSOLIDATION TEST</b>						
	Coefficient of Consolidation ( C <sub>v</sub> )	in cm/sec	0.00183	0.00184	0.00148	0.00144	0.00145
	Compression Index ( C <sub>c</sub> )		0.321	0.313	0.538	0.569	0.560
	<b>TRIAxIAL ( UU TEST )</b>						
	Cohesion ( c )	in Kg/cm <sup>2</sup>	-	-	0.126	0.117	0.120
	Friction Angle ( f )	in °	-	-	4.111	4.058	3.915
	<b>UNCONFINED COMPRESSION TEST</b>						
	Undisturbed Compressive Strength ( Q <sub>uu</sub> )	in Kg/cm <sup>2</sup>	-	-	-	-	-
	Re-molded Compressive Strength ( Q <sub>ur</sub> )	in Kg/cm <sup>2</sup>	-	-	-	-	-
	Sensitivity ( S <sub>I</sub> )		-	-	-	-	-
<b>DIRECT SHEAR TEST</b>							
Cohesion ( c )	in Kg/cm <sup>2</sup>	0.18	0.20	-	-	-	
Friction Angle ( f )	in °	30.1	30.7	-	-	-	
<b>COMPACTION</b>							
Optimal Water Content ( W <sub>opt</sub> )	in %	-	-	-	-	-	
Maximum Dry Density ( g <sub>d max</sub> )	in t/m <sup>3</sup>	-	-	-	-	-	
<b>C B R</b>							
CBR Design		-	-	-	-	-	
<b>PERMEABILITY</b>							
Coefficient of permeability ( k x -07 )		-	-	-	-	-	
<b>UNIFIED CLASSIFICATION</b>		SM	SM	CH	CH	CH	



## 6.8.2 Bore Log

Table 6.21 *Drilling Log* HB 01

DRILLING LOG				HOLE NO.	HB 01								
Project : Rencana Bangunan			Type of Drilling : Auger	Coordinate									
Location : Reklamasi - Jawa Tengah			Driller : Agus m	X									
Date : 30 Mei 2023			Supervisor : Rendu	Y									
DWI			Z										
Depth	Sampling	Symbol	Soil Description	Soil Laboratory Results									
				γ <sub>w</sub> ton/m <sup>3</sup>	G <sub>s</sub>	W %	LL %	PL %	Type	C kg/m <sup>3</sup>	φ		
0.0													
0.5													
1.0		SP	SAND, Blackish Grey, fine to coarse grains, poorly graded, moist, loose.										
1.5													
2.0	UDS 1	SM	Silty SAND, Black, fine grains, poorly graded, wet, loose.	1.680	2.628	34.54	NP	NP	SM	0.18	30.1		
2.5													
3.0													
3.5													
4.0													
4.5		SP	SAND, Black mottled white, fine to coarse grains, poorly graded, wet, loose, contain shell fragment.										
5.0													
5.5													
6.0			Drilling stopped at 6.0 m depth										
6.5													
7.0													
7.5													
8.0													
8.5													
9.0													
9.5													
10.0													



Remarks:  UDS (Undisturbed Sample)  
 DS (Disturbed Sample)

Table 6.22 Drilling Log HB 02

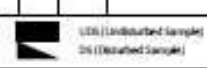
DRILLING LOG				HOLE NO.	HB 02							
Project : Rencana Bangunan		Type of Drilling : Auger		Coordinate								
Location : Pekalongan - Jawa Tengah		Driller : Agus m		X								
Date : 20 Mei 2022		Supervisor : Pando		Y								
DWL : -				Z								
Depth (m)	Sampling	Symbol	Soil Description	Soil Laboratory Results								
				γ <sub>sat</sub> (kN/m <sup>3</sup> )	G <sub>s</sub>	W %	LL %	PL %	Type	C (kg/cm <sup>2</sup> )	φ	
0.0												
0.5												
1.0		SP	SAND, Blackish Grey, fine to coarse grains, poorly graded, moist, loose.									
1.5												
2.0	UIDS 1		3.00 m	1.689	2.630	33.86	NP	NP	SM	0.20	30.7	
2.5												
3.0												
3.5												
4.0		SM	Silty SAND, Black mottled white, fine grains, poorly graded, wet, loose, contain shell fragment.									
4.5												
5.0												
5.5												
6.0			4.00 m									
6.5			Drilling stopped at 6.0 m depth									
7.0												
7.5												
8.0												
8.5												
9.0												
9.5												
10.0												
Remarks :												

Table 6.23 Drilling Log HB



DRILLING LOG				HOLE NO.	HB 03								
Project : Rencana Bangunan		Type of Drilling : Auger		Coordinate									
Location : Pekanbaru - Jawa Tengah		Driller : Agus cs		X									
Date : 31 Juli 2022		Supervisor : Pandu		Y									
GWL : -				Z									
Depth	Sampling	Symbol	Soil Description	Soil Laboratory Results									
				$\gamma^m$ t/m <sup>3</sup>	G <sub>s</sub>	W %	LL %	PL %	Type	C kg/c m <sup>3</sup>	↓		
0.0													
0.5													
1.0													
1.5													
2.0		SM	Silty SAND, Blackish Brown, fine grains, poorly graded, moist, loose.										
2.5													
3.0													
3.5													
4.0													
4.5													
5.0		CH	Silty CLAY, Blackish Brown, medium plasticity, moist, medium stiff, contain fine sand.										
5.5													
6.0	JDS 1												
6.5					1.536	2.598	59.23	84.76	32.86	CH	0.126	4.111	
7.0		OH	Silty CLAY, Grey, high plasticity, wet, soft.										
7.5													
8.0													
8.5													
9.0													
9.5													
10.0													
Drilling stopped at 8,0 m depth													
Remarks :  JDS (Undisturbed sample)  DS (Disturbed sample)													

Table 6.24 *Drilling Log* HB

DRILLING LOG				HOLE NO.		HB 04											
Project : Rencana Bangunan		Type of Drilling : Auger		Coordinat													
Location : Pelalangan - Jawa Tengah		Driller : Agus m		X													
Date : 31 Juli 2022		Supervisor : Pandu		Y													
GWS : -				Z													
Depth	Sampling	Symbol	Soil Description	Soil Laboratory Results													
				T <sub>r</sub> t <sub>tr</sub> m <sup>3</sup>	G <sub>s</sub>	W %	LL %	PL %	Type	C kg/c m <sup>3</sup>	φ						
0.0																	
0.5																	
1.0																	
1.5																	
2.0		SM	Silty SAND, Blackish Brown, fine grains, poorly graded, moist, loose.														
2.5																	
3.0																	
3.5																	
4.0																	
4.0																	
4.5																	
5.0		CH	Silty CLAY, Blackish Brown, medium plasticity, moist, medium stiff, contain fine sand.														
5.5																	
6.0																	
6.0	UIDS 1				1.547	2.996	61.35	86.78	33.92	CH	0.117	4.058					
6.5																	
7.0		OH	Silty CLAY, Grey, high plasticity, wet, soft.														
7.5																	
8.0																	
8.0			Drilling stopped at 8.0 m depth														
8.5																	
9.0																	
9.5																	
10.0																	





Remarks:  UDS (Undisturbed Sample)  
 DS (Disturbed Sample)



Table 6.25 Drilling Log HB

DRILLING LOG				HOLE NO.	HB 05														
Project : Rencana Bangunan		Type of Drilling : Auger		Coordinat															
Location : Pelalangan - Jawa Tengah		Driller : Agus D		X															
Date : 01 Jul 2022		Supervisor : Pando		Y															
GWL : - m				Z															
Depth	Sampling	Symbol	Soil Description	Soil Laboratory Results															
				γ <sub>m</sub> t/m <sup>3</sup>	G <sub>s</sub>	W %	LL %	PL %	Type	C kg/m <sup>2</sup>	φ								
0.0																			
0.5																			
1.0																			
1.5																			
2.0		SM	Silty SAND, Blackish Brown, fine grains, poorly graded, moist, loose.																
2.5																			
3.0																			
3.5																			
4.0																			
4.5																			
5.0		CH	Silty CLAY, Blackish Brown, medium plasticity, moist, medium stiff, contain fine sand.																
5.5																			
6.0	UOS 1																		
6.5																			
7.0		OH	Silty CLAY, Grey, high plasticity, wet, soft.																
7.5																			
8.0																			
8.5																			
9.0																			
9.5																			
10.0																			
Remarks :  UOS (Undisturbed Sample)  OH (Observed Sample)																			

**NPA** NAWA PANCADASA ABADI

## CHAPTER 7 EXISTING VEGETATION INVENTORY SURVEY

### 5.1.1.68 7.1 Introduction

Pekalongan, which is located on the North Coast of Java Island, is one of the regions that have mangrove areas like other areas on the north coast of Java Island. Geographically, mangrove forests are usually found along the tropical and subtropical coasts, between 32° North Latitude and 38° South Latitude. Therefore, our country is fairly significant in providing mangrove land in the world and is ranked 1<sup>st</sup>, followed by Brazil and other countries.

Mangrove forest is a complex ecosystem consisting of coastal flora and fauna, living simultaneously in land and seawater habitats, between the high and low tide boundaries. Mangrove is also one of the components in 3 series of important ecosystems in coastal areas other than coral reefs and seagrass beds. Tree groups in mangrove areas can consist of only a certain tree species or a group of tree communities that can live in brine water. Natural mangrove forests grow abundantly and extensively in large deltas and river basins with wide estuaries. Mangrove forests have a great tolerance for salt content and can develop on land with high salinity where ordinary plants cannot grow.

The results of analysis conducted by the Ministry of Marine Affairs and Fisheries (KKP) indicate that mangroves in Pekalongan are at an index of 2.3 or it can be said that they have high vulnerability.

0.1 - 1.0 : Low.

1.1 - 2.0 : Medium.

2.1 - 3.0 : High.

This shows that mangroves existing in Pekalongan City must be immediately recovered.

### 7.2 Purpose and Objective

The purpose of the existing vegetation inventory survey work in the PIM mangrove area is to obtain information related to the presence of mangroves in that location.

The objective of the existing vegetation inventory survey work is to obtain a baseline overview for the mangrove planting program along with improvements to both methods and ways to make it effective.

### 7.3 Scope of Work

The scope of the existing vegetation inventory survey includes the collection of information and data on mangroves around the PIM area, completed with sample photo documentation of each type of plant found.

## 7.4 Survey Methodology

### 7.4.1 Tools Used

1. Canoe or done by walking during the low tide on the onshore side that can bereached.
2. GPS or Mobile Phone with GPS.
3. Camera.
4. Drone.
5. Recording board.
6. Computer.





### 7.4.2 Observation, Interview and Analysis



- a) Compiling a catalog of mangroves which are endemic to Indonesia and especiallyPekalongan.
- b) Taking photos both macro and aerial photos.
- c) Compiling a database resulting from the observation and matching it with the endemicspecies first.
- d) Plotting location mapping, coordinates of similar mangroves in the location.
- e) Direct interviews with the community are purposive in accordance with the purpose of this survey, namely to inventory mangroves. Open-ended questions related to mangrove planting include:
  - a) Physical data: planting area, mangrove species planted, number of plants.
  - b) Role of stakeholders: government, private sector and surrounding communities related to the local field condition.
- f) Secondary data analysis by utilizing the data and information obtained from journals and publications related to mangroves in the Crematorium Beach area.

## 7.5 Results of Survey and Discussion

### 7.5.1 Mangrove Reference

5.1.1.69 **Table 7.1 Morphological Characteristics of the Vegetative Organs of Mangrove**

Name of Species	Morphological Characteristics of the Vegetative Organs Of Mangrove						Visual
	Stature (stem)	Root	Leaf				
			Leaf arrangement	Leaf Layout on the Stem	Leaf Blade	Leaf Tip	
1. <i>Rhizophora mucronata</i> Lam	tree	taproot	single	face-to-face	ellipse	Tapered/sharp, the underside of the leaf has many small black spots	
2. <i>Sonneratia caseolaris</i> (L.) Engl		pneumatophore	single	face-to-face	Ovoid	rounded	
3. <i>Sonneratia alba</i> J. Sm		pneumatophore	single	face-to-face	Ovoid	rounded	
4. <i>Xylocarpus moluccensis</i> (Lam.) M. Roem		pneumatophore	compound	alternate	Ovoid	taper	

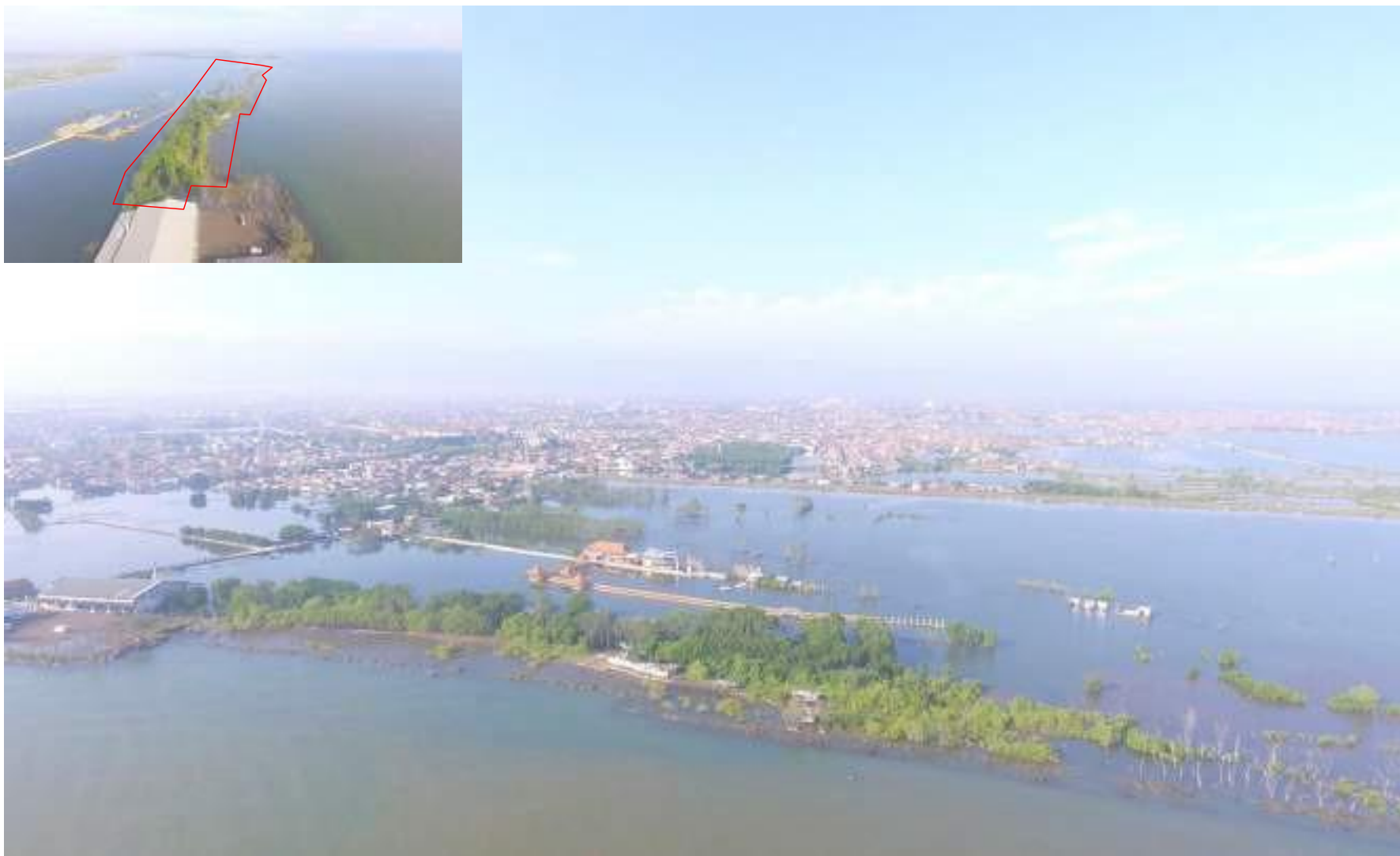
Name of Species	Morphological Characteristics of the Vegetative Organs Of Mangrove						Visual
	Stature (stem)	Root	Leaf				
			Leaf arrangement	Leaf Layout on the Stem	Leaf Blade	Leaf Tip	
<i>5. Avicennia alba Blume</i>		pneumatophore	single	face-to-face	lanceolate	taper	
<i>6. Lumnitzera racemosa Willd</i>		without aerial roots	single	alternate	lanceolate	split	

Source: Adaptation from Maria Teresia Danong, et al. (2019)

### 7.5.2 Mangrove Planting Area

As previously informed, the mangrove planting area is around 9.5 ha (2012). However, due to the condition of the land which continues to be critical due to prolonged coastal flooding, the results of field identification show that the remaining mangrove planting area is about± 2.3 ha. The results of aerial observation resulting from drone photograph on 15 May 2022 are shown in Figures 7.1 and 7.2.





**Figure 7.1 Area Identification with a Bird's-eye View from the East of Mangrove Inventory**



5.1.1.70 Figure 7.2 Aerial identification plan for Mangroves

The PIM (Mangrove Information Center) area is an educational tourism mangrove forest which was inaugurated in 2013. This tourist destination complements Pekalongan City, rich in marine tourism potential which is attractive to nature lovers. In addition, it becomes a tourist attraction to enjoy the beauty of mangroves on the beach. At the beginning of PIM operations, many people visited it. Some interesting activities that can be carried out at Pekalongan Mangrove Park, in relation to its main function as a tourist attraction, were learning about coastal ecosystems and how to plant mangrove seedlings, fishing, enjoying the beauty of flora and fauna collections, especially birds that nest on trees of the mangrove forest, watching fish and crab pond cultivation activities while enjoying the sunset, fresh and pollution-free air in the middle of the city. Furthermore, the management was also open and provided opportunities for anyone who wants to participate in preserving it by planting mangroves in Pekalongan. Thus, the mangroves in that area were not only planted by the local government but by all communities who also cared about the ecosystem, environment, and abrasion vulnerability in the Pekalongan area.

The coastal flooding that continues to hit the area lately causes a decrease in community visits and there are almost no visitors. Meanwhile, the PIM area is not handled properly because it is always nearly inundated. Figure 6.3 provides an illustration of the severity of coastal flooding in the Crematorium Beach location.



5.1.1.71

**Figure 7.3 Coastal Flooding Condition at the Crematorium Beach, Crematorium Yard Location 13 May 2022 and 29 July 2022**

From the results of direct survey to the Crematorium Beach location on 13 – 15 May 2022 and 29 - 30 July 2022, plants in the mangrove forest were already inundated by the high tide because they were not strong enough to withstand swift erosion thus, they are immersed. The same condition applies to the right and left sides of the gazebo. In addition, the bridge that was built along the ecotourism area as a foothold for tourists who want to take a walk, take photos and enjoy the aesthetics of the mangrove forest up close has started to be immersed thus it can no longer function properly. The crematorium building exactly on the beach is nearly inundated by seawater during the high tide and water can enter the place of worship where the remains are stored.

Based on the online news site nativeindonesia.com, it can be said that parts of the Pekalongan Park mangrove area have been immersed and the coastline is even barely visible anymore. This condition is quite critical and concerning and if ignored continuously, Pekalongan City can also undergo significant land subsidence so that standing water rises and affects urban buildings. As expected, and known, the main function of making mangrove forests is to prevent erosion and abrasion so as not to let seawater rise inland.

Based on direct observation in the Crematorium Beach location and the Mangrove Information Center as well as information obtained from local residents who participated in planting the two trees, approximately 2,500 mangroves of the red mangrove species (*Rhizophora mucronata* Lam) and *api-api* (*Avicennia alba* Blume) were planted in the planting area of ± 2.3 ha in 2006.

Meanwhile, data obtained from the Maritime Affairs and Fisheries Service Office of Pekalongan City shows that until 2012, planting by the communities has been carried out as shown in Table 7.2.

**5.1.1.72 Table 7.2 Data on mangrove planting at PIM (2012)**

SOURCE	NUMBER OF SEEDLINGS (STEMS)	MANGROVE SPECIES
APBN of the Ministry of Forestry (KBR- BPDAS Pemali Jratun)	150,000	Rhizophora sp.
State Budget of the Ministry of Forestry (KBR- BPDAS Pemali Jratun)	25,000	Avicennia sp.
State Budget of KP3K of the Ministry of Marine Affairs and Fisheries of the Republic of Indonesia	25,000	Rhizophora sp.
IPB Bogor	5,000	Rhizophora sp.
Regional Budget of Pekalongan City	5,000	Rhizophora sp.
LSM Bintari	15,000	Rhizophora sp.
CSR of FIF	5,000	Rhizophora sp.

However, the initiative to plant mangroves could not be carried out continuously because of the continuous coastal flooding, in addition to the degraded area due to land subsidence that causes the loss of planting areas washed away by seawater. Meanwhile, efforts to carry out recovery of the mangrove area also cannot instantly overcome coastal flooding.

Efforts to place coastal protection, such as Geotube in 2014-2015, have also been prejudiced so that they are ineffective in protecting the mangroves behind them. Since the intensive mangrove planting in 2012, there has been practically no more mangrove planting program in that location.

Ario, R., et al. (2017) reports the results of a survey carried out by his team until July 2014 indicating that the planted mangroves grew to a height of 30-50 cm, but after August 2014 when the research was conducted, various types of the planted mangrove vegetation were in fact gone. The surviving mangrove vegetation was *Rhizophora* sp. and *Avicennia* sp. This condition was made possible because of poor water circulation resulting in the withering of the mangrove vegetation.

### 7.5.3 Results of Interview and Observation

#### a) Planting method

The method of planting mangroves, of course, begins with identifying the species of tree seedlings to be planted based on the tree characteristics. The red mangrove or *Rhizophoramucronata* Lam sp. is a species of mangrove that is suitable for planting in muddy and watery soil media, for example swamp. These seedlings, which are about 30 cm high, tend to be sensitive to waves, especially because the diameter of the stem cavity and the taproot posture that has not yet been formed so that it cannot support its body perfectly. To plant red mangrove seedlings using the correct method, seeds are usually sown in environmentally friendly polybags so that the root and around 4 to 6 leaves come out first. Thereafter, planting is carried out by digging the muddy soil at a shallow depth until the root in the polybag are covered with mud media. The distance between planting each seedling is usually adjusted to the planting location and the number of seedlings to be planted. The distance between trees is usually about 20 cm to 25 cm.

The steps for planting *api-api* or *Avicennia alba* Blume sp. are almost the same. However, this *api-api* species of mangrove has a slight advantage compared to the red mangrove, namely it can live in various environments, both sandy and muddy. Furthermore, as previously explained, the pneumatophore of this tree has the property of being able to collect soil sediment because the shape of the roots comes out to the ground surface so that they are not easily eroded by seawater. The seed sowing method is the same, both of them use environmentally friendly polybags, while the seedlings are also sensitive because they still have stems that break easily. However, when they start to grow about 30 cm and have a woody stem in about 1 and a half months, the seedlings are ready to be planted. About the age of 3 months, these trees will grow roots that come out to the ground so that they will quickly grow large.

The following are the morphological characteristics of the mangrove species in the mangrove forest location of Crematorium Beach.

In the location, there are 2 (two) very dominant species, consecutively namely *Rhizophoramucronata* Lam sp. (red mangrove), *Avicennia alba* Blume (*api-api*), and a small number of *Bruguiera gymnorhiza* sp. (oriental mangrove). These three plants have their own peculiarities. **Figure 6.8** shows *Rhizophora mucronata* Lam sp in general, usually being a pioneer mangrove, which can grow in mud areas, while *Avicennia alba* Blume (*api-api*) can generally grow stronger because it has roots that stick deep into the ground. Meanwhile, *Bruguiera gymnorhiza* sp. (oriental mangrove) is found in small quantities. This plant can generally grow to a height of 15 m but can also reach a height of 30 m. Nevertheless, this plant is relatively less popular for planting due to lack of nurseries.



5.1.1.73 Table 7.3 Morphological Characteristics of the Vegetative Organs of mangrove at PIM Pekalongan




Name of Species	Morphological Characteristics of Plant Organs						Plant photo
	Stem	Root	Leaf				
			Leaf arrangement	Leaf layout on the stem	Leaf blade	Leaf tip	
Rhizophora mucronata Lam sp. (red mangrove)	Tree	Taproot	Single	Face-to-face	Ellipse	Tapered/sharp, the underside of the leaf has many small black spots	
Avicennia alba Blume sp. (api-api)		Pneumatophore	Single	Face-to-face	Lanceolate	Taper	
Bruguiera gymnorhiza sp. (oriental mangrove)		Pneumatophore	Single	group at the end of a branch,	Rather thick like hides	Taper	



Figure 7.4 Avicennia alba Blume (*api-api*) behind the Crematorium





**Figure 7.5 Rhizophora mucronata Lam sp. (red mangrove)**



**Figure 7.6 Bruguiera gymnorhiza sp (Oriental Mangrove)**

b) **Community Participation**

Community participation is an absolute prerequisite for maintaining the sustainability of mangrove replanting in the study area. The results of direct observation in the field require coordination down to the lowest level in the surrounding communities to be able to drive and raise their concern.

The focus in the future will be on the planting system, starting from the nursery to the planting and maintenance of the formed mangrove forest.

Subsequently, the planting mechanism needs to be thought of further, while it is important involve community leaders who have skills, experience, concern as well as the local Sub- district in future programs.

## 7.6 Conclusion

- a) Based on the experience of local residents, the type of mangrove that is suitable and can survive is *api-api* or *Avicennia alba* Blume sp. when compared with *Rhizophora mucronata* Lam sp. The selection of plants suitable to the field condition will be very useful for planning the future planting programs.
- b) A more diversified mangrove planting pattern will be very beneficial for preserving the environment of mangrove forest.
- c) The issue of maintenance and monitoring is very important to be paid attention to. Based on the experience gained, a sustainable program is needed. From 2012, when the planting program was quite intensive, it was not accompanied with a continuous maintenance and monitoring plan, in addition to the coastal flooding which had not been resolved, making the mangrove areas at PIM become neglected.
- d) The participation of the local communities is absolutely necessary in the replanting program, because a mangrove habitat really needs the stability of the remaining land condition and vice versa.

## 7.7 Response to the Results of Study

### Spread of Mangroves and Their Species

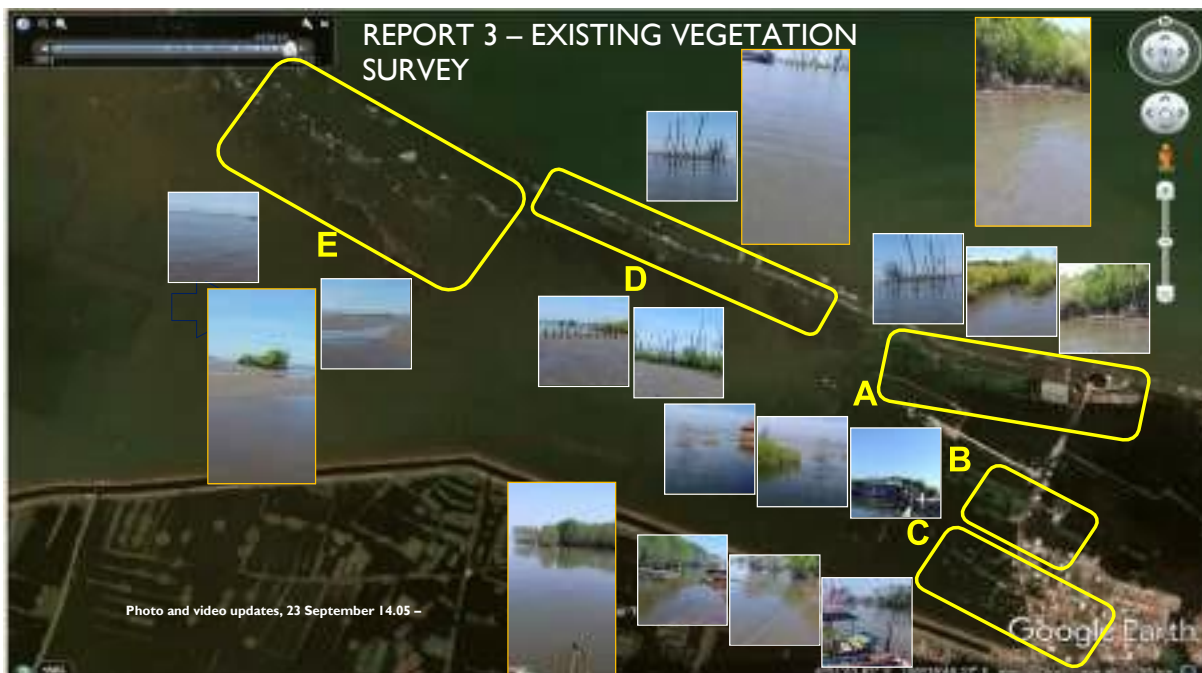


Figure 7.7 Spread of mangroves and their species



5.1.1.74 Figure 7.8 Mangrove colony in area A, results of identification dominated by *Rhizophora mucronata* Lamsp. (red mangrove)



5.1.1.75 Figure 7.9 Mangrove colony in area A, results of identification dominated by:  
***Rhizophora mucronata* Lamsp. (red mangrove)**





5.1.1.76 Figure 7.10 Mangrove colony in area C, results of identification dominated by:  
**Rhizophora mucronata Lamsp. (red mangrove)**



5.1.1.77

Figure Gambar 6.7.11 Mangrove colony in area D, results of identification dominated by.





5.1.1.78 Figure 7.12 Mangrove colony in area E, results of identification dominated by:  
***Avicennia alba* Blume (*api-api*)**



## CHAPTER 8 AVAILABILITY, LOCATION AND BUILDING MATERIAL PRICE SURVEY

### 8.1 Introduction

In the construction process, the availability of materials is a determining factor for the implementation of construction work, as well as in the plan to construct a coastal protection structure in the form of a breakwater as requested in the Terms of Reference (TOR).

### 8.2 Purpose and Objective

The purpose of this availability, location and building material price survey is to obtain data and information on the location, supply and material price for the need for breakwater construction materials in the form of alternative natural stone and concrete materials.

The objective of the availability, location, and building material price survey has the material criteria as follows:

- 1) Crushed natural stone (not river stone) for core material of 200-1000 kg.
- 2) Crushed natural stone (not river stone) for armor of 1,500 kg.
- 3) Ready mix concrete of K-350 quality or higher.

### 8.3 Scope of Work

The scope of work of the availability, location and material price survey includes location identification, on-site field survey, analysis of availability, and accessibility related to the distance from the quarry location to the location of the planned construction in the PIM Area, Pekalongan.

### 8.4 Location

The location for carrying out the availability, location and material price survey is around Pekalongan City, Central Java, and Central Java Boundaries.

### 8.5 Survey Period

The on-site survey was carried out on 13 - 15 May 2022 and 23-25 May 2022.

### 8.6 Survey Method and Stage

The steps taken are as follows:

- a) Seeking information as much as possible through the official channels regarding information on sources of crushed natural stone and batching plants that meet the criteria above.
- b) Carrying out direct observation to locations that provide those materials.
- c) Analyzing and optimizing the use of river stone including the following aspects: Cost – Quality and Time.

The elaboration of the three aspects above is as follows:

- The cost of material price must be as low as possible with a score of 1-10. The cheaper it is, the higher the score is.
- Quality is analyzed by visual observation in the location with a Scale of 1-10. The better it is, the higher the scale is.
- Time takes into account the distance and travel time to the project location with a scale of 1-10. The closer it is, the higher the scale is.

The results of the analysis shown in the tabulation with the assumption of balanced weighting (33%) of each aspect reviewed are ranked, with the highest total value being the best material that can be used in breakwater work.

## 8.7 Results of Survey and Discussion

### 8.7.1 Availability

A breakwater is made as a form of coastal protection against erosion by breaking wave energy before it reaches the beach. There are several types of breakwaters, among others sloping side breakwater, vertical side breakwater and combined side breakwater. The material for building this breakwater depends on the shape of the breakwater type that will be made according to the resulting modeling analysis. In general, a breakwater can be made of materials such as masonry, steel pavement cells filled with soil or rock, concrete piles, steel or concrete pavement walls, concrete caissons and others.

In accordance with the Terms of Reference (TOR), the required building materials of the breakwater are as follows:

- 1) Crushed natural stone (not river stone) for materials of 200 – 1,000 kg.
- 2) Crushed natural stone (not river stone) for armor of 1,500 Kg
- 3) Ready mix concrete of K-350 quality or higher.

The results of observation from the primary survey obtain information on the sources of crushed natural stones and concrete suppliers from the batching plants located both in Pekalongan and outside Pekalongan.

The results of field inspection find the material sources of river stone, andesite stone (crushed natural stone), and andesite stone (KW1). Each material source location in Table 8.1 can provide materials with a size of 200 Kg – 1,000 Kg for core materials and a size of

1,500 Kg for armor. The material source location closest to the location of the planned breakwater construction is Broko, Wonotunggal with a distance of 23.5 Km from the location of the planned breakwater construction in the PIM Coastal Area, Pekalongan City.

Meanwhile, the source of material with the quality of crushed natural stones in accordance with the requirements of the KAK was found outside Pekalongan, namely the nearest location in Limpung District, Batang Regency located 46.2 Km from the location and the farthest location is in Majalengka, West Java located 175 Km from location of the planned breakwater construction in the PIM Coastal Area, Pekalongan City.

Based on the analysis of 3 (three) criteria, namely cost, quality and time, it was concluded that the highest score for the source of materials with the lowest cost, good quality and the shortest average distance was found in the source of andesite stone materials located in Limpung District, Batang Regency, Central Java.

**5.1.1.79 Table 8.1 Crushed natural stone materials for core material of 200-1000 kg for 1,500 kg armor**

No	Lokasi	Jenis Batu	Spes	Harga per Ton/m3		Jarak	Mata		Jarak ke Lokasi		Skor
				Inc PPN 11%	Inc Transport s/d Lokasi		Mata	Rorak	Jarak	Rorak	
1	Kec. Dukupuntung, Kab Cirebon	Batu Andesit	200 Kg s/d s 1000 Kg 1.500 Kg	350,000 390,000	0	Batu Andesit	0	175 Km	+	03	
2	Kec. Limpung, Kab Batang	Batu Kali Boulder	200 Kg s/d s 1000 Kg 1.500 Kg	350,000 350,000	0	Batu Andesit	0	46,2 Km	+	22	
3	Majalengka, Cirebon	Batu Andesit	200 Kg s/d s 1000 Kg 1.500 Kg	467,000 467,000	0	Batu Andesit (177/11)	7	175 Km	+	09	
4	Danu Kapah, Cirebon	Batu Andesit	200 Kg s/d s 1000 Kg 1.500 Kg	1.000,000 1.000,000	4	Batu Andesit	0	175 Km	+	08	
5	Areni Sorah Dan Keban, Brokoh, Wonotunggal, Kab Batang, Jawa Tengah* (tidak ada surat pemenuhan resmi)	Batu Kali	200 Kg s/d s 1000 Kg 1.500 Kg	305,000 305,000	3	Batu Kali	4	23,5 Km	0	05	



1. Documentation of river stones, location Brokoh



2. Documentation of natural stones, location Batang Regency

	
3. Documentation of natural stones, location Majalengka	4. Documentation of natural stones, location Palimanan, Cirebon
	
5. Documentation of natural stones, location Bobos, Dukupuntang, Cirebon	

**Figure 8.1 Documentation of the supply of natural stone materials**





5.1.1.80 Figure 8.2 Spread of quarry locations of natural stone materials

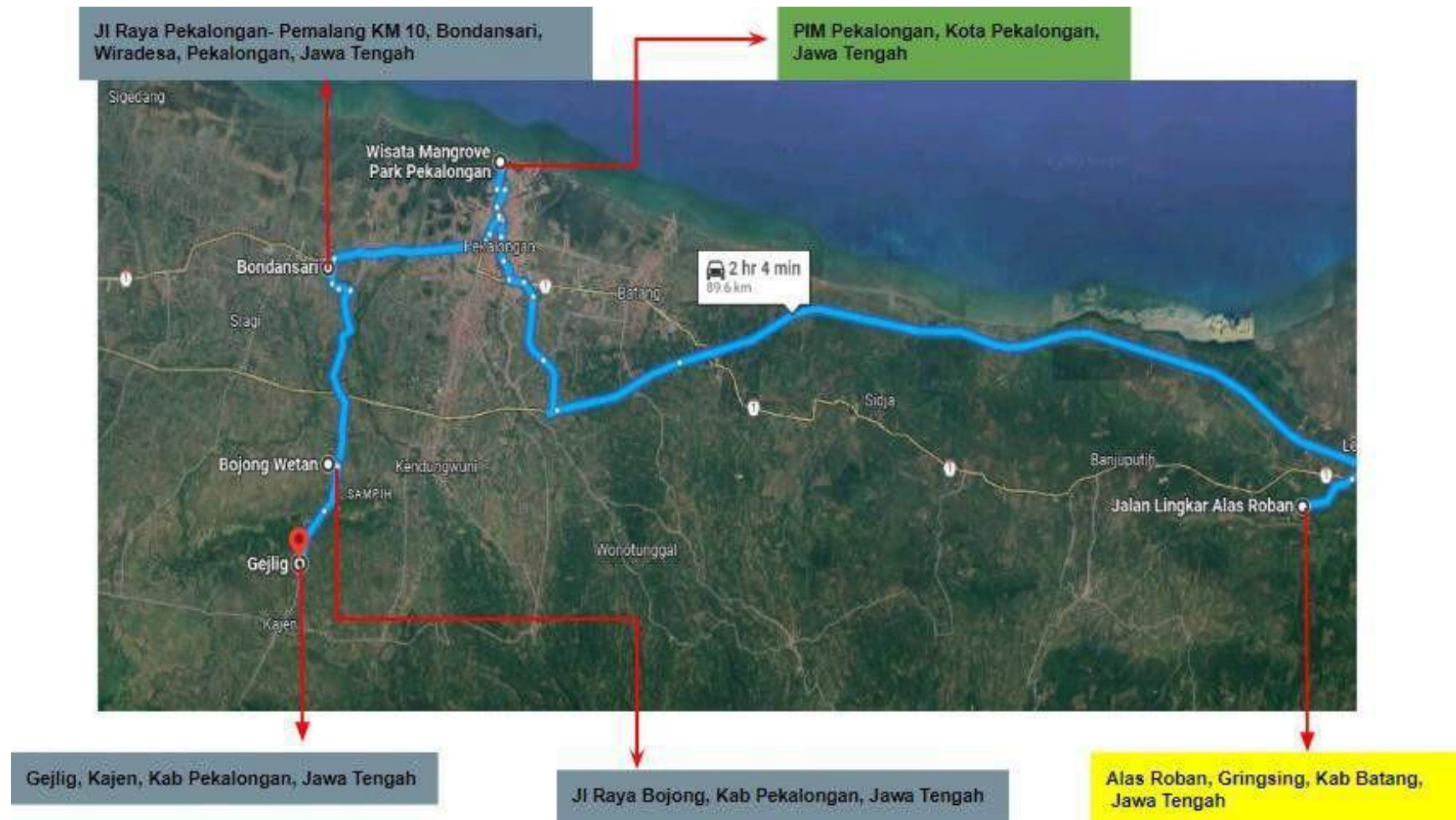


Figure 8.3 Spread of batching plant locations

An alternative material for the breakwater construction other than crushed natural stone is concrete with the quality qualification of K350 ready mix concrete or higher. In this case, the Consultant only displays the price information of K350 and K400 quality. In general, the availability of concrete quality is almost the same from each batching plant. Distance and cost become specific considerations for the source of this ready mix concrete material. The results of the primary and secondary inspections find 4 (four) closest locations of the batching plants providing K350 or K400 ready mix concrete from the location of the planned breakwater construction in the PIM Coastal Area, Pekalongan City.

The closest batching plant location is at Jl. Raya Pekalongan-Pemalang Km 10 Bondansari, Wiradesa, namely located +/-12.5 Km from the location of the planned breakwater construction in the PIM Coastal Area, Pekalongan City. Meanwhile, the farthest batching plant location from the 4 locations in Table 8.2 is in Kajen District Pekalongan Regency at a distance of 24 Km from the location of the planned breakwater construction in the PIM Coastal Area, Pekalongan City. The results of the tabulation of cost, quality and distance analysis conclude that the source of K350 or K400 ready mix concrete material with the lowest cost, distance and quality in accordance with the requirements is located namely in Tegalsari Village, Batang Regency, CentralJava.

**Table 8.2 Ready Mix Material of K350 Quality and K400**

No	Lokasi	Harga per Ton/m3		Rank	Mutu		Jarak ke Lokasi		Skor
		Inc PPN 11%			Mutu	Rank	Jarak	Rank	
		Inc Transport s/d Lokasi							
1	Gejig, Kec. Kajen, Kabupaten Pekalongan, Jawa Tengah	1,098,900	7	K350	8	24 Km	6	21	
		1,154,000		K400					
2	Jl Raya Pekalongan- Pemalang KM 10	1,054,000	5	K350	6	12,5 Km	7	20	
		1,087,000		K400					
3	Jl Raya Boyong, Kab Pekalongan	1,110,000	4	K350	8	14 Km	6	18	
		1,148,000		K400					
4	Ds, Tegalsari Kabupaten Batang, Jawa Tengah	900,000	8	K350	8	15,6 Km	6	21	
		950,000		K400					

**Quality**

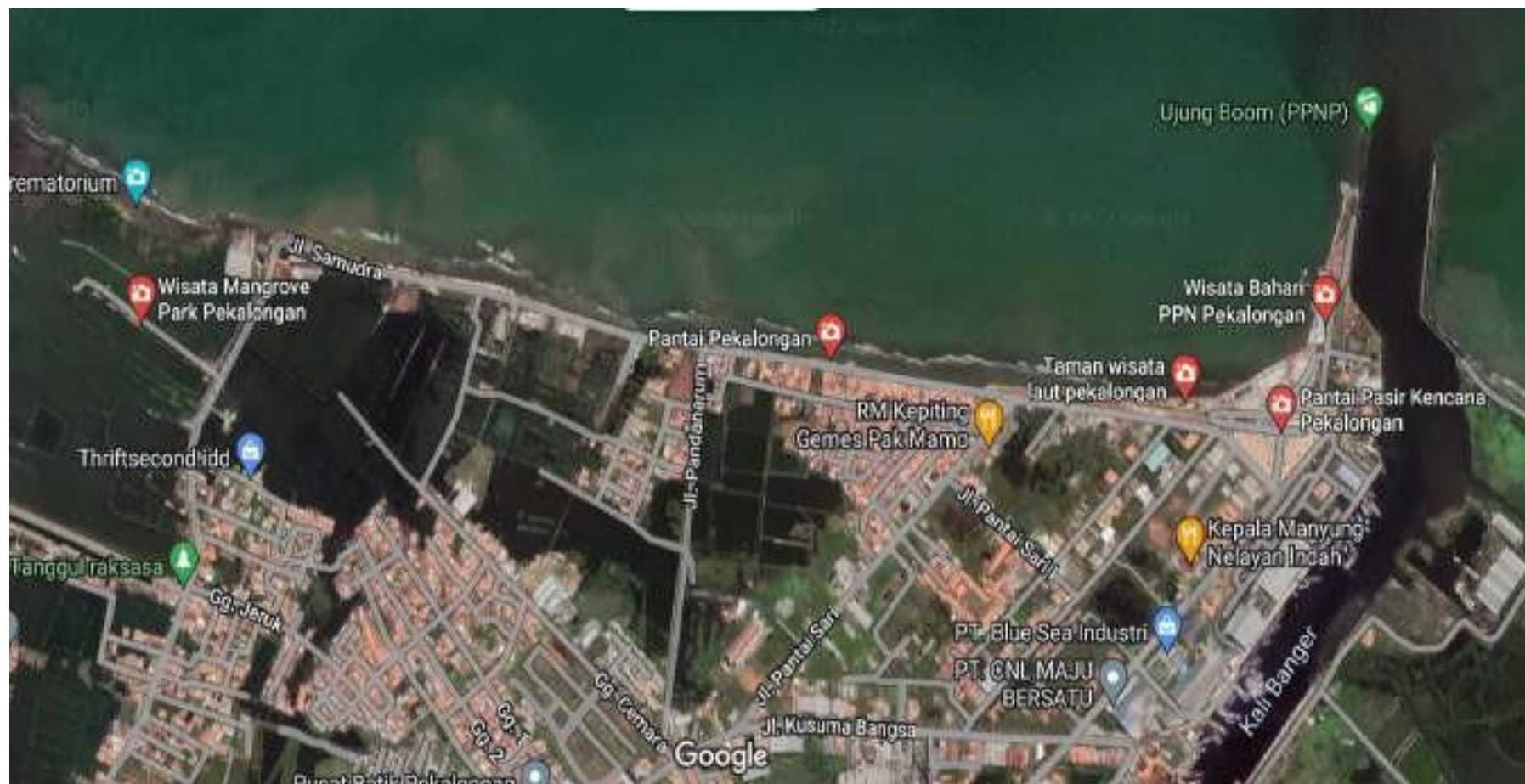
### 8.7.2 Accessibility

Pekalongan city is located 101 km west of Semarang city, or 384 km east of Jakarta. Pekalongan is known as the city of batik, because Pekalongan batik has a distinctive and varying pattern. In 2021, the population of Pekalongan city is 315,997 people with a density of 6,983 people/km<sup>2</sup>. Pekalongan is in the province of Central Java, Indonesia, bordering the Java Sea in the north, Batang Regency in the East, and Pekalongan Regency in the South and West, and is located on the North Coast Line that connects Jakarta - Semarang - Surabaya. Pekalongan City has an area of 4,525Ha out of the regional area of Central Java Province of 3,254 thousand Km<sup>2</sup> The farthest distance from the north to the south is ± 9 km, while from the west to the east is ± 7 km. The work location, namely the PIM Coastal Area, Pekalongan City, is located on the north coast of Pekalongan City with the Eastern and Western boundaries as follows:

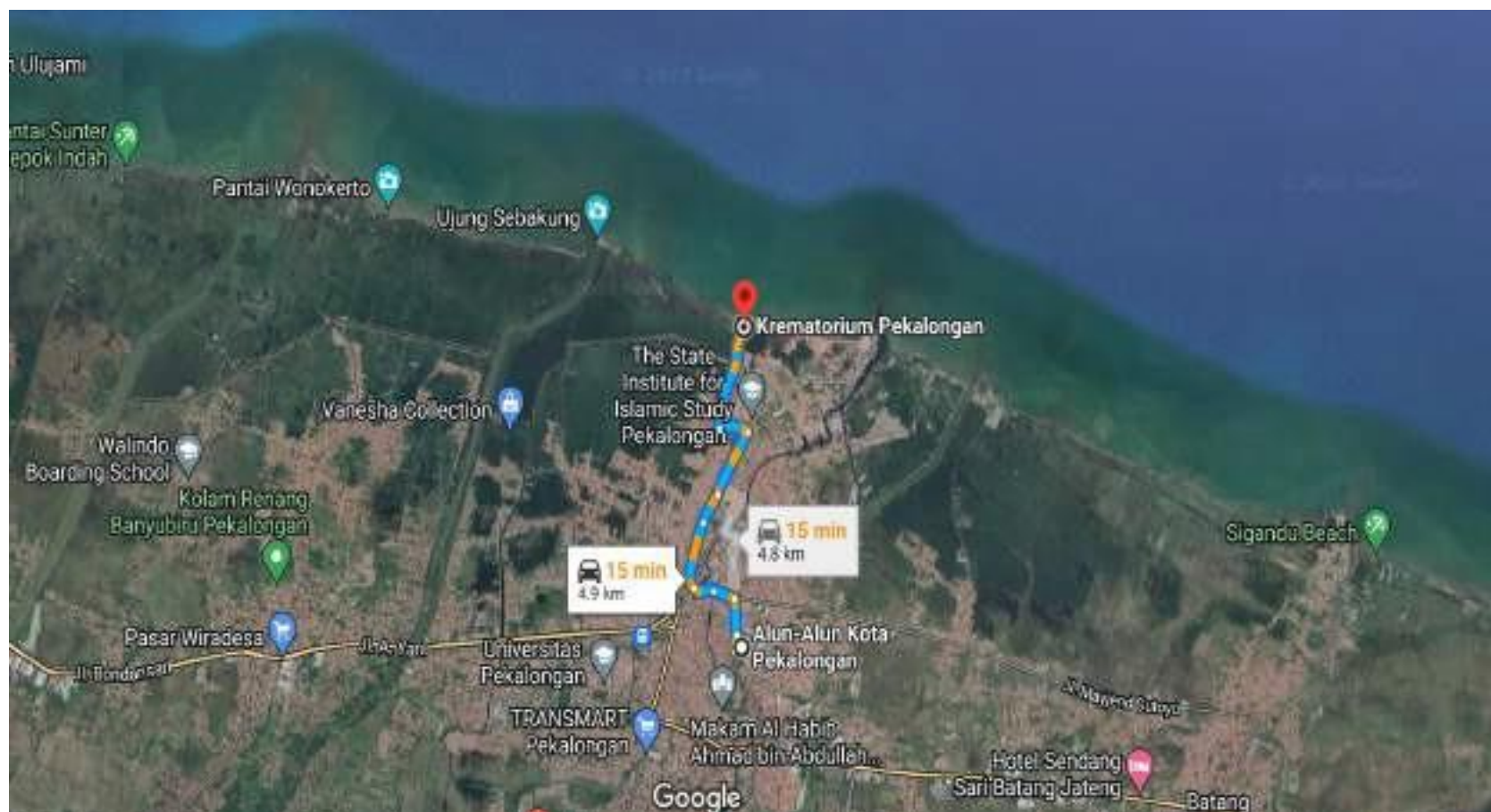
- a) The Eastern boundary of the Work Location is the Crematorium building of Pekalongan (Kandang Panjang Sub-district, Pekalongan Utara, Pekalongan City, Postal Code 51149).
- b) The Western boundary of the Work Location is the coastal boundary of Pekalongan City in the Western part. (Bandengan Sub-district, Pekalongan Utara, Pekalongan City, Postal Code 51149). It is not easy to obtain an official high-resolution map of the administrative boundaries of Pekalongan City. One of the official maps can be found in Regional Regulation of Pekalongan City Number 9 of 2020 on the Amendment to Regional Regulation of Pekalongan City Number 30 of 2011 on Spatial Layout Plan of Pekalongan City for 2009-2029.
- c) The Northern and Southern boundaries follow the measurement limits required in the topographical and bathymetric surveys as far as 250 m landward and seaward respectively from the coastline.
- d) Pekalongan Utara is a Coastal Conservation Area and is included in an area prone to coastal flooding of approximately 60 (sixty) hectares, partially located in the area of Pekalongan Utara District including Degayu Sub-district, Krapyak Lor Sub-district, Pajang Wetan Sub-district, Panjang Baru Sub-district, and Kandang Panjang Sub-district.
- e) The Eastern boundary of the Work Location is the Crematorium building of Pekalongan. The distance from Pekalongan city square to the Crematorium building of Pekalongan can be traveled in approximately 15 minutes or +/- 4.9 Km if using a four-wheeled or 2-wheeled vehicle. The road to the crematorium building can be accessed by 4-wheeled or 2-wheeled vehicles. The access road to the work location or the nearest location of the crematorium building is already an asphalt road in a relatively good condition.

The location can be accessed overall by land means of transportation both to and from the implementation location of the planned breakwater construction at PIM, Pekalongan.





5.1.1.81 Figure 8.4 Map of PIM Coastal Area, Pekalongan City



**Figure 8.5 Accessibility to the nearest location of work**



## 8.8 Conclusion

- a) The supply of natural stone materials as requested in the TOR is not available in Pekalongan City, but the material as intended in the TOR is available outside Pekalongan City. The closest distance is 46.2 km in Batang Regency.
- b) The existence of the batching plant as the supply of ready mix concrete material is located in Pekalongan City with the shortest distance of 12.5 km from the PIM location, Pekalongan.

## 8.9 Quotation Attachment

### a. Natural Stone Material Providers



**SRIWIJAYA STONE**  
 PRODUKSI & PRODUSEN BATU ALAM CIREBON  
 ( Andesit, Palmanan, Palm, Dll )

Pejabat : Jl. Rajah – Padalangsiring Desa Rajah Blok Mook RT 001 RW 008  
 Rumah : Jl. Raya Ki Ageng Tajuk Gg. Pasirtrusmi Desa Rajah  
 Blok Karanganyar No 7 RT 04 RW 03 Palmanan – Cirebon  
 HP : 08157181345 Email : denngumbara29@gmail.com

---

CIREBON , 30 Agustus 2022

No : 30/8/X/2022  
 Lamp :  
 Hal : Penawaran Harga  
 Batu alam pecahan 200 kg - 1.000 kg  
 dan pecahan 1.500 kg

Kepada Yth.  
 PT Nawa Pancadasa Abadi  
 Sudirman Central Business District  
 Jl Jend Sudirman Kav 52-52 Jakarta 12190

Dengan Hormat,

Selubungan dengan adanya kebutuhan pecahan Batu Alam Andesit untuk proyek pembuatan Breakwater di Pantai Pekalongan  
 Maka dengan ini kami SRIWIJAYA STONE selaku produsen batu alam bermaksud untuk mengajukan penawaran harga untuk pengadaan batu tersebut.

Jenis Batu : Batu Andesit  
 Ukuran : pecahan 200 - 1.000 kg dan 1.500 kg  
 Harga : 5.000.000 / Rit ( kurang lebih 5 ton )  
 Franco Pekalongan ( sudah termasuk bongkar )  
 Cara Bayar : CBD ( Cash Before Delivery )

Demikian surat penawaran harga ini kami sampaikan, atas perhatian dan kerjasamanya kami mengucapkan terima kasih.

Hormat kami,  
 SRIWIJAYA STONE

Denny Umbara  
 Pemilik

### Validity Period:

Pending a quotation update from the stone material supplier.

# ASFASTONE

Jl. Raya Provinsi Cirebon-Bandung, Desa Langlang Wetan Kec. Sulasungraji Kab. Majalengka  
HP. 0821 7312 7533

Nomor : Istimewa  
Lampiran : --  
Perihal : Penawaran Harga Bahan Baku Andesit

## Kepada Yth

Direktur PT Nawa Pancadasa Abadi  
Sudirman Central Business District  
Jl Jend Sudirman Kav 52-53 Jakarta 12190

*Dengan hormat,*

Kami dari ASFASTONE Perusahaan yang bergerak di bidang batu alam dan pengadaan bahan baku Andesit dilokasi Maja Majalengka, bermaksud menawarkan produk kami kepada Direktur Utama PT Nawa Pancadasa Abadi

Berikut daftar harga yang kami tawarkan :

1. Bahan Baku Batu Andesit kualitas super (KW 1) seharga Rp. 2.200.000/ ritasi (kapasitas mobil truk bak kayu, dengan muatan 6.5 Ton) dari lokasi gudang kami / tempat pengepakan/transit bahan.
2. Ongkos Gendong dari lokasi pengepakan sampai ke pekalongan Rp. 5.000.000, indeks mobil tronton
3. 1 (satu) mobil Tronton, kapasitas 6 mobil truk bak kayu.
4. Berlaku penawaran dalam kurun waktu 60 hari.


Jika berminat pada produk dengan harga yang kami tawarkan tersebut, ada beberapa metode pembayaran yang bisa dilakukan untuk menyelesaikan transaksi, yaitu :

- Pembayaran dengan cash
- Pembayaran dengan sistem deposit

Demikian surat penawaran harga ini kami sampaikan dengan harapan bapak Direktur/pemilik PT Nawa Pancadasa Abadi berminat pada produk yang ditawarkan. Atas perhatiannya kami ucapkan terima kasih

Bobos, 29 Agustus 2022

Owner



**DEDE BUDIMAN**

## Validity Period:

60 Days from the date of issuance of the quotation.

## CV. TRI JAYA PUTRA MANDIRI

Ds. Bobos Blok 02 Rt.03 Rw.04, Jl. Pasar Kramat – Rajagaluh  
Kec. Dukupuntang Kab. Cirebon  
Pusatbatualamcirebon.com

Perihal : Penawaran Kebutuhan Batu alam

Cirebon, 29- 08 - 2022

Kepada Yth.  
PT.Nawa pancadasa abadi  
JL. Jend sudirman Kav 52-53 Jakarta 12190

Dengan Hormat,

Bersama dengan ini kami dari Tri Jaya Putra Mandiri Stone bermaksud mengajukan penawaran Batu Alam kepada PT. Nawa pancadasa abadi , yang dimana penawaran kami berikan adalah harga terbaik untuk lebih mempercepat kerja sama antara Tri jaya Putra Mandiri dengan PT.Nawa pancadasa abadi harga yang kami tawarkan sudah termasuk ongkos pengiriman dengan sebagai berikut.

NO.	Kebutuhan	Berat/ukuran	Harga Per Balok	Total kebutuhan
1.	Batu alam Balok Andesit	1.000kg - 1.500kg	Rp. 590.000,-	1000m <sup>3</sup>
		200kg	Rp. 350.000,-	

Demikian surat penawaran ini kami sampaikan, besar harapan kami PT. Nawa pancadasa abadi berminat dengan harga yang kami tawarkan. Atas perhatian dan kerjasamanya kami ucapkan terima kasih.

Hormat Kami,

Ega Maulana Agustin  
Owner Tri Jaya PM Stone

### **Validity Period:**

Pending a quotation update from the stone material supplier.



## CV. MUNCUL JAYA

JASA – EKSPEDISI – LEVERANSIR – KONTRAKTOR

Alamat : Jl. Kasnan No. 04 Desa Babudan Rt. 03 Rsw. 02 Kecamatan Limpatung Kabupaten Batang

Nomor : 01/MI/Pen/VIII/2022  
Perihal : Penawaran Harga Material

Kepada :  
PT. NAWA PANCADASA ABADI  
Sudirman Central Business District  
Jl. Jend. Sudirman Kav. 552-53, Jakarta 12190  
Up. Bapak .....

Di – Tempat

Dengan Hormat,  
Dengan ini kami mengajukan Daftar Harga Material sebagai berikut :

No	Nama Barang	Satuan	Harga (Rp.)
1	Material Batu Alam pecahan (Bukan Batu kali) uk. 200-1.000 kg	m <sup>3</sup>	350.000
2	Material Batu Alam pecahan (Bukan Batu kali) uk. 1.500 kg	m <sup>3</sup>	350.000

Catatan : material sudah termasuk biaya Transport sampai ke lokasi (all in).

- Lokasi Pekerjaan : Pantai Pekalongan (dekat crematorium)
- Pengiriman barang setelah ada pesanan atau SPK.
- Pembayaran DP Sebesar 35% dari Surat Pesanan atau SPK melalui transfer bank ke rekening : Bank BCA 2490603819 An. NUR HANDOYO.

Demikian pengejuan daftar harga yang kami ajukan dengan harapan dapat menjadi pertimbangan Bapak/Ibu Pimpinan.

Atas dukungan dan kepercayaan yang diberikan kami ucapkan terimakasih.

Batang, 22 Agustus 2022  
CV. MUNCUL JAYA

NUR HANDOYO  
Marketing

### Validity Period:

Pending a quotation update from the ready mix material supplier.

## b. Ready Mix Concrete Material Providers

**PT. INTIMIX MITRA PERKASA**  
 Jl. Raya Pekalongan – Pemalang KM 10  
 Bondansari Wiradesa Pekalongan Jawa Tengah  
 Email:astinaa72@gmail.com Telp/WA:0877 6384 0522

---

No : 12/20/2022  
 Lamp : -  
 Hal : Penawaran Harga Beton

Kepada Yth :  
 Pimpinan PT. NAWA PANCADASA ABADI  
 Sudirman Central Business District  
 Jl. Jend. Sudirman Kav. 52 – 53  
 Jakarta 12190

Sehubungan dengan adanya pekerjaan proyek Break Water/ pemecah ombak yang ada di lokasi Pekalongan, maka kami dari PT. Intmix Mitra Perkasa Pekalongan mau mengajukan penawaran harga beton sebagai berikut :

No	Mutu	Slump	Harga Plus PPh
1.	K 350	10 ± 2	Rp. 1.054.000
2.	K 400	10 ± 2	Rp. 1.087.000

Demikian surat penawaran ini kami buat dan atas perhatiannya kami ucapkan terima kasih.

Divisi Marketing

**ERIK FIANTO**

### Validity Period:

Pending a quotation update from the ready mix material supplier.



"Perusahaan Stone Crusher, Kontraktor & Pengadangan Ujan"

Jl. Lingkar Atas, Rebut, Grogol, Kab. Bandung

Bandung, 21 Agustus 2022

Kepada: PT. Nawa Pancadasa Abadi  
 Di: Sudirman Central Business District  
 Jl. Jend. Sudirman Kav. 52-53 Jakarta 12190  
 ( Pekerjaan pemecatan Hardscrum, Pehalangan )

Berikut ini kami sampaikan Penawaran Harga Rycas sebagai berikut :

I. Harga :

Spesifikasi	Jenis (cm)	Max. Size (mm)	Harga Per m <sup>3</sup>	Keterangan
K-150	10 x 2	20	Rp. 990.000	Inchude
K-400	3 x 1	20	Rp. 950.000	PPN 11%

II. Penawaran Lain-lain :

1. Perbaikan dan 3 meter saluran periribuan.
2. Vitrak Aluvit masuk truck mixer 600 liter jadi tanggung jawab pembeli
3. Perawatan dan penggantian benda uji diluar Laboratorium CV. Ningsri Readymix menjadi beban tanggung jawab pembeli dan wajib disediakan kerangka.
4. Benda uji diadapkan umur 7 hari dan 28 hari (request sebelumnya)
5. Volume pengaliran minimal 5m<sup>3</sup> per truck mixer
6. Sewa vibrator Rp 500.000/hari
7. Sewa Concrete Pump Rp. 3.500.000,- / 200 m<sup>3</sup> per hari
8. Nuzulasing Pembayaran :  
 098.160.8631 Bank BCA a/c CV Ningsri  
 1200150010 Bank BNI a/c CV NINGSRI

Ah :  
 - Harga masih dalam penawaran, harga akhir setelah pembetulan lebih lanjut  
 - Syarat dan ketentuan berlaku

CV. Ningsri

Manajemen

**Validity Period:**

Pending a quotation update from the ready mix material supplier.



**STN**  
READY MIX

**STN READY MIX**  
 READY MIX, PRECAST, PRESTRESSED CONCRETE PRODUCT  
 Jl. Pahlawan Km. 21 Gg. Kajen Kab. Pekalongan  
 Hp : 085-741-444-440  
 Email : [sempalobuku@gmail.com](mailto:sempalobuku@gmail.com)

**KAN**  
KONSTRUKSI

### SURAT PENAWARAN

**Data Customer**

Nama Perusahaan	<b>PT. NAWA PANCADASA ABADI</b>
Nama Paket	<b>REMBANGUNAN BREAKWATER KOTA PEKALONGAN</b>
Alamat	Sulaiman Central Business District II, Jabel Sulaiman Kav 52-63 Jakarta 12190
Lokasi Pengiriman	<b>Kota Pekalongan</b>
Kepada	
Email	
Handphone	
Tgl Pengiriman	Mulai - 1/2

**Alamat Pengirim**

Jl. Raja Pahlawan km 21	
Desa Gg. Kajen	
Kab. Pekalongan	
Rp. Santo (085786286179)	
FIRMAN (085741444440)	

No	Mutu Beton	Slump	Volume ( m <sup>3</sup> )	Harga ( Rp/M <sup>3</sup> )
1	Beton Ready Mix			
	K250	50 +/- 2	1000	900.000
	K400	7 +/- 2	1000	1.040.000
HARGA TERSEBUT DIATAS BELUM TERMASUK PPN 11%				

**Persyaratan Khusus :**

- Cara Pembayaran : - PO/SPPK disertai /Tandatangan. - Pembayaran dengan Uang Muka/Cash & SKPDN sebelum barang dikirim. - Pengiriman
- Pembayaran melalui Rekening **PT. Sempalan Teknologi Nasional Bank Mandiri** cab Pekalongan: 139-20-3371465-6
- Harga tersebut dapat berubah sewaktu - waktu mengikuti kenaikan harga material dan kebijakan pemerintah di bidang moneter dan BBM
- Apabila terjadi kerusakan/kehilangan atas petakan benda uji dengan biaya di proyek adalah tanggung jawab proyek / kontraktor
- Pembuatan beton benda uji dan pemeriksaan kekompakan adukan beton sesuai dengan syarat - syarat penjualan kami yang mengacu pada standar C 11 dan C 29 atau ISIR 99
- Biaya uji lab diluar lab PT.STN READYMIX menjadi tanggung jawab pembeli
- Apabila perawatan dan pengujian sample uji dilakukan oleh pihak Konsumen / proyek / kontraktor PT. STN READYMIX Tidak bertanggung jawab atas kuat tekan sample uji yang dihasilkan
- Komplain untuk kerusakan beton pada struktur tidak dilayani bila hasil kuat tekan sample benda uji telah memenuhi persyaratan mutu yang dipesan.
- Kerusakan beton pada struktur yang di akibatkan oleh kesalahan konstruksi bukan menjadi tanggung jawab PT. STN READYMIX, karena itu komplain tidak dilayani
- Urn jalan masuk dan lingkungan menuju proyek menjadi tanggung jawab konsumen / proyek / kontraktor
- Beton yang telah tiba di lokasi proyek menjadi tanggung jawab pihak proyek
- Pengiriman beton kepada pembeli hanya dapat dilakukan setelah kami menerima PO Asli dan Copy Penawaran yang telah disertai akan ditandatangani oleh pembeli
- Pengiriman beton ke proyek dapat dilaksanakan setelah kami menerima copy penawaran dan kelengkapan administrasi lainnya dengan menandatangani penawaran ini dalam waktu \_\_\_\_\_ hari
- Tanda terima pembayaran yang sah adalah kwitansi asli dari PT.STN READYMIX

Keberangan Tambahan

PEKALONGAN, 22 Agustus 2023

**PT. STN Readymix**  
[ Firman Fortandi, A.Md ]

Mengetujui

Pelanggan

### Validity Period:

Those prices can change at any time following the increase in material prices and government policy in the monetary and fuel sectors (according to point No. 3).



**PT. PUTRA MANDIRI GRUP**  
**Stone Crusher, Beton & Transportasi**  
 Jl. Raya Bojong-Kapoi Dapang Wetan, Kec. Bojong, Kab. Pekalongan  
 Email: pt.pmg@gmail.com

Pekalongan, 29 Agustus 2022

Nomor : 221/PMG/Pea/VIII/2022  
 Perihal : Perawatan Beton Readymix

Kepada Yth.  
**PT. Nawa Pancadasa Abadi**  
 Sudirman Central Business District  
 Jl. Jend. Sudirman Kav 52-53  
 Jakarta

Dengan Hormat,

Melalui surat ini, kami PT Putra Mandiri Grup sebagai Perusahaan Batching Plant yang berlokasi di Jl. Raya Bojong-Kapoi, Ds. Bojong Wetan Rt.06/ Rw.04 No.559, Kec. Bojong, Kab. Pekalongan kami ingin menawarkan kerjasama dalam pengadaan Beton Readymix yang dibutuhkan Pekerjaan Pembangunan Break Water, adapun Kriteria nya sebagai berikut,

No.	Nama Barang	Slump	Harga
1.	Beton Readymix K-150	7 ± 2	Rp. 1.000.000,- / m <sup>3</sup>
2.	Beton Readymix K-400	7 ± 2	Rp. 1.035.000,- / m <sup>3</sup>
Harga Belum Termasuk PPh 11%			

Demikian surat penawaran ini kami buat, besar harapan kami dapat bekerjasama, sebelum dan sesudahnya kami ucapkan terimakasih.

Catatan

- No. Rek. A N PT PUTRA MANDIRI GRUP  
 BNI : 0902314010  
 BPD : 3-109-26969-6

Hormat Kami  
**PT Putra Mandiri Group**  
  
**PT. PUTRA MANDIRI GRUP**  
 Stone & Transportasi  
**Bayu Setiaji**  
 Ka Batching Plant

**Validity Period:**

Pending a quotation update from the ready mix material supplier.

## CHAPTER 9 HYDRO AND SEDIMENT MODELING

### 9.1 Background

Pekalongan City has a mangrove area located in Kandang Panjang Sub-district. This area is one of the examples of mangrove ecosystem development in Indonesia. This area has been developed into an educational tourism object which has also contributed to increasing regional income from the tourism sector. In addition, with the existence of a mangrove ecosystem, there is also an increase in the quality of marine biota which is very beneficial for fishermen in the surrounding area.

Since the last few years, the beach around the mangrove area has been exposed to increasingly severe erosion from year to year. This condition caused damage to the mangrove ecosystem in the area. Many mangroves withered because of the high waves that directly hit the trees. Therefore, a coastal protection structure is needed to protect the area and mangroves from the frequent coastal flooding impacts.

### 9.2 Objective

In this activity, the numerical model is required to obtain an analysis of the water condition in the work location and its surroundings before and after the breakwater is constructed.

### 9.3 Study Location

The area to be modeled includes the area to be protected, namely the green area of PIM (Mangrove Information Center) and its surroundings seaward, as shown in Figure 9.1.



Gambar 1  
Citra Satelit Lokasi Pekerjaan.  
Sumber: Google Map diunduh Feb 2022

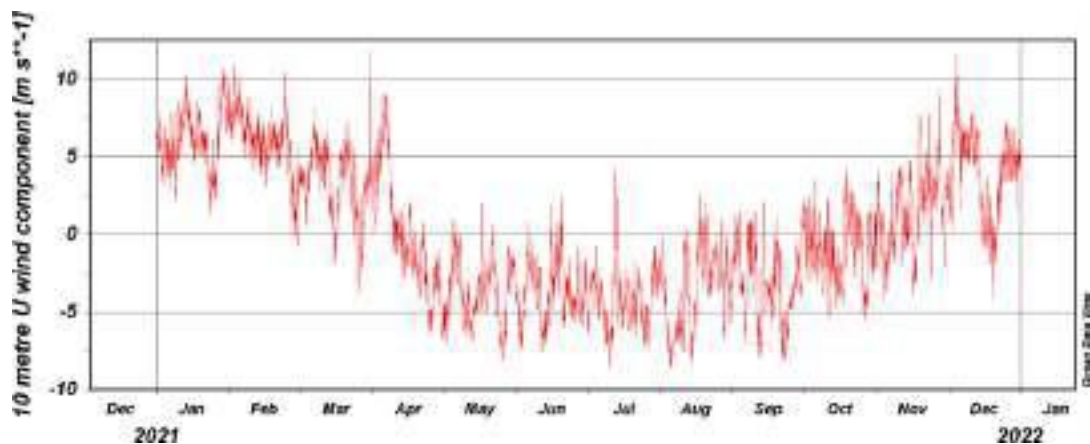
Source: TOR of DED of PIM Coastal Area Protection in Pekalongan City (Partnership, 2022)

### 5.1.1.82 Figure 9.1 Study location to be modeled

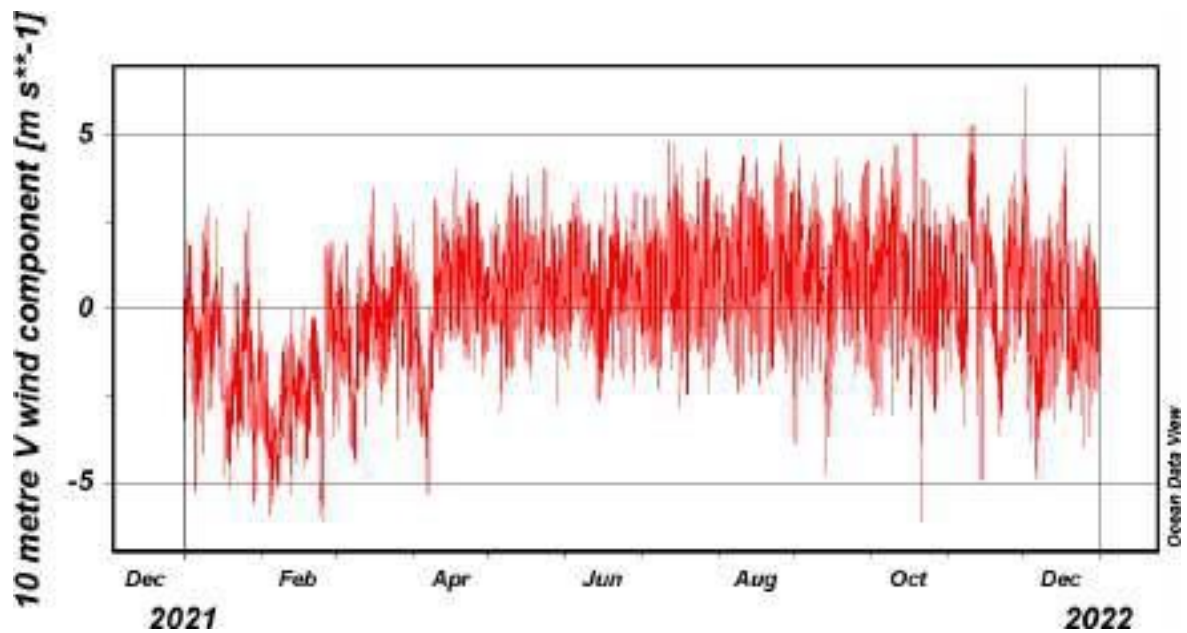
## 9.4 Secondary data collection

### 9.4.1 Wind Data

In this study, wind data was obtained from the European Center for Medium-Range Weather Forecasts (ECMWF) website as one of the trusted providers of climatological data. The data can be accessed via the ERA 5 link (<https://cds.climate.copernicus.eu/cdsapp#!/dataset/reanalysis-era5-single-levels>). The wind data taken is wind elevation at an elevation of 10 m above the water surface, in the form of  $u_{10}$  and  $v_{10}$  for 10 years from 2012 to 2022 at coordinates  $109.5^{\circ}\text{BT } 6.0^{\circ}\text{LS}$ . An example of raw data from the data source is shown in Figure 9.2.



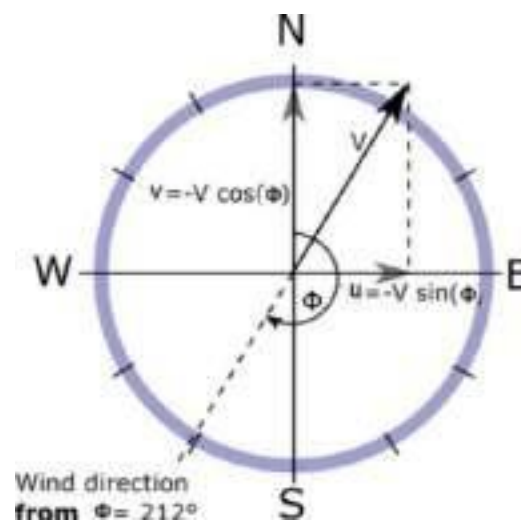
(1) Wind data  $u_{10}$



(2) Wind data  $v_{10}$

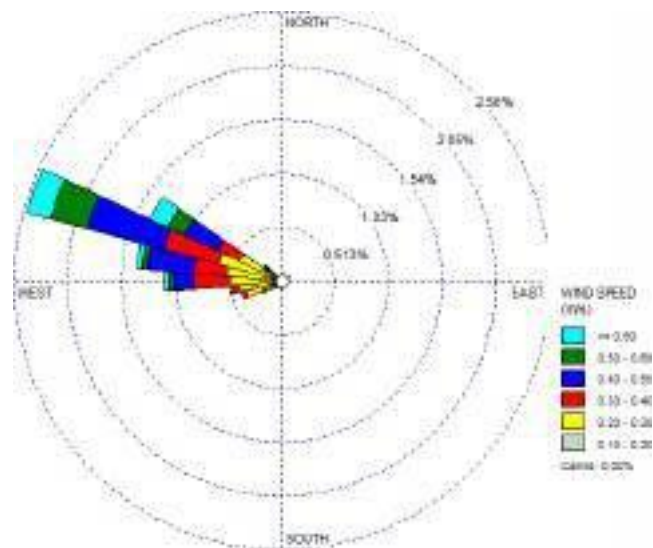
5.1.1.83 **Figure 9.2 Example of raw wind data**

The wind data consists of data  $u_{10}$  and  $v_{10}$  from which the resultant speed is then calculated and the wind direction is obtained. Figure 9.3 shows how to calculate the resultant wind speed and direction. Subsequently, after obtaining wind data and its direction, the data is depicted in a wind rose to determine the distribution of wind data from 2021 to 2022, as shown in Figure 9.4.



5.1.1.84 **Figure 9.3 Resultant calculation process of wind speed and direction**

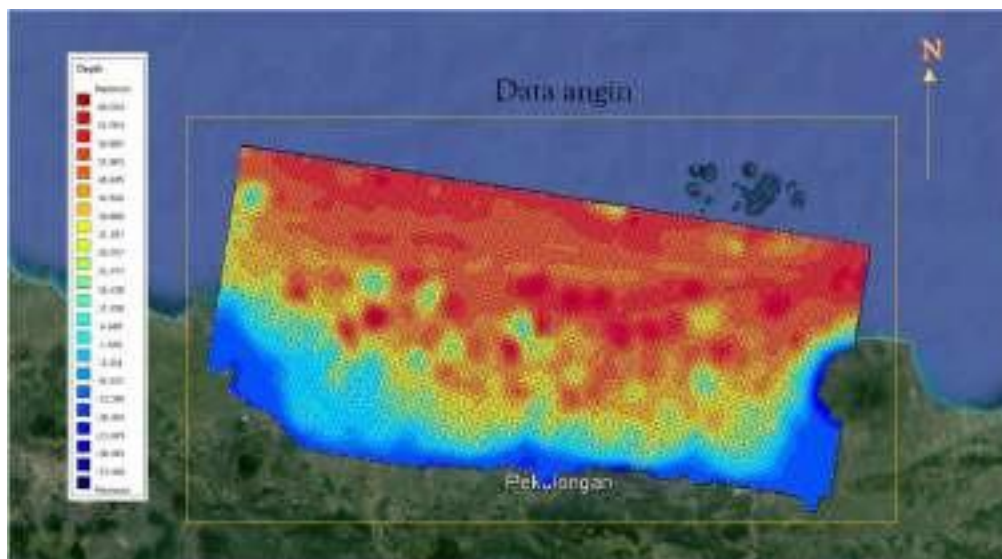




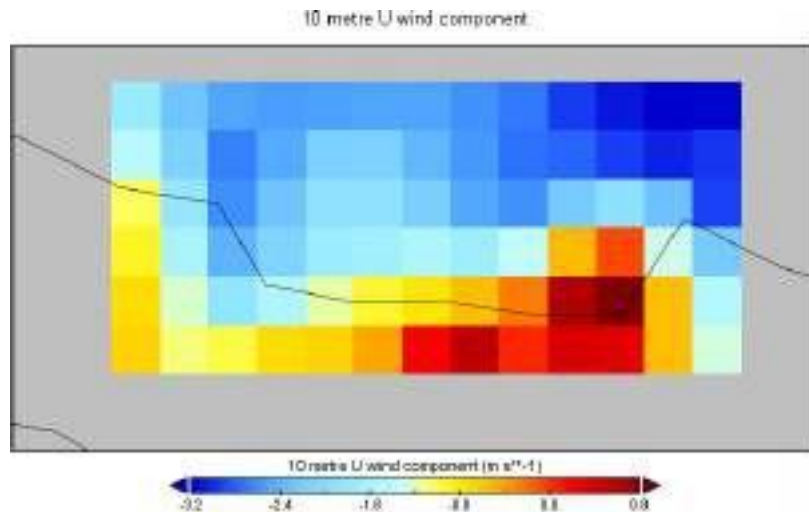
**Figure 9.4 Wind rose based on data of the 2021-2022 ECMWF Interim Reanalysis**

Based on the wind rose, the dominant wind blows northwest in that year range. The highest wind speed ranges from 0.2 m/s to 0.5 m/s.

For numerical modeling, the wind data collected covers a large domain which is enlarged for interpolation in the wave model. The following are the wind data provided and the domain used in the numerical model.





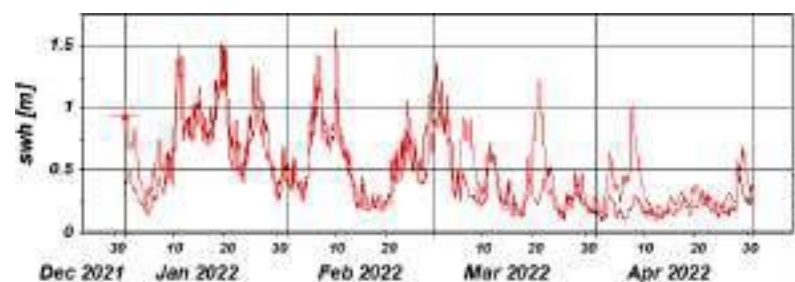


**Figure 9.5 Extent of wind data provided in 2021-2022**

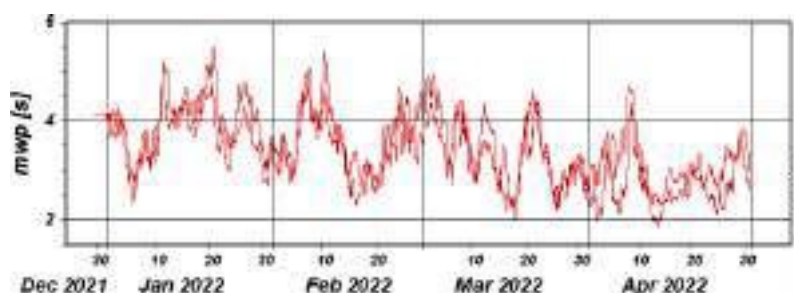
### 9.4.2 Wave data

In this study, wave data was obtained from the European Center for Medium-Range Weather Forecasts (ECMWF) website as one of the trusted providers of climatological data. The data can be accessed via the ERA 5 link (<https://cds.climate.copernicus.eu/cdsapp#!/dataset/reanalysis-era5-single-levels>). The wave data taken is significant wave height, period, incoming wave angle for 10 years from 2012 to 2022 at coordinates 109°BT

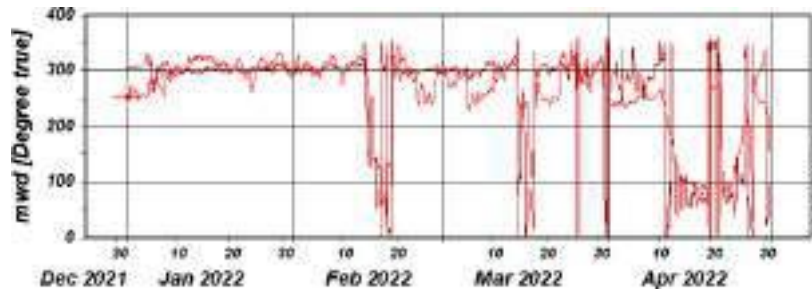
6.00LS.. An example of raw data from the data source is shown in Figure 9.6.



(1) Wave height



(2) Wave period



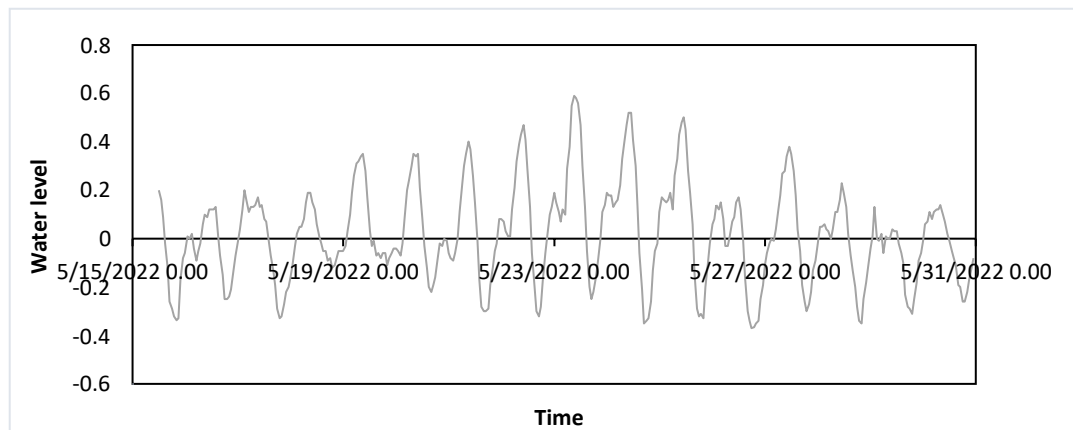
(3) Incoming wave angle

**5.1.1.85 Figure 9.6 Example of raw wave data**

The data is presented in the form of a wave rose to make it easier to know the significant wave height from various directions when compared with the model output.

**9.4.3 Tidal data**

This computational simulation used tidal constituent data instead of using



**Figure 9.7 Tidal**

**graphTable 9.1 Tidal**

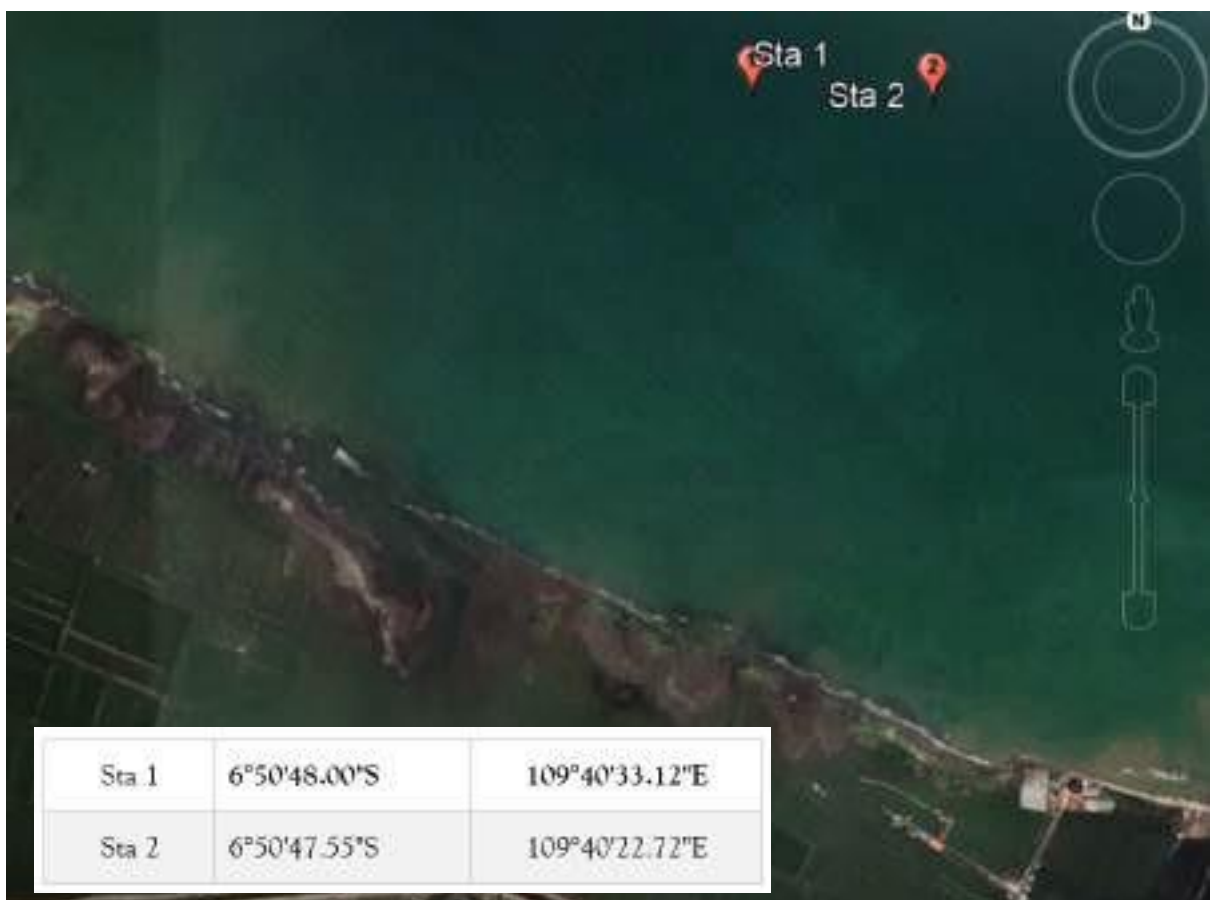
	RESULTS									
	constituents									
	S0	M2	S2	N2	K2	K1	O1	P1	M4	MS4
A (cm)	168.93	11.09	9.08	3.67	3.46	17.9	6.92	6.92	0.78	0.91
g°		-45.74	-31.9	-52.68	-20.56	191.46	71.7	13.17	-30.29	-12.36

### 9.4.4 Current speed data

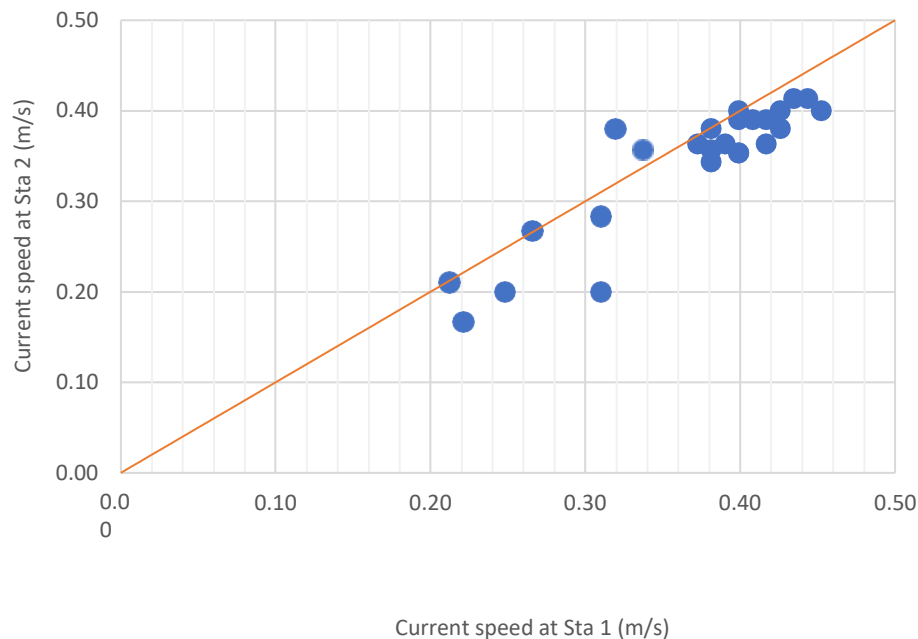
The current measurement was carried out simultaneously with the bathymetric measurement at 2 points at depths of 0.2d, 0.6d and 0.8d for 25 hours. The measurement was carried out on 16 May 2022 at both stations (Table 9.2) by the Survey Team of PT Nawa Pancadasa Abadi.

**5.1.1.86 Table 9.2 Coordinates of Current Station Position**

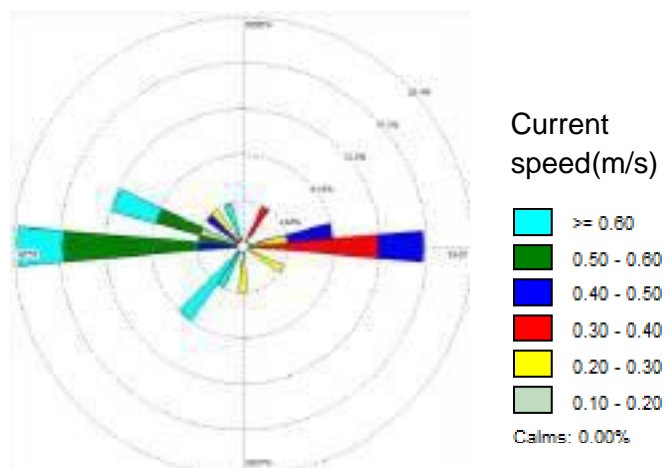
Station	Latitude	Longitude	Depth
Sta 1	6°50'48.00"S	109°40'33.12"E	-6 m
Sta 2	6°50'47.55"S	109°40'22.72"E	-6 m



**Figure 9.8 Current speed data collection location.**



5.1.1.87 **Figure 9.9 Comparison of current speed data at Station 1 and Station 2**



5.1.1.88 **Figure 9.10 Distribution of current speed in the field**

The current speed measurement was carried out in May 2022 which is in the transitional season from the west to the east monsoons. The dominant current speed is from the west with current speeds ranging from 0.5 to 0.6 m/s. Based on the figure above, there is not much current speed of less than 0.2 m/s.

#### 9.4.5 Sediment characteristic data

Based on the results of sediment survey, the sediment size distribution chart is shown in Figure 9.11.



5.1.1.89 Figure 9.11 Graph of sediment size distribution at PIM Beach

Table 9.3 Grain size classification according to the American Geophysical Union

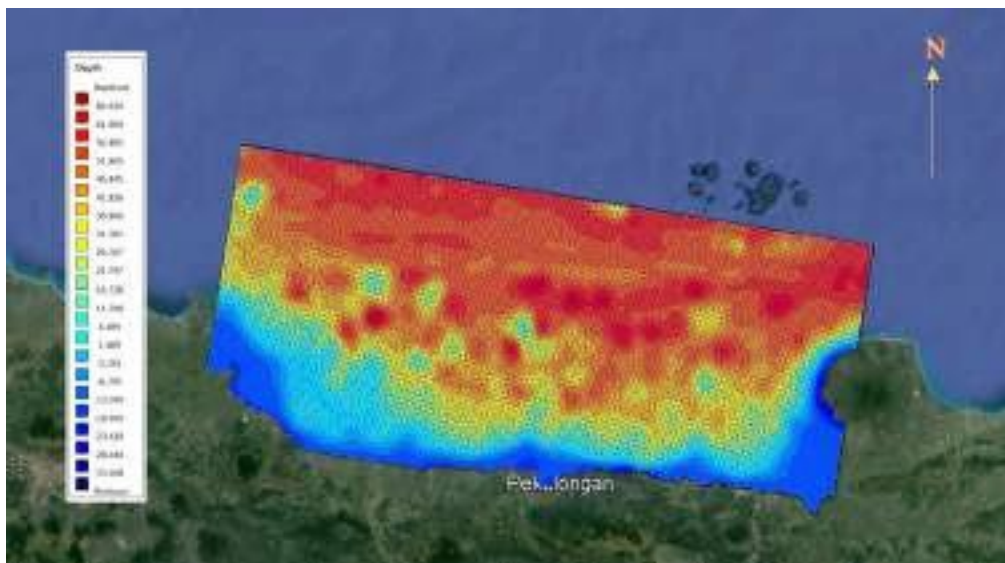
Interval/range (mm)	Nama	Interval/range (mm)	Nama
4096 - 2048	Batu sangat besar ( <i>Very Large Boulders</i> )	1/2 - 1/4	Pasir sedang ( <i>Medium Sand</i> )
2048 - 1024	Batu besar ( <i>Large Boulders</i> )	1/4 - 1/8	Pasir halus ( <i>Fine Sand</i> )
1024 - 512	Batu sedang ( <i>Medium Boulders</i> )	1/8 - 1/16 (s/d 0.0625 mm)	Pasir sangat halus ( <i>Very Fine Sand</i> )
512 - 256	Batu kecil ( <i>Small Boulders</i> )	1/16 - 1/32	Lumpur kasar ( <i>Coarse Silt</i> )
256 - 128	Kerakal besar ( <i>Large Cobbles</i> )	1/32 - 1/64	Lumpur sedang ( <i>Medium Silt</i> )
128 - 64	Kerakal kecil ( <i>Small Cobbles</i> )	1/64 - 1/128	Lumpur halus ( <i>Fine Silt</i> )
64 - 32	Kerikil sangat kasar ( <i>Very Coarse Gravel</i> )	1/128 - 1/256	Lumpur sangat halus ( <i>Very Fine Silt</i> )
32 - 16	Kerikil kasar ( <i>Coarse Gravel</i> )	1/256 - 1/512	Lempung kasar ( <i>Coarse Clay</i> )
16 - 8	Kerikil sedang ( <i>Medium Gravel</i> )	1/512 - 1/1024	Lempung sedang ( <i>Medium Clay</i> )
8 - 4	Kerikil halus ( <i>Fine Gravel</i> )	1/1024 - 1/2048	Lempung halus ( <i>Fine Clay</i> )
4 - 2	Kerikil sangat halus ( <i>Very Fine Gravel</i> )	1/2048 - 1/4096	Lempung sangat halus ( <i>Very Fine Clay</i> )
2 - 1	Pasir sangat kasar ( <i>Very Coarse Sand</i> )		Koloid
1 - 1/2	Pasir kasar ( <i>Coarse Sand</i> )		

Source: Garde & Raju, 1985

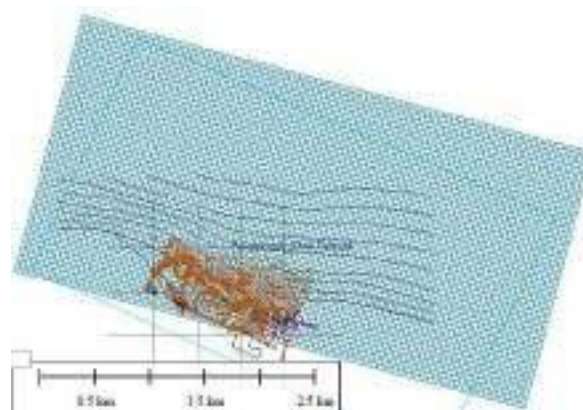
Figure 9.11 shows that the sediment on the Mangrove Information Center Beach is included in the silt type with the highest percentage with  $D_{50}$  of 0.062mm.

### 9.4.6 Bathymetric data

The bathymetric data used in the numerical modeling is the bathymetric survey results as shown in Figure 9.12 which is combined with data from Batnas and Demnas. The data can be accessed via <https://tanahair.indonesia.go.id/>. The coastline used is based on the results of survey in this activity. This data is combined with data resulting from the bathymetric measurement in the field linked to MSL.



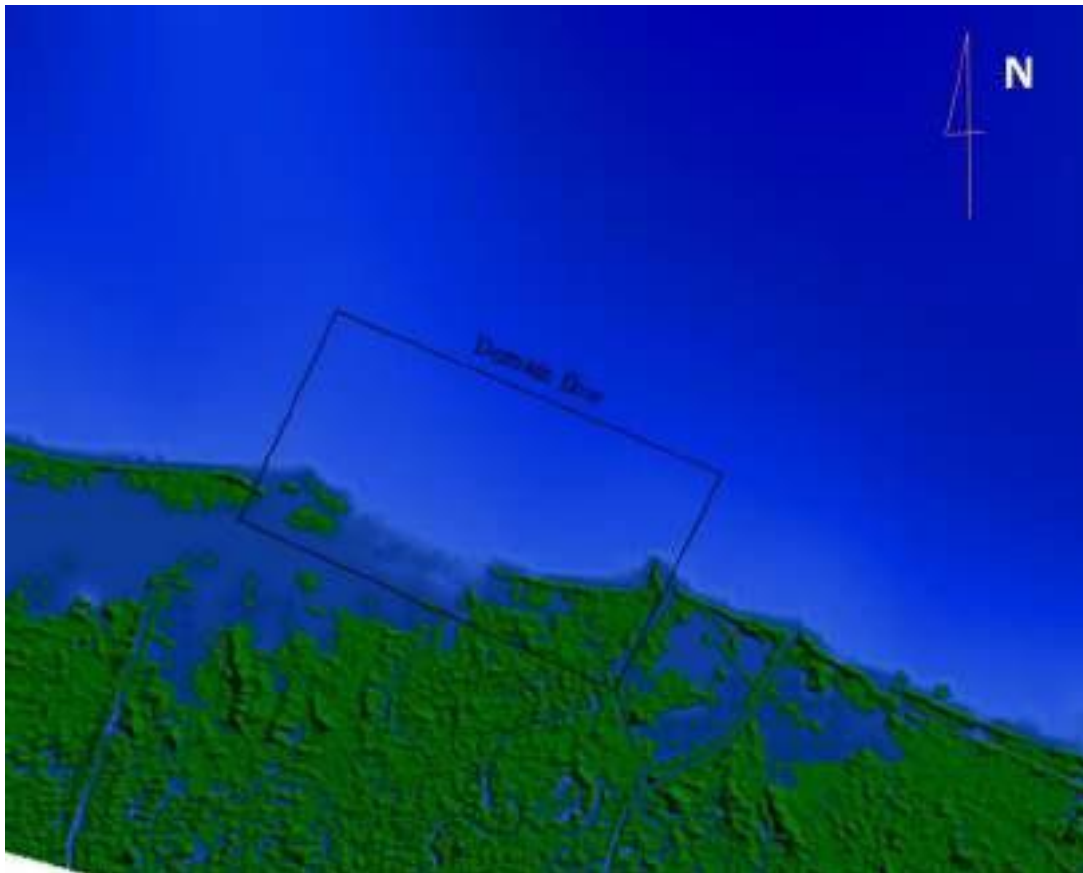
(a) Coastline from Demnas data



(a) Bathymetric and topographical data resulting from the survey

#### 5.1.1.90 Figure 9.12 Data used for model data assimilation





**Figure 9.13 Bathymetric assimilation results from measurement with data from Batnas, Demnas, and field survey results for the FLOW domain**

### 9.5 Simulation of Hydro and Sediment Computation

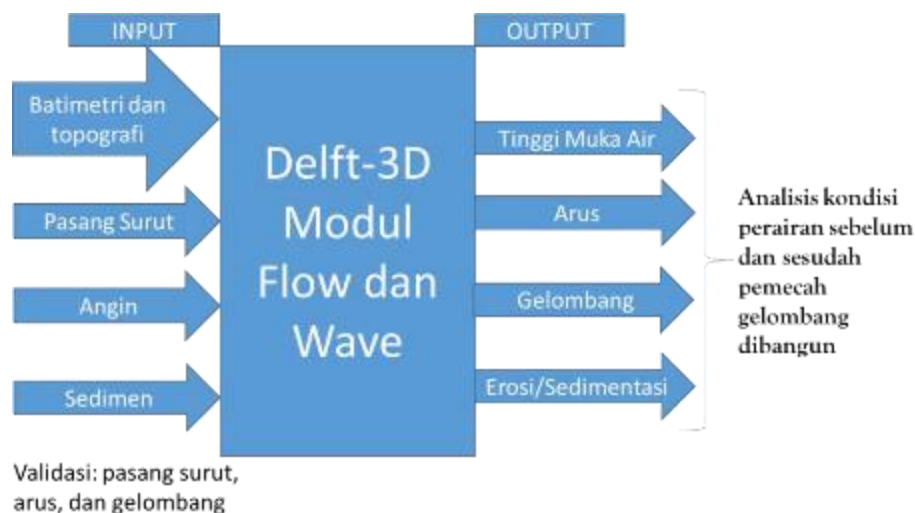
The method for implementing the numerical modeling of the marine and coastal water dynamics was prepared by referring to the TOR. The numerical simulation was used to make a water condition scenario in the work location and its surroundings before and after the breakwater is constructed.

This study used Delft3D software version 4.04. Delft3D is a leading 3D modeling suite in the world for studying hydrodynamics, sediment transport, morphology, and water quality for fluvial, estuarine and coastal environments. Since 1 January 2011, Delft3D flow (FLOW), morphology (MOR), and wave (WAVE) modules are available in an open source manner. Delft3D has been used by several researchers throughout the world to study various coastal dynamics (Van Rijn and Walstra 2003; Treffers 2009; Rueda et al. 2020; Nardin 2022).

The Delft3D modules used in this study are:

- a. The FLOW module is the core of Delft3D and is a multi-dimensional (2D or 3D) hydrodynamic simulation program that calculates unsteady flow and transport phenomena caused by tidal and meteorological forces at curved grids, fixed boundaries or spherical coordinates. Vertical grids in a 3D simulation are defined using the sigma coordinate approach or the Z-layer approach.

- b. For a number of changing cohesive and non-cohesive fractions, the MOR module calculates sediment transport (total suspended and base sediment transport) and morphological changes. Both currents and waves act as driving forces, and many transport formulas are used. This module is connected to a 2D or 3D advection- diffusion solver of the FLOW module for suspended load; density effect can be considered.
- c. The FLOW module coupled to the WAVE module, which allows currents and waves to adapt to the local bathymetry and allows simulation on any time scale from days (hurricane impact) to centuries, is an important feature of the MOR (dynamic system) module.



**Figure 9.14 Comparison of current speed data at Station 1 and Station 2**

### 9.5.1 Model formulation description

#### a. Hydrodynamics and waves

The DELFT3D-FLOW module solves the instability of the shallow water equation in two (average depth) or three dimensions. The equation system consists of the horizontal momentum equation, the continuity equation, the transport equation, and the closure model turbulence. In Delft3d, the simulation involving waves follows the Generalized Lagrangian Mean (GLM) theory. In the GLM formulation, the Flow model equation in both 2DH and 3D is very similar to the Euler's standard equation. However, the wave-induced driving force is averaged over the wave, thus the period is expressed more accurately (Lesser, 2004).

Some of the equations used according to Lesser (2004) are as follows:

- The relationship between the GLM speed and the Euler speed is given by  $U = u + u_s$   
 $V = v + v_s$

where  $U$  and  $V$  are the GLM velocity components,  $u$  and  $v$  are the Euler velocity components, and  $u_s$  and  $v_s$  are the Stokes drift components.

- Hydrostatic pressure assumption

By assuming a shallow sea, the vertical momentum equation is reduced to the hydrostatic pressure equation. Based on this assumption, vertical acceleration due to the buoyancy effect or sudden variation in the bottom topography is not considered, thus:

$$\frac{\partial P}{\partial \sigma} = -\rho g h$$

- Horizontal momentum equations.

$$\begin{aligned} \frac{\partial U}{\partial t} + U \frac{\partial U}{\partial x} + v \frac{\partial U}{\partial y} + \frac{\omega}{h} \frac{\partial U}{\partial \sigma} - fV \\ = -\frac{1}{\rho_0} P_x + F_x + M_x + \frac{1}{h^2} \frac{\partial}{\partial \sigma} \left( \nu_V \frac{\partial u}{\partial \sigma} \right) \end{aligned}$$

$$\begin{aligned} \frac{\partial V}{\partial t} + U \frac{\partial V}{\partial x} + V \frac{\partial V}{\partial y} + \frac{\omega}{h} \frac{\partial V}{\partial \sigma} - fU \\ = -\frac{1}{\rho_0} P_y + F_y + M_y + \frac{1}{h^2} \frac{\partial}{\partial \sigma} \left( \nu_V \frac{\partial v}{\partial \sigma} \right) \end{aligned}$$

where the horizontal pressure terms,  $P_x$  and  $P_y$ , are given by (the Boussinesq approximation)

$$\frac{1}{\rho_0} P_x = g \frac{\partial \zeta}{\partial x} + g \frac{h}{\rho_0} \int_{\sigma}^0 \left( \frac{\partial \rho}{\partial x} + \frac{\partial \sigma'}{\partial x} \frac{\partial \rho}{\partial \sigma'} \right) d\sigma'$$

$$\frac{1}{\rho_0} P_y = g \frac{\partial \zeta}{\partial y} + g \frac{h}{\rho_0} \int_{\sigma}^0 \left( \frac{\partial \rho}{\partial y} + \frac{\partial \sigma'}{\partial y} \frac{\partial \rho}{\partial \sigma'} \right) d\sigma'$$

The horizontal Reynold stresses,  $F_x$  and  $F_y$ , are determined by using the concept of eddy viscosity (Rodi, 1984 in Lesser, 2004). For large-scale simulations (when the shear stress along a closed boundary is negligible)  $F_x$  and  $F_y$  force is reduced to a simplified formulation:

$$F_x = \nu_H \left( \frac{\partial^2 U}{\partial x^2} + \frac{\partial^2 U}{\partial y^2} \right) \quad F_y = \nu_H \left( \frac{\partial^2 V}{\partial x^2} + \frac{\partial^2 V}{\partial y^2} \right)$$

where the gradient is taken along the r-plane.  $M_x$  and  $M_y$  represent contributions due to external sources or momentum sinking (external force by hydraulic structures, release or withdrawal of water, wave stress, etc.).

## b. Sediment transport

Advection-diffusion equation

$$\begin{aligned} & \frac{\partial [hc]}{\partial t} + \frac{\partial [hUc]}{\partial x} + \frac{\partial [hVc]}{\partial y} + \frac{\partial [\omega c]}{\partial \sigma} \\ & = h \left[ \frac{\partial}{\partial x} \left( D_H \frac{\partial c}{\partial x} \right) + \frac{\partial}{\partial y} \left( D_H \frac{\partial c}{\partial y} \right) \right] \\ & \quad + \frac{1}{h} \frac{\partial}{\partial \sigma} \left[ D_V \frac{\partial c}{\partial \sigma} \right] + hS \end{aligned}$$

where  $S$  represents the terms source and sink per unit area.

## c. Sediment transport

Sediment transport basically refers to the advection-diffusion Equation

### 9.5.2 Expected model output

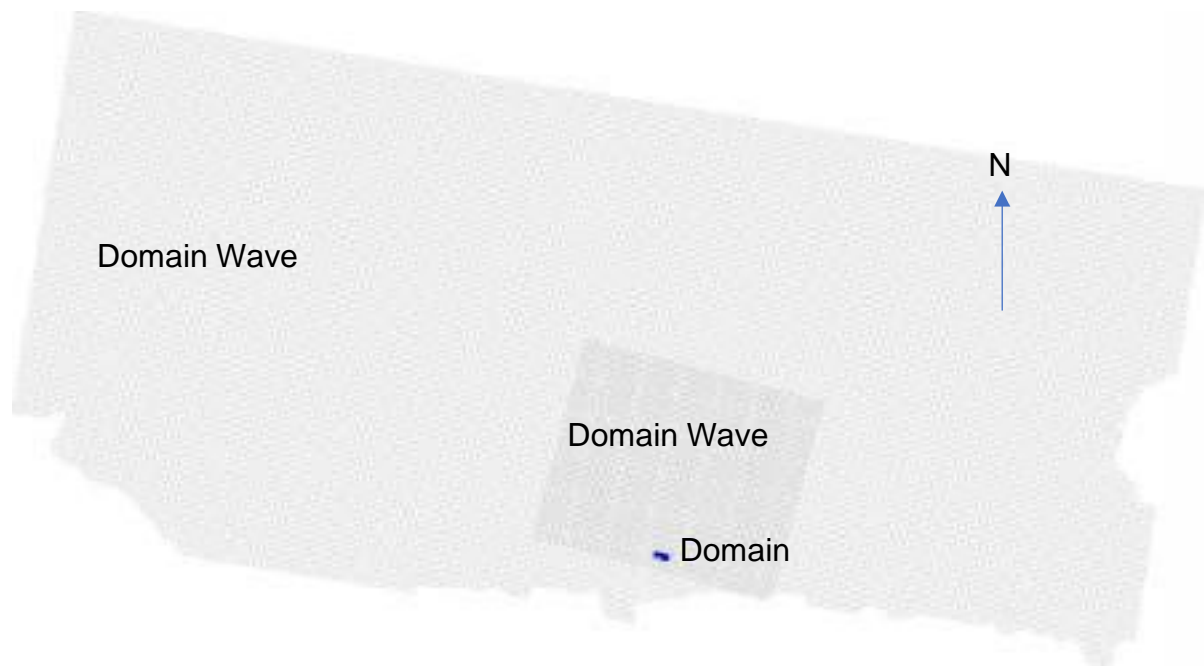
Characteristics of the modeling output :

- 1) tide in the work location.
- 2) currents in every season
- 3) waves in every season
- 4) sediment transport in every season.

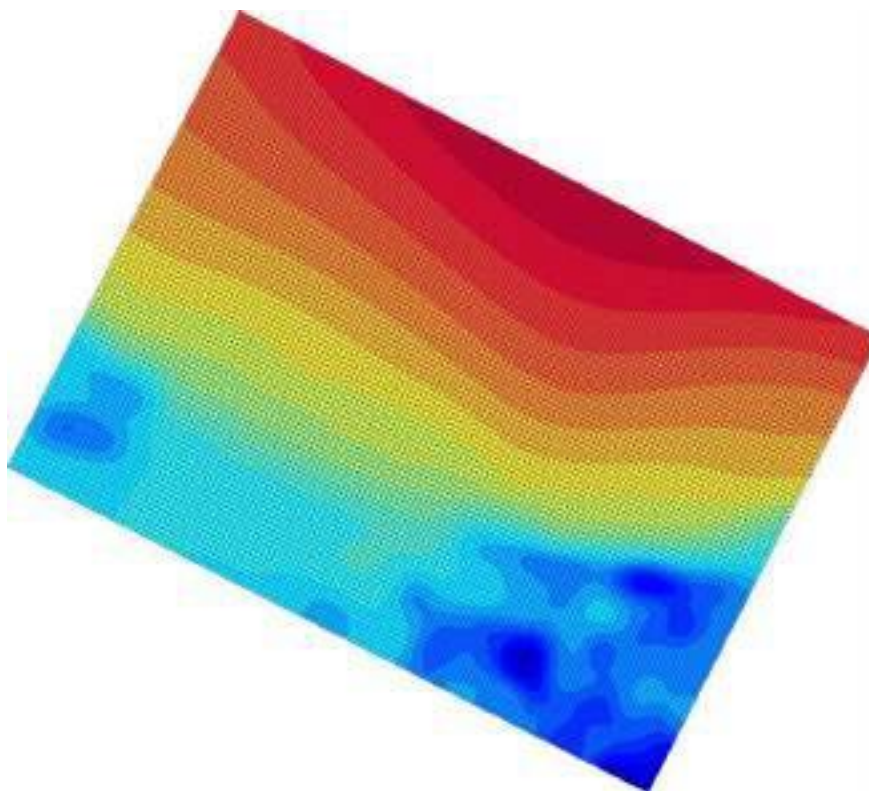
### 9.5.3 Model Domain

As previously explained, the modeling method would be carried out by using the open source DELFT3D software, with the DELFT3D-WAVE and DELFT3D-FLOW modules running simultaneously (online coupling). Waves from the point where the ERA5 data was taken, were spread through several domains in the DELFT3D-WAVE module which would then be used by DELFT3D-FLOW having a smaller domain.

The following describe the setting of the modal domain in this work.



a. Domain Wave and Flow



b. Domain Flow with its bathymetry

**Figure 9.15 Creating a grid in Delft3D**

There are two rivers in the study location, namely the Pencongan River on the western side and the Banger River on the eastern side. There are sediment guide/jetty buildings on both rivers. Thus, it is assumed that the supply of sediment from the two rivers is relatively small, so that the discharge of those rivers is not included in the simulation.

Wave nesting is required to efficiently adjust the model coverage to the wave generation data points available from the ERA5 data. In this model, the wave modeling schematic approach is carried out by dividing the wave domain into 2 nesting (Figure 15a). This is done so that the computation is lighter considering the wave data point is located about 60 km from the coastline. A study related to it requires a relatively high spatial-numerical resolution. If the wave modeling domain is carried out on just one grid size without nesting, an extremely number of grids will be obtained so that the computation time becomes ineffective.

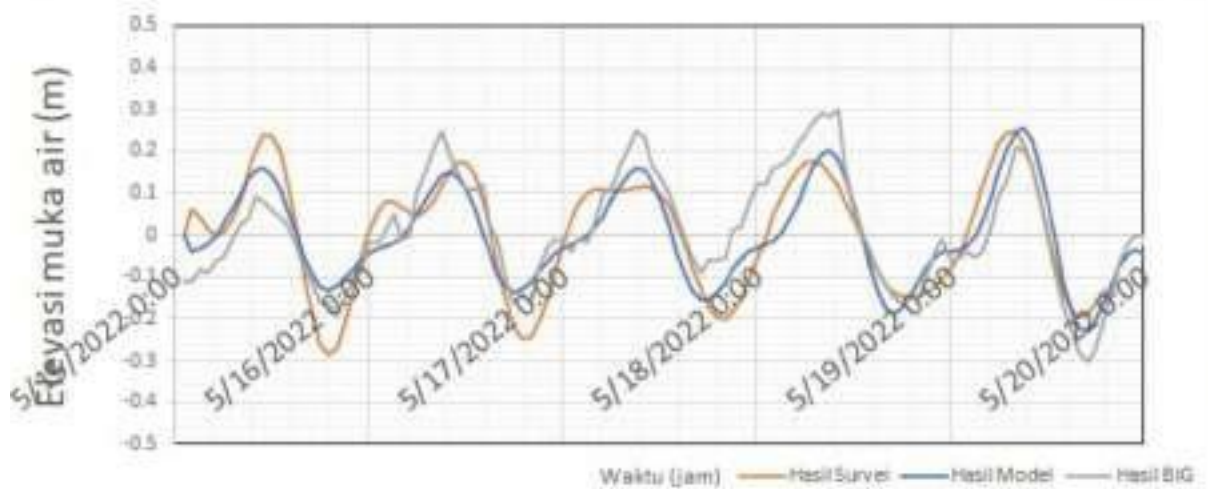


**Figure 9.16 Location of current measurement against the model domain**

#### 9.5.4 Model Validation

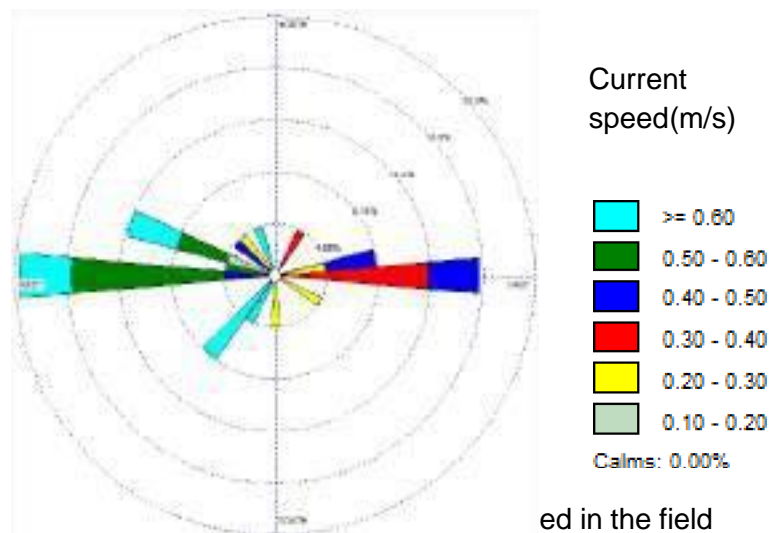
Seawater level elevation validation was carried out by comparing the model results with tide observation data and BIG tide data. The following figure shows the similarity of the phases and magnitude of seawater level elevation.

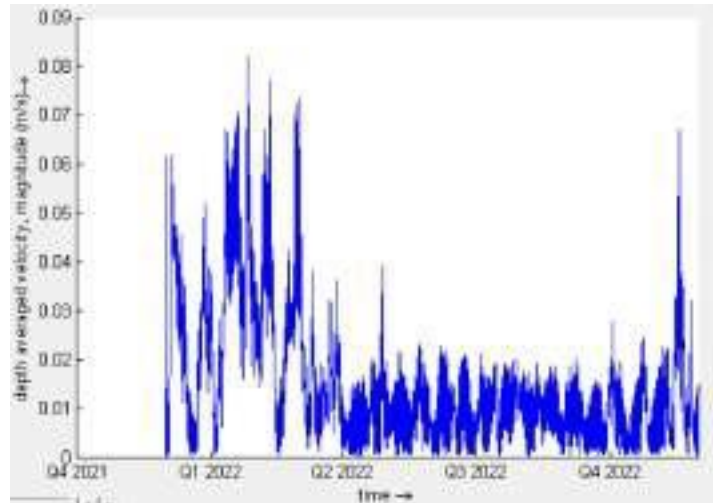




**5.1.1.91 Figure 9.17 Validation of water level elevation**

Based on the results of NRMSD (normalized root mean square error deviation) calculation of the two data, the NRMSD value is 9.23%. This value is still below 20%. Therefore, the data can be used to process the numerical model.





(b). Distribution of current speed in the model

**5.1.1.92 Figure 9.18 Comparison of data on current speed (field) and current speed (model)**

The next validation is to use current data. Based on Figure 18, it is found that the value of the current speed resulting from the model remains smaller than the field data. While the current pattern has followed the trend in field data. Assumptions settings have been made in the FLOW model.

Pekalongan waters are located west of Batang waters, which is not far, thus comparative data was sought for based on the results of the current measurement in Batang Waters carried out by BPPT in March 2015. In the measurement, the Lagrange method was used and the following measurement results were obtained:



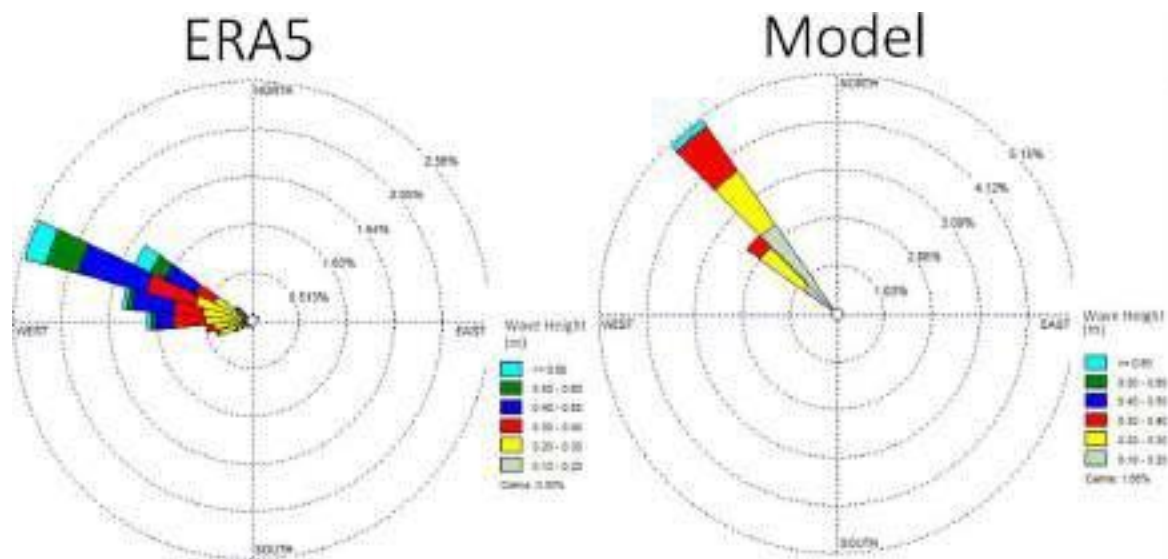
**5.1.1.93 Figure 9.19 Vector of Surface Current speed in Batang Waters during the High Tide condition (BPPT, 2015)**



5.1.1.94 **Figure 9.20 Vector of Surface Current speed in Batang Waters during the Low Tide condition (BPPT, 2015)**

The average speed in Batang Waters is 0.139 m/second. However, the average speed is still far from the mean current speed in Pekalongan (field).

The final validation is to compare the wave height data resulting from the model to the wave height data from ERA5



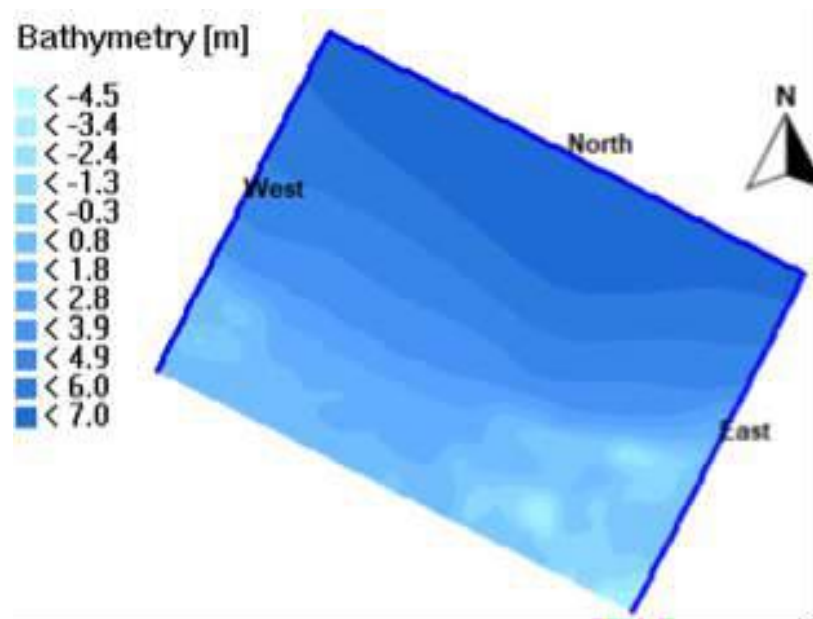
5.1.1.95 **Figure 9.21 Wave verification based on model results against ERA5 data.**

The figure above shows the results of wave verification based on the model results on the ERA5 data. There is a trend in incoming wave direction that is almost the same. The model data inputted in the model is the daily mean value of wind data, while ERA5 wave data is the hourly wave data. Therefore, the data generated from the model has a slightly different distribution.

### 9.5.5 Model Scenario

The model scenario includes

- 1) Condition before the existence of structure or existing condition and condition after the existence of the breakwater structure. The breakwater structures used are 5 detached breakwater structures (Figure 9.24). The function of the detached breakwater is to reduce wave energy, thus the area behind the structure becomes calmer.
- 2) This modeling was run continuously for 12 months (1 year) and 60 months (5 years) by taking the morphological factor into account.



5.1.1.96 Figure 9.22 Model scenario after the existence of a breakwater structure

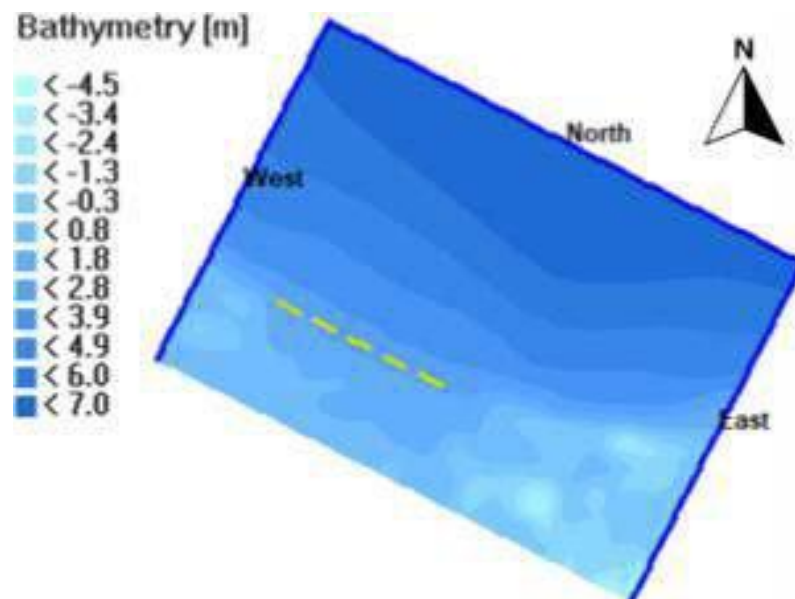


Figure 9.23 Model scenario after the existence of a breakwater structure



**Figure 9.24 Details of the detached breakwater structure placement**

### 9.5.6 Model Set-up

#### 5.1.1.97 Table 9.4 Model set-up for several parameters for initial assumptions

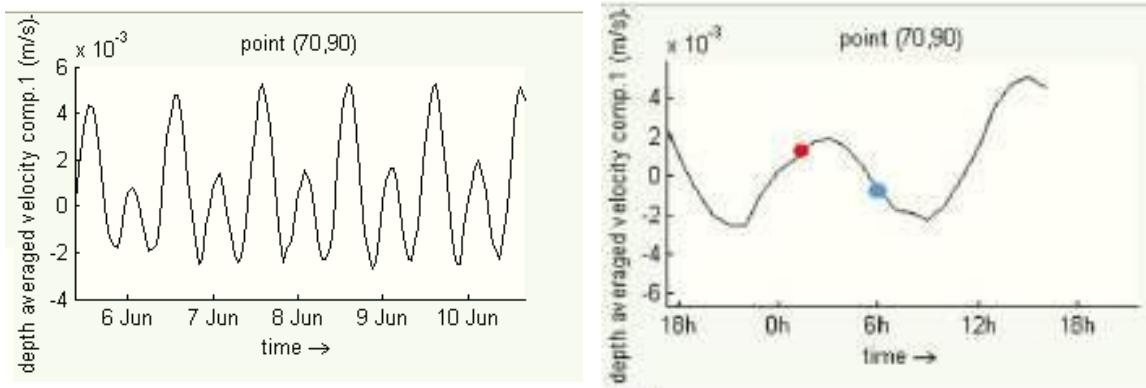
Parameter	Set-up model
$d_s$	0.062 mm (Results of sedimentsurvey,
$Dt$	0.5 minutes
Grid	$dx=dy=25$ m (flow model), $dx=dy=500$ m (wave domain 2), 121x61 (flow model), 50x30 (wave domain 2), 281x128 (wavedomain 1)
Domain size	
Morphological scale factor	1

Parameter	Set-up model
<b>Sediment</b>	Reference density for hindered settling = 1600 kg/m <sup>3</sup> Dry bed density = 500 kg/m <sup>3</sup> Fresh settling velocity = 0.25 mm/s Saline settling velocity = 0.25 mm/s Critical bed shear stress for sedimentation (uniform) = 1000 N/m <sup>2</sup> Critical bed shear stress for erosion (uniform) = 0.5 N/m <sup>2</sup>
<b>Morphology</b>	Spin-up interval before morphological changes = 720 minutes Minimum depth for sediment calculation = 0.1
<b>West monsoon wave height</b>	Hs = 1.257 m, Tp = 4.75 seconds, Dir = 300.66°
<b>East monsoon wave</b>	Hs = 0.6227 m, Tp = 4.2404
<b>Tide</b>	M2, S2, K1, O1, N2, P1, K2, Q1, L2, O2

## 9.6 Model Result and Discussion

### 9.6.1 Hydrodynamics during neap tide and spring tide

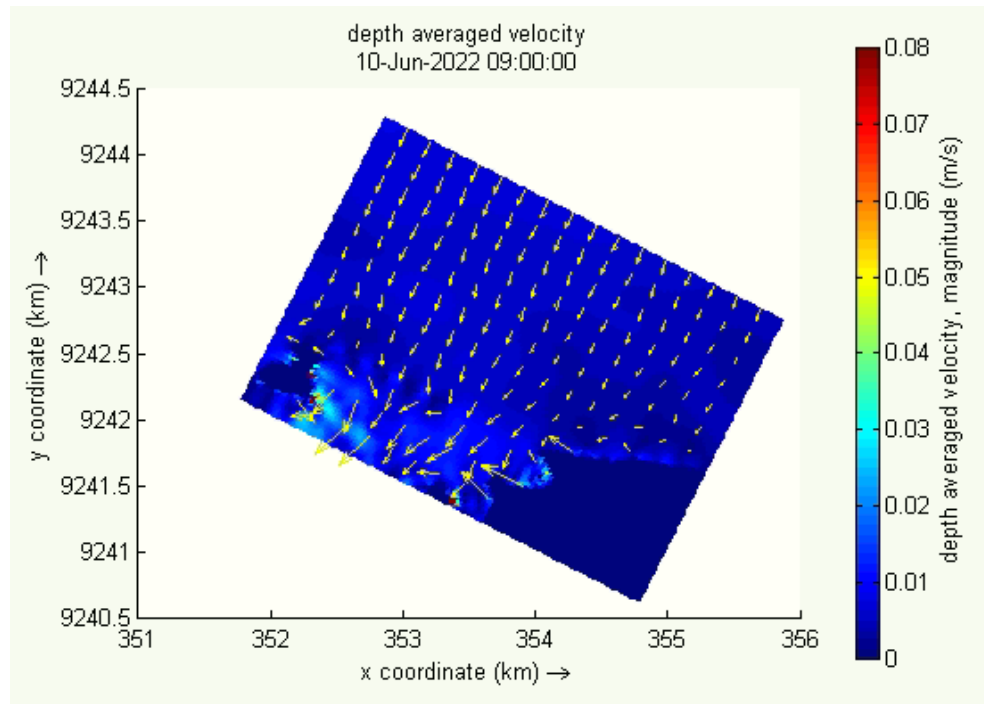
The data presented in the model results for the neap and spring tide conditions are shown in Figure 9.24. The conditions of each water level elevation are shown in Table 9.4.



5.1.1.98 Figure 9.25 Determination of observation points towards the high and low tides



Figures 9.25 to 9.26 show the current speed before the high tide and before the low tide. During the high tide, the current speed ranges from 0.02 to 0.03 m/s. Meanwhile, during the low tide, the current speed weakens with a value between 0.05 – 0.06 m/s.



5.1.1.99 Figure 9.26 Current speed towards the high tide in the existing condition

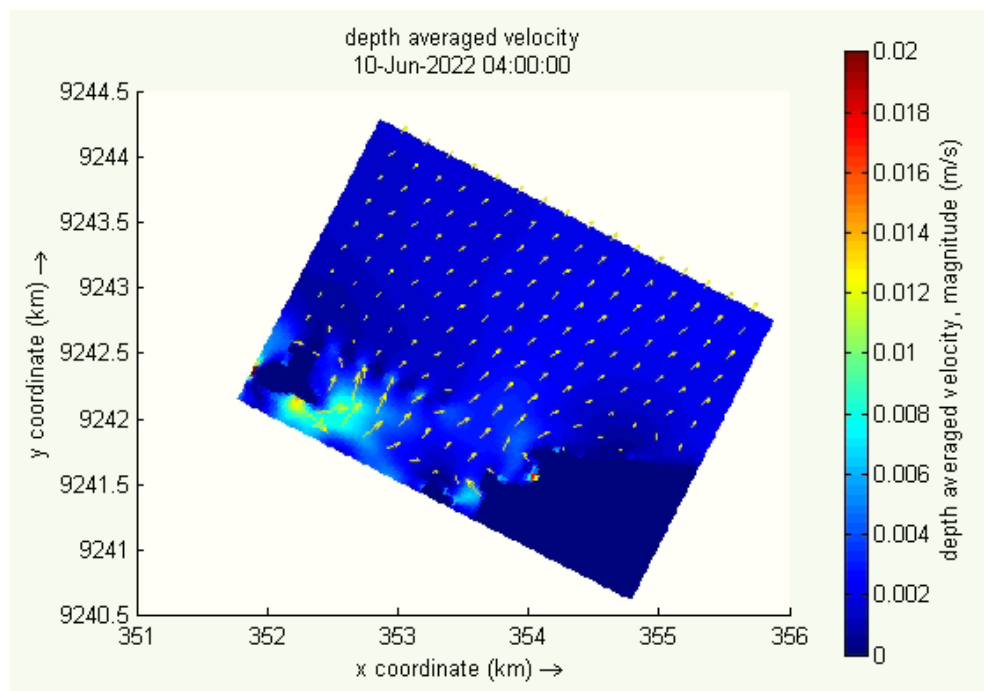
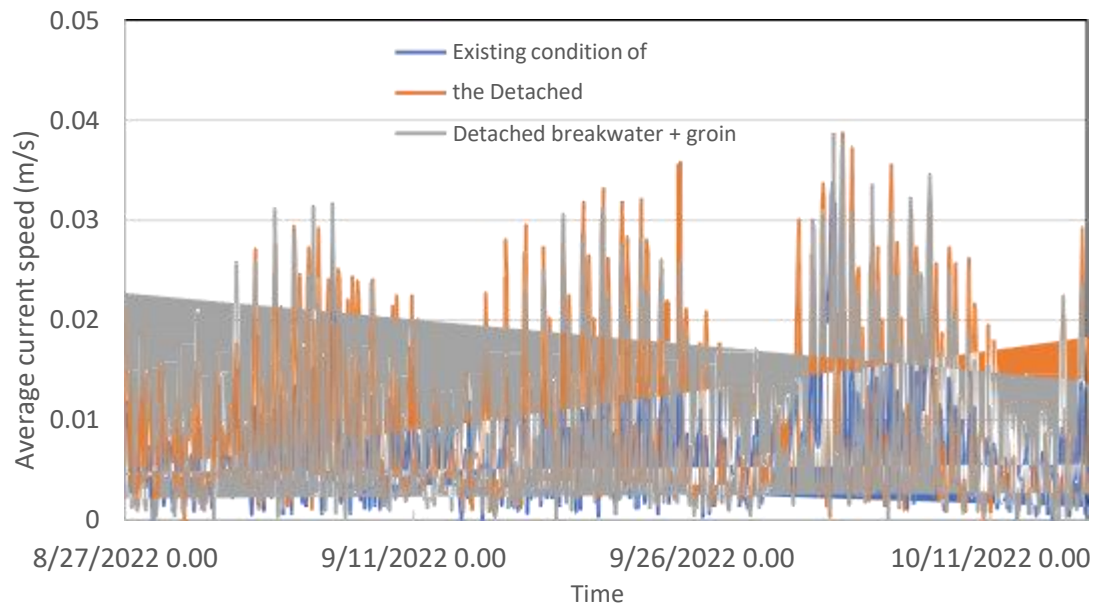
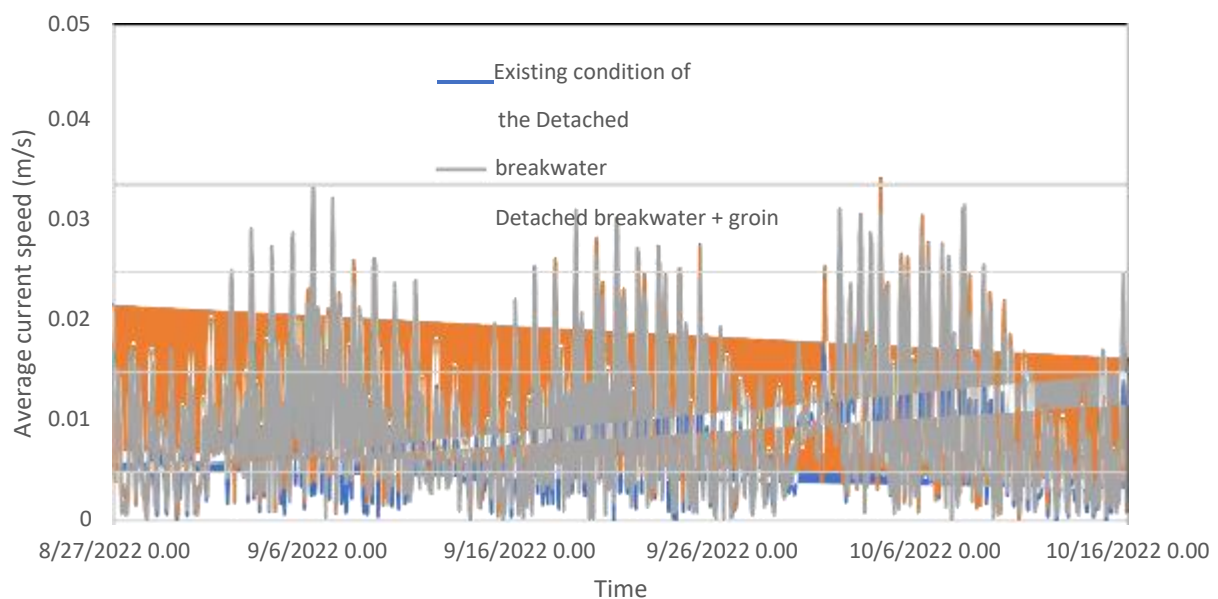


Figure 9.27 Current speed towards the low tide in the existing condition

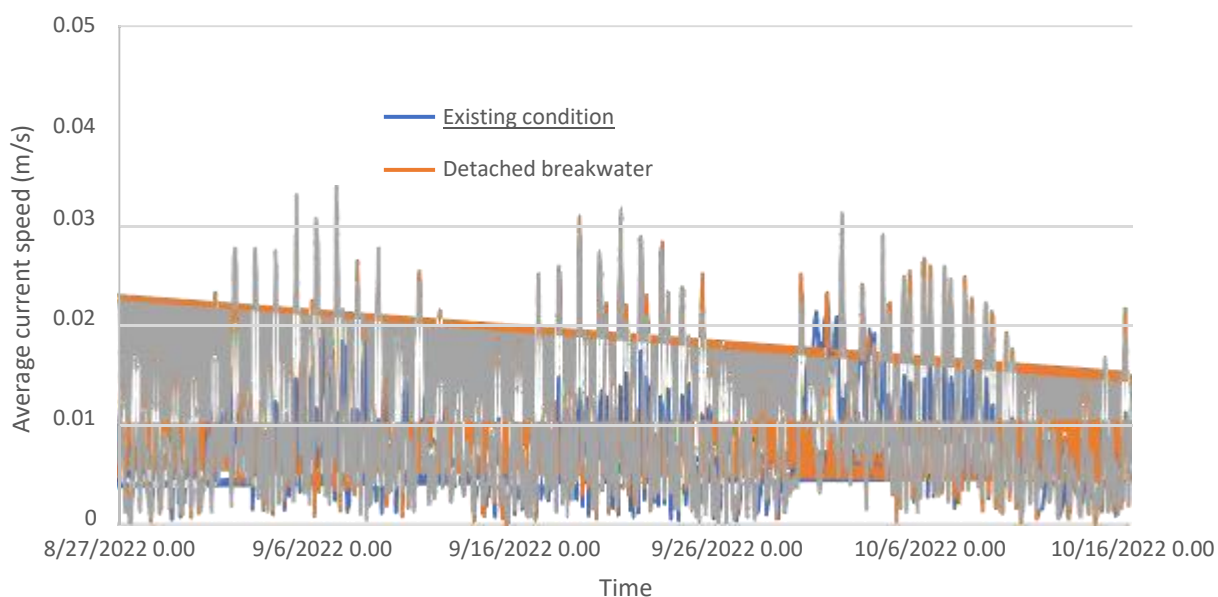
The effect of the structure on the current velocity is shown in the figure below.



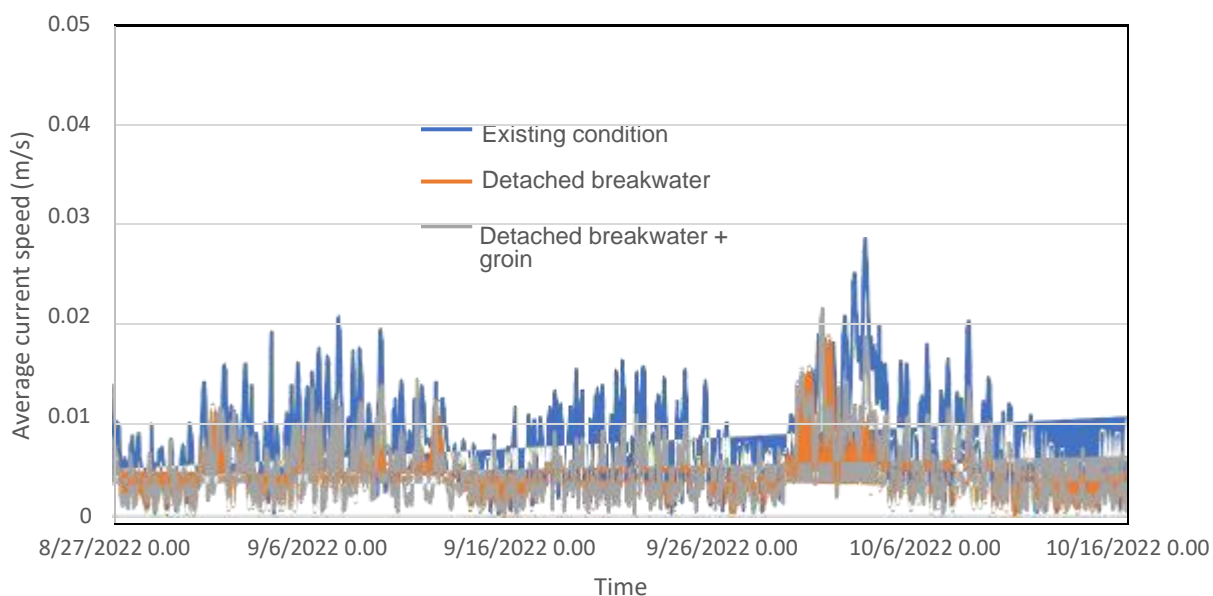
5.1.1.100 Figure 9.28 Comparison of the average current speed at Point A



5.1.1.101 Figure 9.29 Comparison of the average current speed at Point B



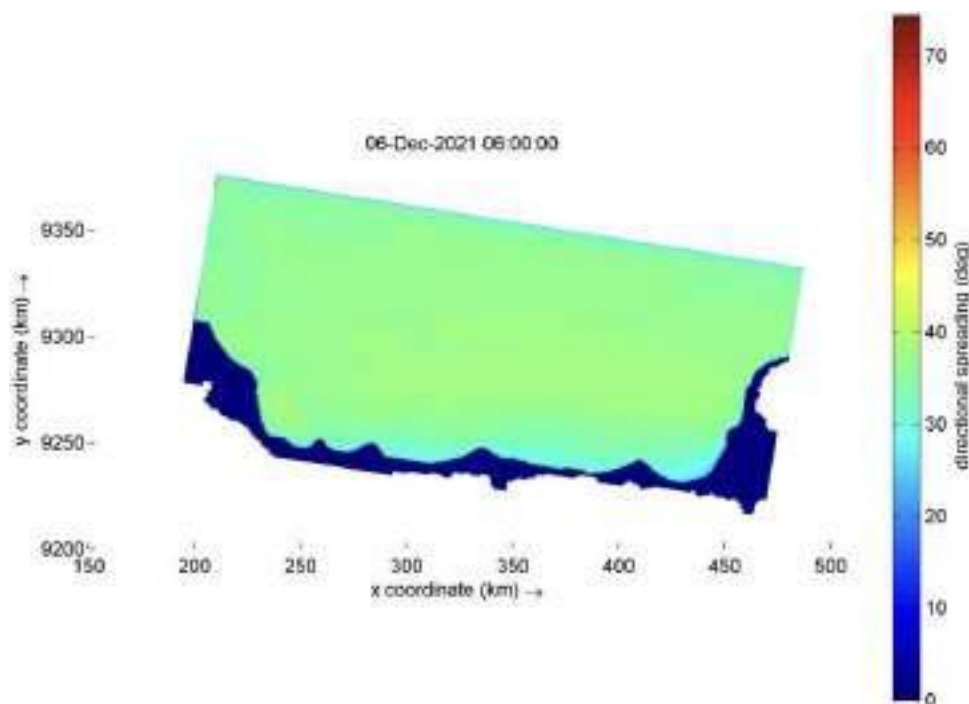
**5.1.1.102 Figure 9.30 Comparison of the average current speed at Point C**



**5.1.1.103 Figure 9.31 Comparison of the average current speed at Point D**

The interaction between the structure and tides as well as waves influences the current pattern around the coast. At Point A, the existence of a groin can slightly reduce the current speed compared to the existence of only a detached breakwater. Whereas at Points B and C, because the formation is in the form of a detached breakwater, there is no significant difference whether or not a groin is added. At point D, it can be seen that there is a detached breakwater in the areathat can significantly reduce the current speed.

### 9.6.2 Wave characteristics



5.1.1.104 Figure 9.32 Directional spreading of waves in wave domain 1

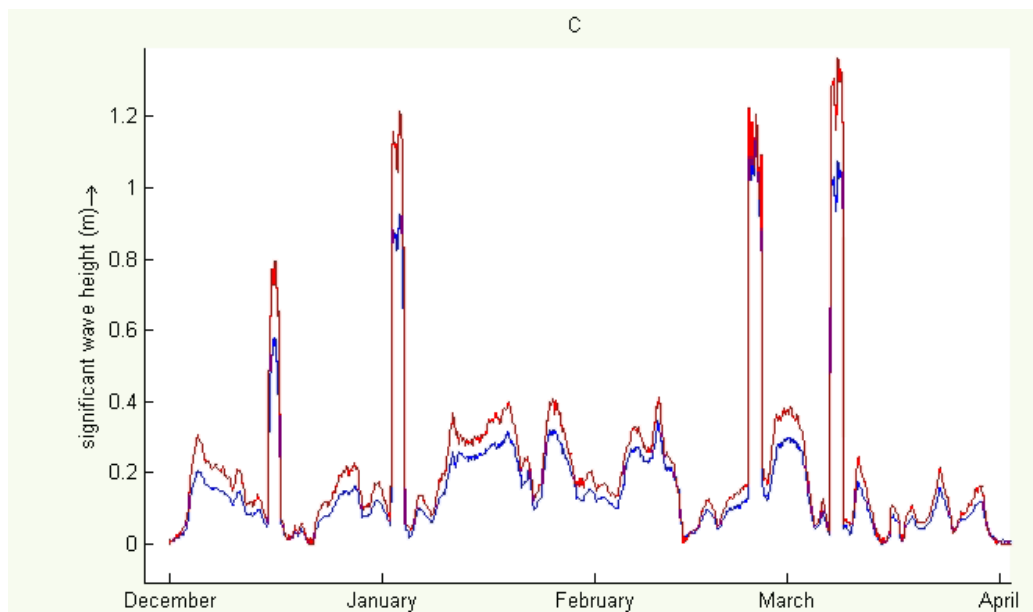


Figure 9.33 Comparison of wave heights in the existing conditions at Point C with the existence of structure

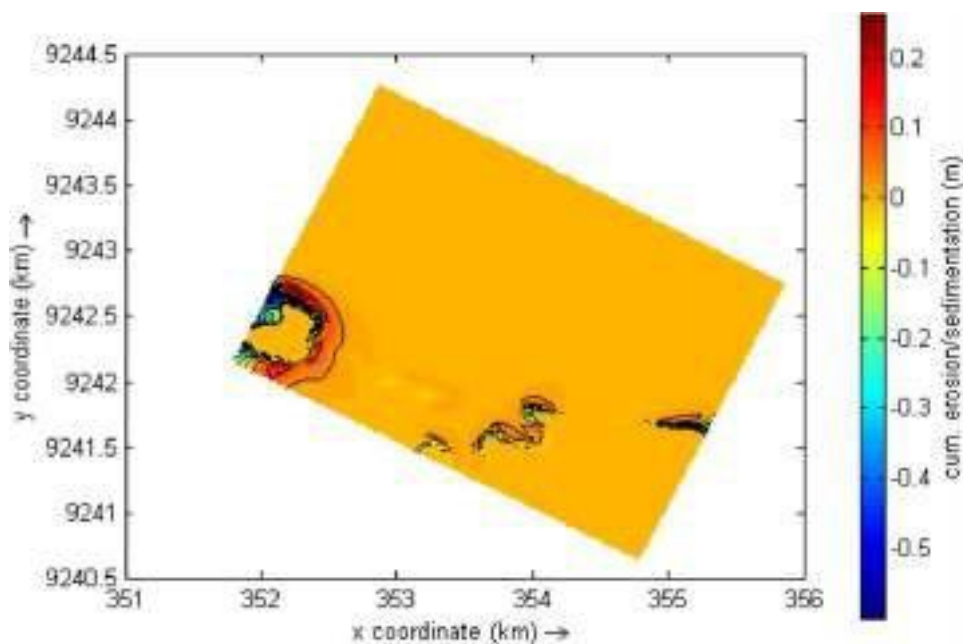
Wave height ranges from 0.1 m to 0.40 m in the study area with some noise that occurs when running the model. With the existence of a detached breakwater structure, wave

height (blue line) decreases compared to the wave height without the structure (red line).

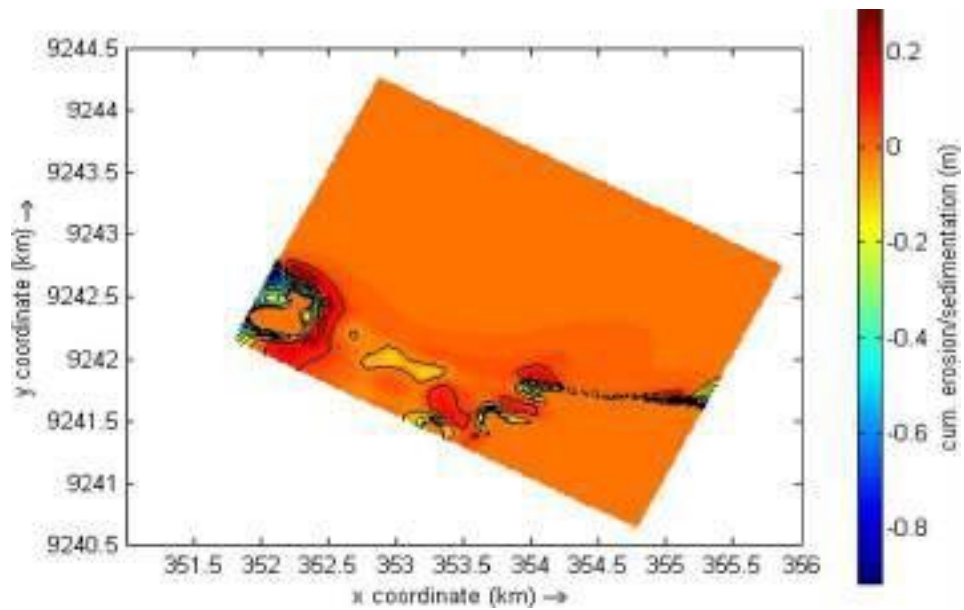
### 9.6.3 Erosion and sediment deposition characteristics in each season in the existing condition and with a detached breakwater structure

For cohesive sediments, the flux between the water and bottom phases is calculated per sediment fraction using the Partheniades-Kronos formula (Deltares, 2022). The running model was carried out for 1 year and 5 years so that erosion and deposition of cohesive sediments were produced with different trends at each observation point. The following figure shows the trend in sediment distribution in PIM Beach waters with the scenarios in the existing condition, condition with a detached breakwater, and condition with a combination of a detached breakwater and a groin.

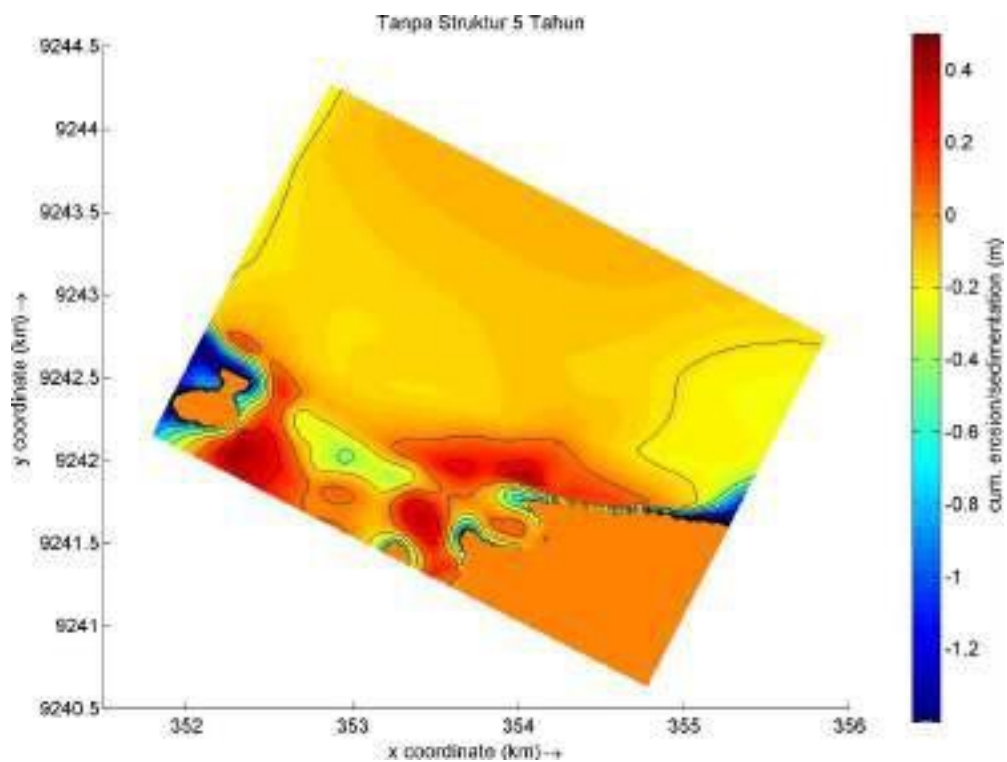
a. Existing condition, no structure



5.1.1.105 Figure 9.34 Condition of the existing model at the start of running



**Figure 9.35 Condition of the existing model after 1 year**

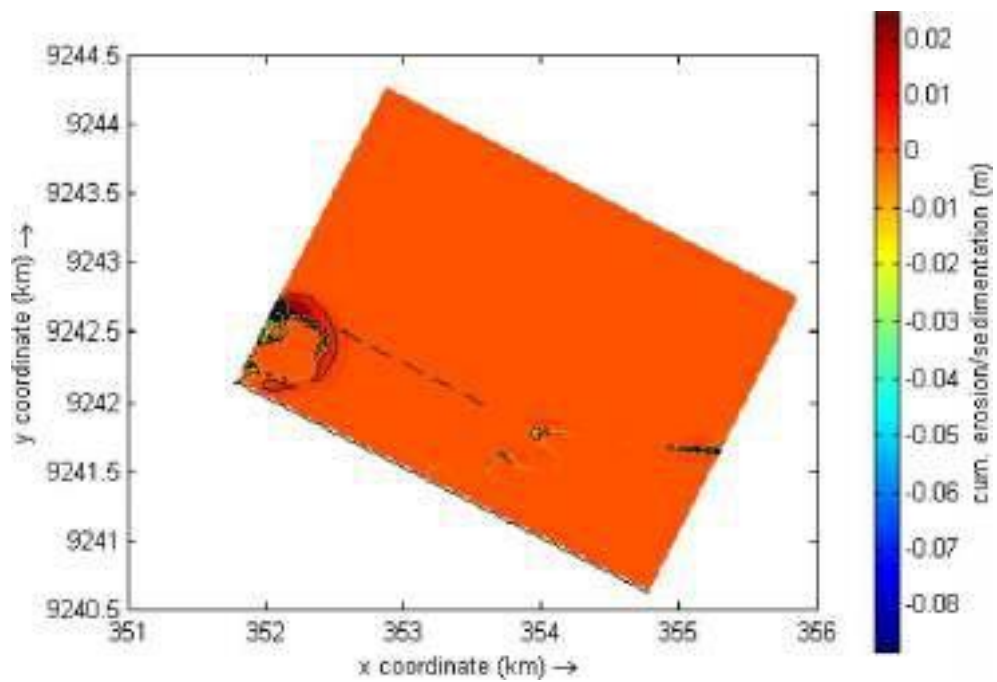


**5.1.1.106 Figure 9.36 Condition of the existing model after 5 years**

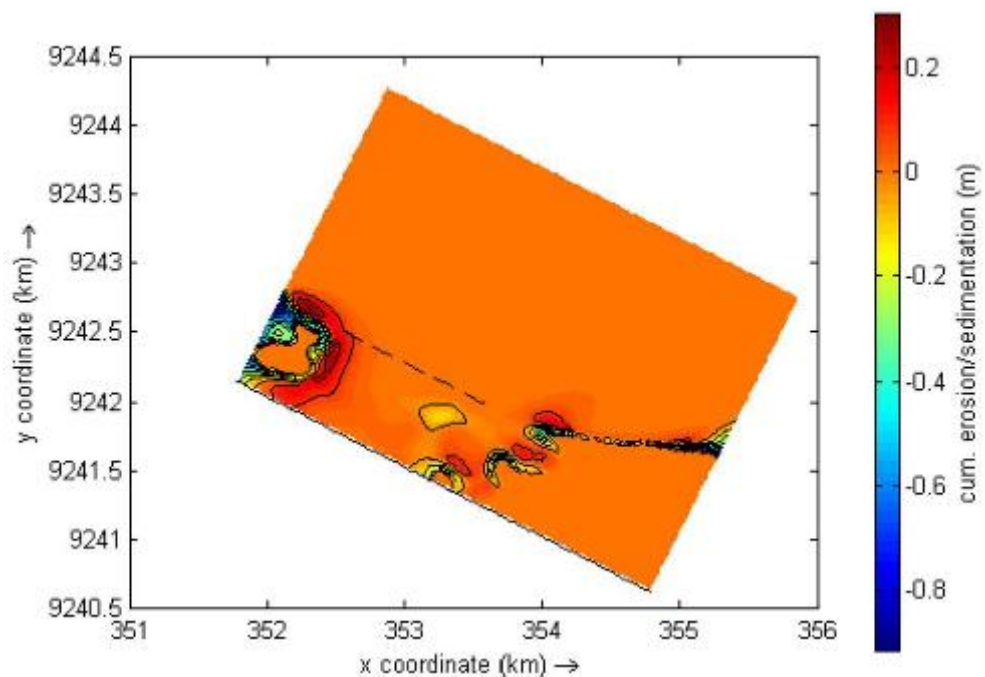
Based on the picture above, in the existing condition, erosion gets worse in the middle of the study area.



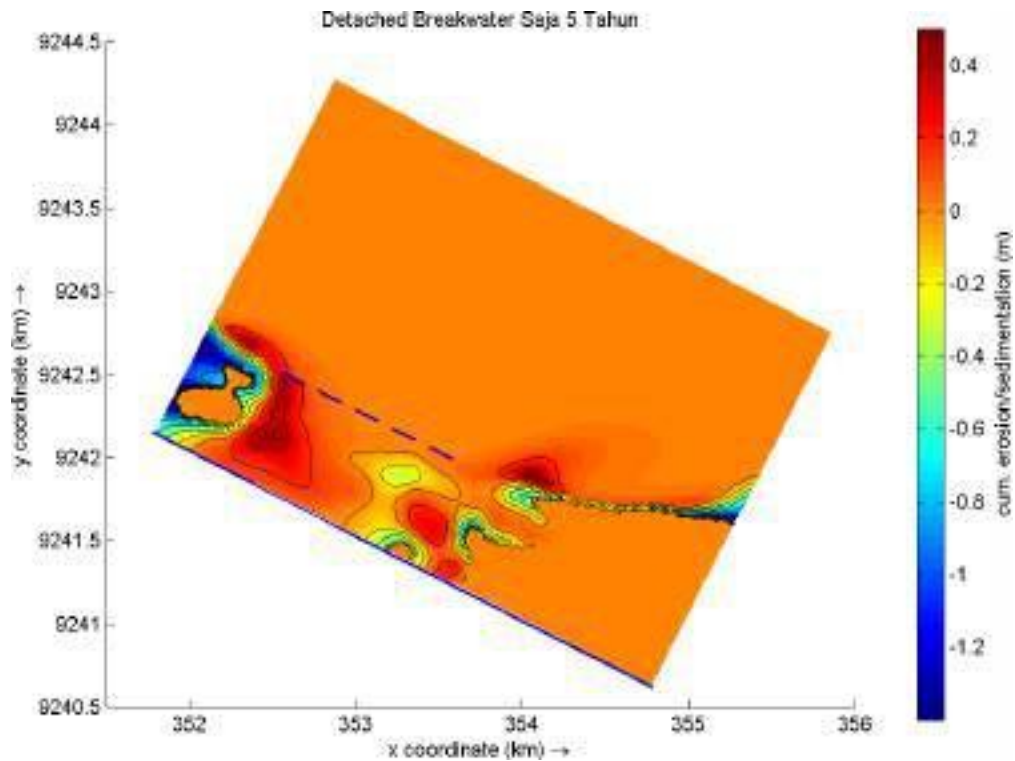
b. Condition with a detached breakwater



**Figure 9.37** Condition of the model with a detached breakwater at the start of running



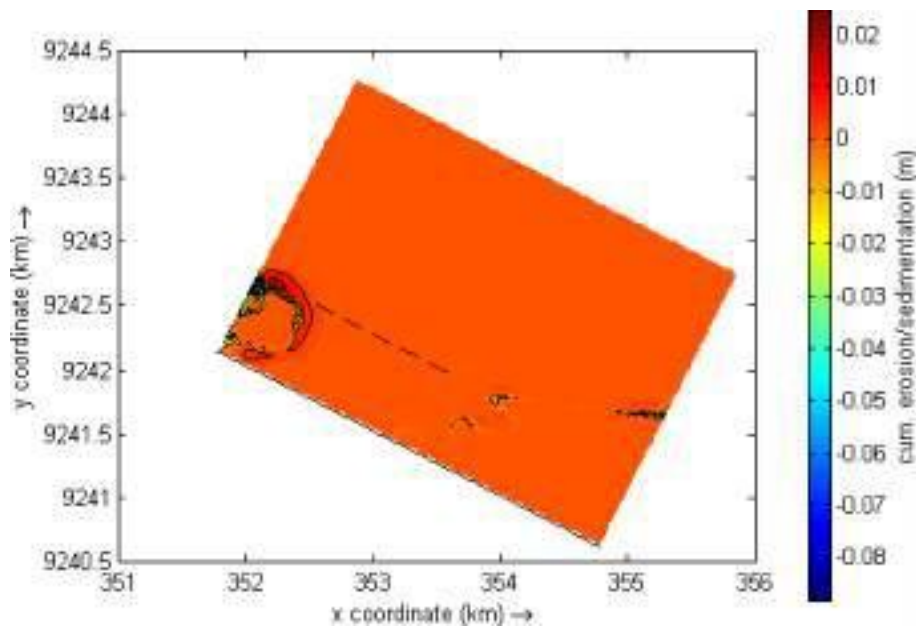
**Figure 9.38** Condition of the model with a detached breakwater after 1 year



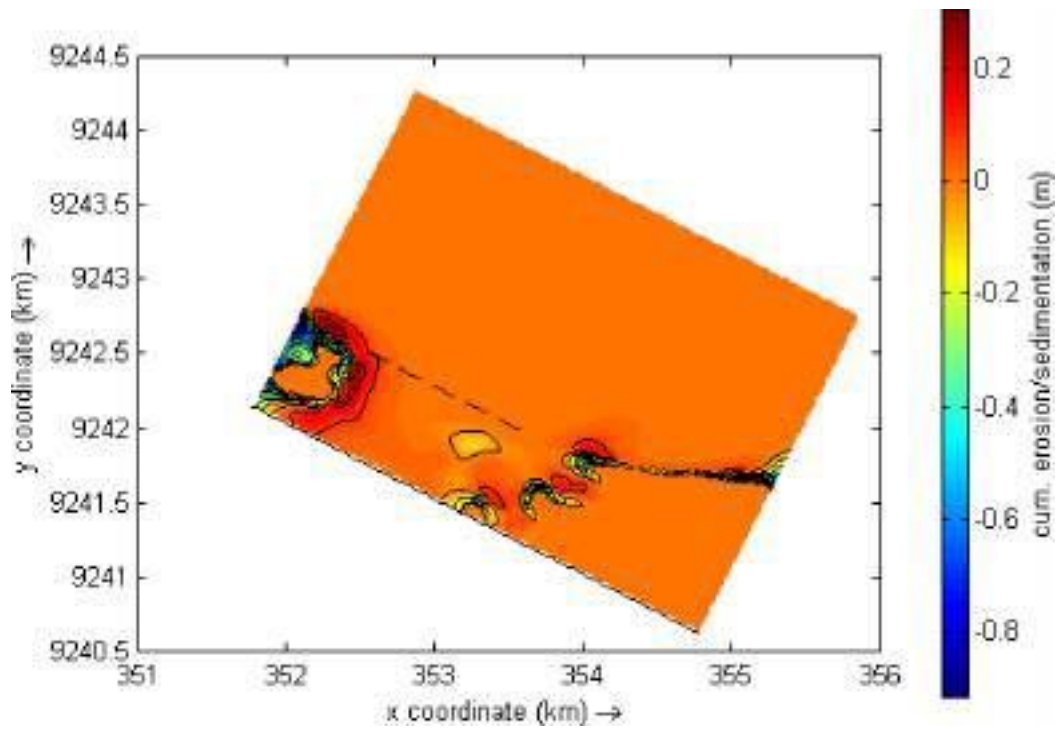
**Figure 9.39 Condition of the model with a detached breakwater after 5 years**

In the scenario of the coastal protection system by using a detached breakwater, the area behind the structure experiences sedimentation on the left side from time to time, in the periods of 1 and 5 years. Meanwhile, on the right side, exactly in the area behind the two structures, erosion still occurs.

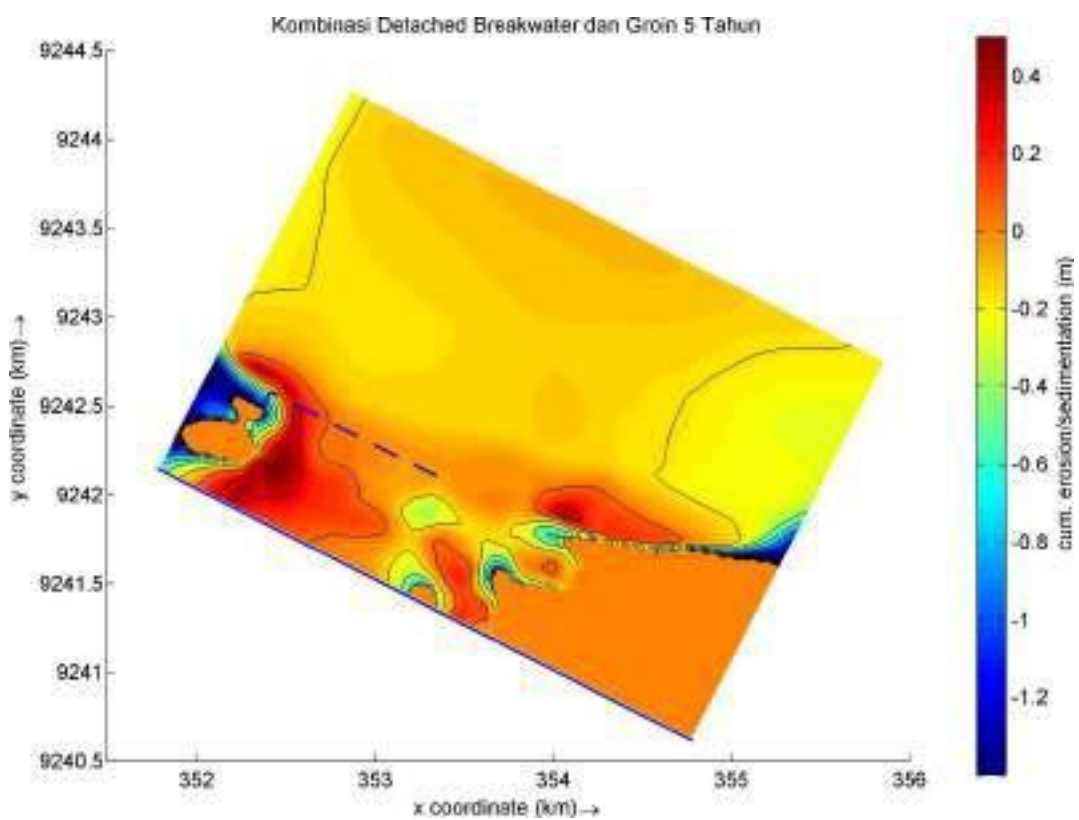
- c. Condition with a combination of a detached breakwater and a groin



**Figure 9.40 Condition of the model with a combination of a detached breakwater and a groin at the start of running**



**Figure 9.41 Condition of the model with a combination of a detached breakwater and a groin after 1 year**



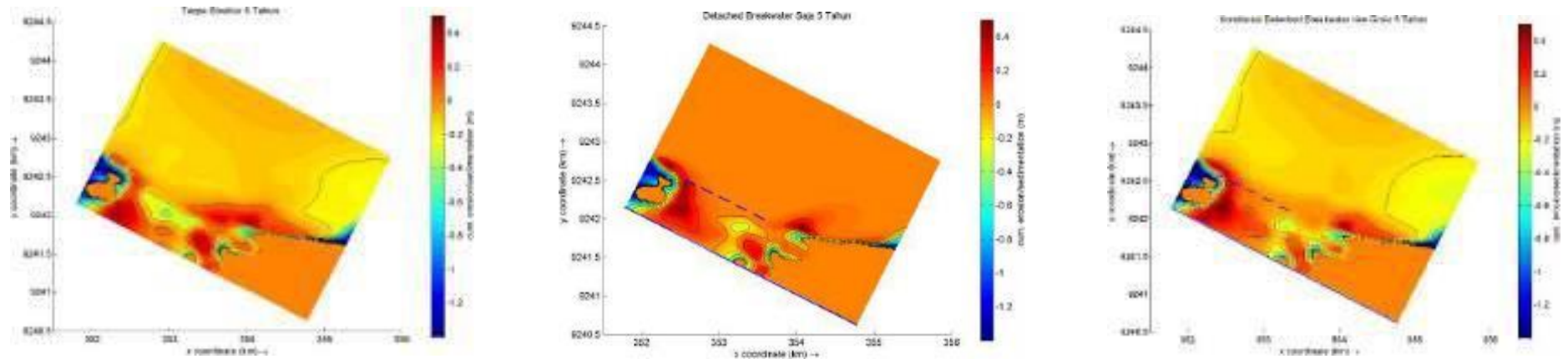
**Figure 9.42 Condition of the model with a combination of a detached breakwater and a groin after 5 years**

groin after 5 years

The combination of a detached breakwater and a groin shows that the area experiencing sedimentation gets wider behind the structure because the groin functioning as a controller of sediment transport parallel to the coast works optimally. In addition, without the addition of a detached breakwater on the right side, serious erosion will not occur. Sediment supply from the right side can still enter the protected area.

## 9.7 Engineer Opinion

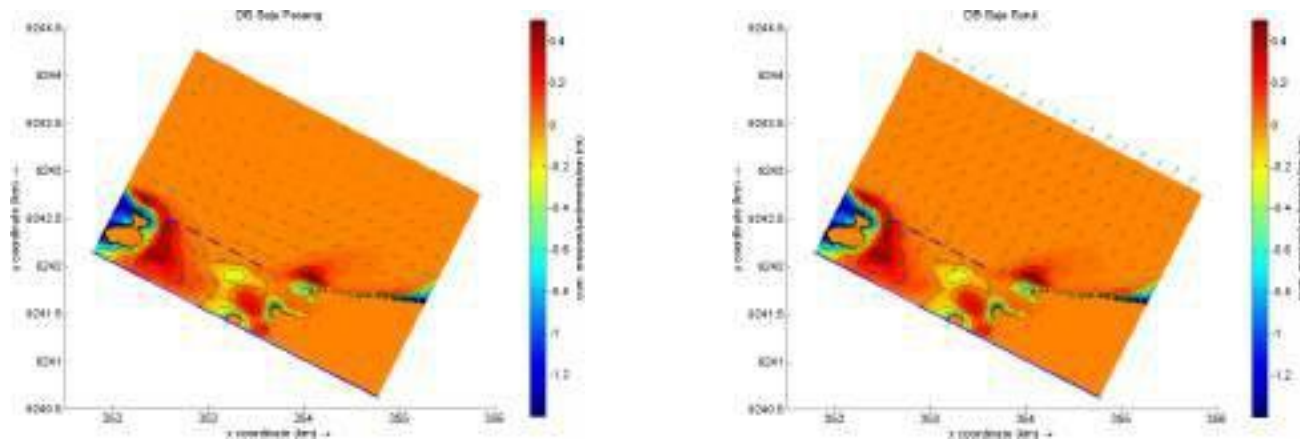
- a. The natural coast protection system in northern Java has been partially degraded due to increased human activities. This causes continuous beach erosion.
- b. Many coastal structures can be applied to overcome this problem, including among others hard and soft structures. A hard structure such as a detached breakwater is required to reduce wave energy due to storms and waves that usually occur in the study area. Waves with a height of 0.1 – 1.1 m often occur in the area. Therefore, a strong building is needed to protect the coast.
- c. Based on Figure 9.43, in the study area, erosion severity will increase due to the absence of a coastal protection system. Meanwhile, with the existence of a detached breakwater, erosion can be controlled, especially on the western and central sides. Meanwhile on the right side, there is erosion due to lack of sediment supply from the right side. On the other hand, the combination of a detached breakwater and a groin is able to expand the sedimentation area. Therefore, it can restore the condition of the coast behind it. On the right side, sediment can enter the protected area to supply the need for sediment.
- d. The results of the simulation show that the existence of a groin on the western side makes the current at a low tide much smaller compared to the layout with only a detached breakwater. The low tide currents that are much smaller make sediment that has been carried during the high tide and deposited during slack water/tidal transition remains significant behind the combination of detached breakwater and groin structures.
- e. In areas where sedimentation has occurred, it would be better to start planting mangroves that grow fast by choosing trees that are strong enough to be hit by waves. Referring to Chapter 7, based on the experience of local residents, the type of mangrove that is suitable and can survive is *api-api* or *Avicennia alba* Blume sp. This planting also needs to be protected with bamboo or other temporary materials.



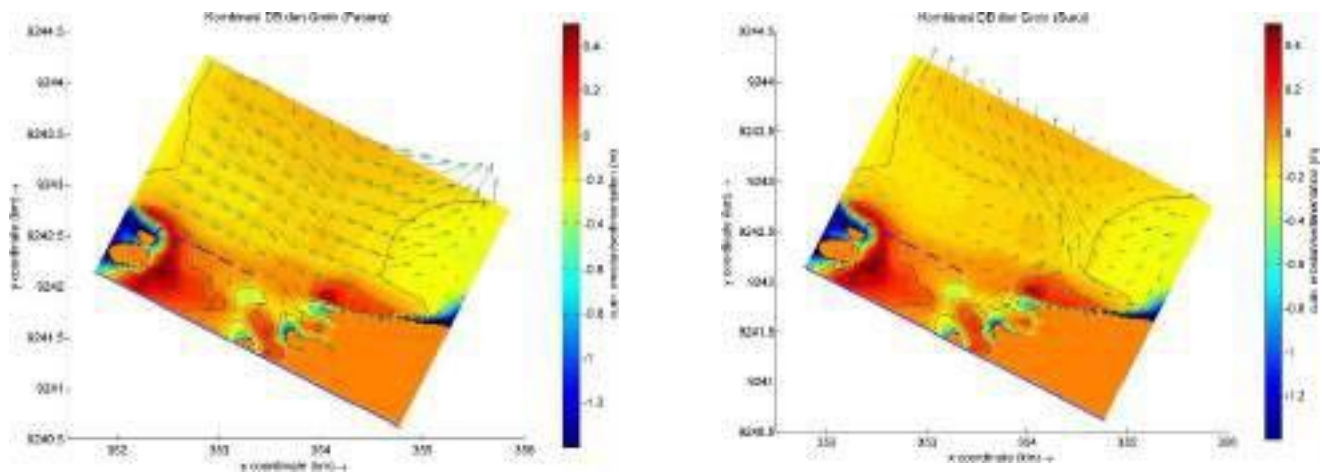
(a) Existing condition (without the structure of groin) (b) Condition with a detached breakwater (c) Condition with a combination of a detached breakwater and a groin

5.1.1.107 **Figure 9.43 Cumulative comparison of erosion and sedimentation based on modeling results after 5 years**





**Figure 9.44 Current pattern at the high and low tides with the detached breakwater scenario**



**Figure 9.45 Current pattern at the high and low tides with the detached breakwater and groin scenario**

## 9.8 Conclusion

- a. The computational simulation has considered the existing conditions and structure, with the assumption that the coastal protection structure is in the form of a detached breakwater. With the existence of a coastal protective structure, current speed decreases in the protected areas. This is good for the sediment deposition process behind the coastal protection structure.
- b. With the existence of a coastal protective structure, wave height can be reduced. However, the distance between parts of the structure needs to be taken into account. Therefore, although it has been optimal, based on the distance assumption used, there is still an opportunity to further reduce waves based on the distance between detached breakwaters. However, closing the distance will result in the high cost of the structure required.

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## CHAPTER 10 IMPLEMENTATION OF CONSTRUCTION WORK

### 10.1 Implementation schedule

The schedule for work implementation is estimated to complete within 6 (six) months or 180 calendar days from the signing of the contract and marked by the kick-off of the work. An outline of the implementation schedule is shown in Table 10.1.

The time for implementing the work should consider the season, namely during the dry season, so that work mobilization is easier.

**5.1.1.108 Table 10.1 Construction Implementation Schedule**

No	Work Item	Month					
A	<b>Kick-off</b>	◆					
I	<b>Preparatory Work</b>						
1	Mobilization and demobilization	—					
2	Topographical and hydrographic surveys, including reports and drawing	—					
3	Soil investigation, including laboratory tests and reporting	—					
4	Accommodation in the form of four-wheeled vehicles	—					
5	Preparation of work areas, material warehouses, fencing and workers' barracks including for the consultant's workspace	—					
6	Temporary facilities and equipment including the procurement of supply of electricity, clean water, telephone and application for related permits	—					
B	<b>Masonry Work</b>						
7	Installation of natural stones of 200-1000 kg (core+intermediate layer)	—	—	—	—	—	—
8	Installation of stone armor of 1.0 ton	—	—	—	—	—	—
1	Installation of stone armor of 1.5 tons	—	—	—	—	—	—
C	<b>Completed</b>						◆

### 10.2 Manpower Requirement

The allocation of manpower highly depends on the contracting strategy to be chosen by the Employer, in this case the Partnership. However, in the construction work, the work owner will generally involve the Contractor as the work implementer and the supervising Consultant.

Requirements for resources as key persons in the field owned by the Contractor and Supervising Consultant in implementing the construction work for the coastal protection structure at PIM Pekalongan can be summarized in Table 10.2 below.

**5.1.1.109 Table 10.2 Manpower requirement allocation**

No	Position	Contractor	Supervising Consultant	Qualifications
1	Project Manager	1	1	<ul style="list-style-type: none"> <li>• S1 Civil Engineering</li> <li>• Having a certificate of intermediate expertise in the field of qualification building.</li> <li>• Having a certificate of intermediate expertise in the field of construction management</li> <li>• &gt;10 years of experience</li> </ul>
2	Site Manager	1	1	<ul style="list-style-type: none"> <li>• S1 Civil Engineering</li> <li>• Having a certificate of junior expertise in the field of qualification building.</li> <li>• Having a certificate of junior expertise in the field of construction management</li> <li>• &gt;5 years of experience</li> </ul>
3	Supervisor	2	1	<ul style="list-style-type: none"> <li>• Minimum D3 Civil Engineering or equivalent</li> </ul>
4	Field Implementer	10	3	<ul style="list-style-type: none"> <li>• Minimum STM/SMA, Local community</li> </ul>
5	Drafter	2	2	<ul style="list-style-type: none"> <li>• Minimum D3, local community</li> </ul>
6	Administration	2	1	<ul style="list-style-type: none"> <li>• Minimum D3, local community</li> </ul>

## **FINAL DOCUMENT**

# **ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT (ESIA)**

## **DEVELOPMENT OF RUBBLE MOUND BREAKWATER IN COASTAL AREA OF PEKALONGAN CITY**



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## List of Abbreviation

AF	Adaptation Fund
BCPCC	Breakwater Construction of Pekalongan City Coast
DED	Detailed Engineering Design
FGD	Focused Group Discussion
IEE	Initial Environmental Examination
IFC	International Finance Cooperation
IKL	<i>Indeks Ketahanan Lingkungan/</i> Environmental Resilience Index
IDM	<i>Indeks Pembangunan Desa/</i> Village Development Index
PIM	<i>Pusat Informasi Mangrove/</i> Mangrove Information Center
PKH	<i>Program Keluarga Harapan/</i> Family Hope Program
SIA	Social Impact Assessment
SMMP	Social Monitoring and Management Plan

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## **Authorization Letter Environmental and Social Impact Assessment (ESIA) Document**

The Environmental and Social Impact Assessment is prepared by KEMITRAAN as the National Implementing Entity (NIE) of the Adaptation Fund (AF) in Indonesia. All results contained in the document are based on the document maker's analysis on data and facts obtained in the field.

The reference data used in preparing the ESIA document is in accordance with the area and interventions carried out within the framework of the Adaptation Fund.

In specific, the document served as a requirement and provision for the construction of the rubble mound breakwater to be carried out by KEMITRAAN for the Pekalongan City's Adaptation Fund Program that has been running since 2021.

**Jakarta, 20 August 2024**



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## EXECUTIVE SUMMARY

1. The ESIA was conducted by KEMITRAAN to ensure that the development and implementation of the rubble mount breakwater in Pekalongan City as part of the 'Safekeeping-Surviving-Sustaining towards Resilience' Project (S3) are both socially responsible and environmentally sustainable. The report covers methodology of ESIA, its legal framework, environmental and social baseline, public consultation and participation, potential environmental and social impact mitigation measures, and environmental and social management plan.
2. The S3 project adopts a 'safekeeping' action framework that identifies persisting gaps in coastal protection from mangroves, even after restoration efforts, and targets interventions to increase protection in the vulnerable zones. This could involve engineering additional natural or hybrid infrastructure alongside mangroves to provide layered buffers. The comprehensive safekeeping approach aims to reinforcing natural coastal protection, managing risks, and building community resilience to flooding. The multi-pronged strategy accounts for rebuilding degraded ecosystems and engineering specialized protections where risks remain high.
3. The selection of rubble mount breakwater was based on its contributions to mangrove ecosystem rehabilitation and restoration by proving sediment and nutrients for mangrove, in which could be extended as natural-based solution to protect people in Pekalongan City coastal from coastal flooding and flood hazards. The construction of the rubble mount breakwater will be applied through the coastline of Kandang Panjang and Bandengan Villages in North Pekalongan, in which potential impacts may arise.
4. The ESIA underline the following key assessment findings:
  - 4.1 The legal framework analysis ensured that the process of rubble mount breakwater has complied with all legal national and sub-national regulations. In this context, KEMITRAAN has obtained government approval to conduct the construction process.
  - 4.2 The baseline survey on environmental and social aspects that covers geographical condition (including but not limited to topography, geology, hydrology, climatology, soil type, and biological components) as well as demography, education, and health showed that the two target villages, Kandang Panjang and Bandengan have moderately high density population with a total of around 20,000 people in households that are closely situated together throughout the village rather than being sparsely spread out over a large area.
  - 4.3 The extensive stakeholder consultations with various stakeholders and a diverse range of key community members and groups, including local residents, business owners, fishermen, local government officials, and civil society organizations, has also been conducted. The main findings are:
    - Majority of the key stakeholders implied the needs for S3 project to provide a dredging machine and have locals trained on how to use it for future beach nourishment and maintenance, in which would create significant benefit for the community's beaches going forward.

- Identification of key stakeholders that may become direct beneficiaries of the rubble mount breakwater are project area groups, groups affected by construction, vulnerable groups, the construction unit, community neighborhood committees and village committees, and government agencies.
- 4.4 The environmental impact and risk assessment identified at least three potential positive impacts: 1) positive community perceptions; 2) job opportunities for local people; and 3) increased income for local people. On the other hand, the following potential negative impacts were also being identified: 1) increased air pollution; 2) increased noise and vibration; 3) construction-based hazards (such as dust and other pollutants); and 4) environmental sanitation and aesthetic disturbances. In regards to the abovementioned findings, KEMITRAAN proposes key risks mitigation measures that cover all of environmental impacts as follows:
- designing Monitoring of Contractor’s Safeguard Performance and Ensuring Environmental Quality Monitoring based on environmental management standard and environmental monitoring standard;
  - placing plan into action to boost project advantages and decrease negative effects; and
  - projected prevention and/or minimize any potential negative impacts as much as feasible.
- 4.5 The environmental impact and risk assessment identified at least three potential positive impacts: 1) positive community perceptions; 2) job opportunities for local people; and 3) increased income for local people. On the other hand, the following potential negative impacts were also being identified: 1) increased air pollution; 2) increased noise and vibration; 3) construction-based hazards (such as dust and other pollutants); and 4) environmental sanitation and aesthetic disturbances.
- 4.6 The social impact and risk assessment identified three potential positive impacts: 1) improved environmental condition in coastal area; 2) coastal tourism and recreation; 3) job creations. The study also identified the potential negative impacts: 1) ecological destruction; 2) construction hazards (road traffic and disruption of normal life for the residents); 3) social risks of labors influx. In addition, potential impacts on poverty alleviation, gender, and social inclusion have been identified: 1) poor people’s dividends; 2) improvement of the quality for the living environment of the poor; 3) employment opportunities for women; 4) women participation encouragement and women’s enhanced role development; 5) increased women’s income; and 6) women’s ability to participate in public affairs. In this regard, the proposed risks mitigation and social action plans are as follows: 1) Design Optimization to Increase Social Inclusiveness; 2) Information Disclosure and Public Participation; 3) Jobs Opportunities Creation and Potential Labor Risks Mitigation; 4) Promoting Gender Development; and Poverty Alleviation. Hence, the project will benefit for local communities including but not limited to vulnerable groups (such as the poor, women, and ethnic minorities). The social action plan stresses social inclusion and equal opportunity to benefit from new economic progress.

5. In conclusion, the following are underlined in the ESIA:

- 5.1 The construction work will be conducted in uninhabited seashore area, in which no displacement, compensation issues or community resistance are potentially emerged. There is no existing settlements or private land ownership are present in the intertidal zone or open waters, no purchase negotiation is required, and there will no demolition of homes, loss of assets, or forced relocation of families to make way for the new development. Selecting previously undeveloped shoreline location helps prevent the human upheaval and disruptions to livelihoods that often accompany acquisition of inhabited land for major construction projects. With no communities to displace, the contractors can focus their impact mitigation efforts on protecting the natural coastal ecological environment.
- 5.2 The local and regency governments place a strong emphasis on safeguarding the rights and wellbeing of vulnerable groups and women in their jurisdictions. The basic rights and interests of women, elderly, disabled, impoverished, and other vulnerable groups who may not have a strong voice in local affairs will be protected in process of social economic development. All ethnic groups live and work together. The society is harmonious and stable without any social risk. At the village level, officials make concerted efforts to ensure the basic needs and interests of marginalized community members are protected as social and economic development initiatives are undertaken. By prioritizing inclusivity, the goal is to enable all citizens, regardless of gender, ethnicity, age, or background, to actively participate in and benefit from the progress being made.
- 5.3 The project has a very small or even close to none potential in creating negative effect on the environment. Comprehensive environmental management plan was developed during the planning stages to identify any potential hazards or risks and outline steps to mitigate them, followed at each stage of implementation to ensure no unforeseen environmental damage occurs. The project also incorporates green building practices, and a minimal footprint to reduce its ecological impact. Sustainable materials, responsible waste disposal practices, and conservation of natural features on the site are all priorities. A strong appeal process in place for any concerned stakeholders to voice objections or request interventions, which ensures that environmental stewardship remains a priority. Lastly, regular monitoring and audits will identify any issues arising so they can be addressed proactively. With proper oversight and commitment to the management plan, the project's social and environmental hazards will remain under control. The developers have taken a conscientious approach to minimizing ecological disruption. While no large-scale infrastructure project is without impacts, this one has worked to reduce its footprint and operate responsibly within the bounds of its environmental plan.



- 5.4 Reshaping the shoreline to enable mangrove growth is a farsighted plan that would yield ecological and economic dividends for many years to come through habitat restoration, ecotourism revenue, and community revitalization. Enabling conditions for mangroves to grow and flourish along the coast would restore vital habitat that protects the shoreline from erosion and storm surge. Mangrove forests are highly effective at trapping sediment and stabilizing the substrate with their intricate root systems that allows the coastline to build up naturally over time. Mangroves provide shelter and breeding grounds for many species of fish, crabs, and other marine life, bolstering biodiversity. As the mangroves expand, they will draw in more tourists eager to explore these unique coastal wetlands and observe wildlife. Local communities could capitalize on this ecotourism potential by offering mangrove boardwalks and eco-educational programs. With careful project implementation, the project offers local benefits in options for residents to find temporary work and higher incomes.
6. ESIA provides potential benefits of the rubble mount breakwater that mostly will occur in 2025 when project is completed. In the time being, temporary employment opportunities are also being created during the development period, mainly to the local residents of Kandang Panjang and Bandengan.

## **1. INTRODUCTION**

### **1.1 Purpose of the Report**

In compliance to the Adaptation Fund's Safeguards Policy it is mandatory to conduct project specific Environmental and Social Impact Assessment Study for the proposed Breakwater Construction project in Pekalongan City. In pursuance of the above, Kemitraan has appointed consultants for carrying out Environmental and Social Impact Assessment (ESIA) studies for Breakwater Construction project in Panjang Baru Village, North Pekalongan Sub-district, Pekalongan City, Central Java. The type of the breakwater construction proposed in the proposal is Rubble Mound breakwater.

The project specific ESIA study has been conducted for the proposed Rubble Mound Breakwater Construction project in Panjang Baru Village, North Pekalongan Sub-district, Pekalongan City in accordance with ESMF prepared for such Breakwater Construction Project of Kemitraan. The main objective of the study is to incorporate environmental and social measures in project planning and designing and formulating the Environmental and Social Management Plan for implementing the environmental and social safeguards at different states of the project. The Environmental and Social Management Plan (ESMP) will be part of the bidding document for construction.

### **1.2 Environmental and Social Impact Assessment (ESIA) Study of Project**

The environmental and social impact assessment (ESIA) preparation led to identification of potential adverse environmental and social impacts and their remedial measures, based on

which the environmental and social mitigation measures have been prepared.

### 1.3 Objectives of the Study

Kemitraan intends to undertake an Environmental and Social Impact Assessment (ESIA) for the proposed Breakwater Construction project in order to understand the environmental and social sensitivities associated with the Rubble Mound breakwater and to implement mitigation measures in order to avoid adverse impacts during the Project's lifecycle. The development of breakwater construction project may have certain Environmental and Social impacts which may be negative or positive. The negative environmental and social impacts need to be avoided as far as possible. The impacts which cannot be avoided need to be mitigated or managed. The key objective of the assignment is follows:

- To conduct Environmental and Social Impact Assessment (ESIA) study to take environmental and social impacts into account in the selection of preferred project options and to determine appropriate measures for mitigating/compensating anticipated environmental and social impacts at different stage of the project.
- To prepare site specific ESIA and Environmental & Social Management Plan as well as Resettlement Action Plan (if required) for affected persons for the proposed Project
- To comply with the Adaptation Fund's safeguards Policy and Government of Indonesia regulatory requirements.

### 1.4 Scope of the Study

Environmental assessment is a detailed process, which starts from the conception of the project and continues till the operation phase. The steps for environmental assessment are therefore different at different phases. The present report details the environmental setting of the project zone, collects the baseline data and then identifies the anticipated environmental impact and finally suggests appropriate mitigation measures and mechanism for ensuring effective implementation of the environmental safeguard measures at different stages of the project.

This report will focus on the above content, describe the environment and socio-economic development of the project area, analyze the main environmental and social factors affecting the implementation of the project; identify the potential positive and negative impacts, analyze the environmental and social risks that the project may bring; incorporate social factors related to the realization of the project objectives into the project design, and propose measures to avoid or reduce negative impacts. The evaluation scope of the project is the north coastal area of Pekalongan with focus on Kelurahan Kandang Panjang and Bandengan. The scope of project ESIA is shown in Figure 1-1.



**Figure 1-1. Work Location Area**

## 1.5 Report Structure

The structure of ESIA report is as follows:

- **Executive Summary**
- **CHAPTER 1: Introduction**

Presents brief introduction of the project, need and objective of the study and structure of report.

- **CHAPTER 2: Project Description**

Describes salient features of the project, technical description and activities.

- **CHAPTER 3: Methodology**

The chapter describes the approach and methodology adopted for the ESIA study

- **CHAPTER 4: Administrative, Regulatory and Policy Framework**

This chapter reviews applicable environmental and social regulatory framework and its relevance for Project;

- **CHAPTER 5: Environmental and Social Baseline**

Outlines Environmental and Social (including Gender) Baseline in the study area of the project;

- **CHAPTER 6: Stakeholder Consultation**

This chapter presents stakeholder mapping and analysis, overview of the stakeholder engagement activities undertaken during the ESIA; and summary of consultations and the output

- **CHAPTER 7: Potential Environmental & Social Impacts and Mitigation Measures:**

Covering analysis of potential Environmental Impact due to the proposed project and mitigation measures;

- **CHAPTER 8: Social Impacts Assessment**

Covering socio-economic profile of the project area, analysis of impacts and mitigation measures;

- **CHAPTER 10: Environmental and Social Management Plan**

Presents detailed Environmental and Social Management Plan (ESMP) in accordance with WBG Policies and Procedures.

- **CHAPTER 11: Conclusion & recommendations**

## 2. PROJECT DESCRIPTION

### 2.1 Introduction

Coastal areas are defined as land areas bordering the sea. The land boundaries include waterlogged and non-waterlogged areas that are still influenced by marine processes, such as: tides, sea breezes and salt intrusion, while the sea boundaries are areas influenced by natural processes on land such as: sedimentation and the flow of fresh water into the sea, as well as sea areas that are influenced by human activities on land.

Beach abrasion in the coastal area of the Mangrove Information Center (PIM) located in Pekalongan City is increasingly worrying. This occurred due to tidal floods and the dying off of many small mangrove plants as a result of being hit by waves. To overcome these problems, it is planned to construct a coastal protection structure to reduce the impact of waves and tidal

floods. It is hoped that this protective structure will be able to allow mangrove plants to grow to maturity and ultimately function as a natural safeguard against increasingly widespread coastal abrasion.

Protecting coastal areas is done by visually reviewing and analyzing dynamic coastal phenomena including, among other things: beach erosion and accretion, direction and volume of sand movement parallel to the coast, weight and slope of armor, boundaries of the investigation area and so on.

Furthermore, to maintain and improve the condition of coastal stability, several innovative construction alternatives have been developed for coastal protection and security in order to provide harmony and comfort for residents in coastal areas as well as other constructed infrastructure. Natural protection restoration efforts to increase resilience from the risks of abrasion, tidal and flood hazards, including vulnerability and exposure, are done through mangrove ecosystem restoration and increasing coastal protection where gaps still exist ('safekeeping' action approach)

The Pekalongan City Government, in collaboration with KEMITRAAN has conducted a Detailed Engineering Design Study on Beach Protection for the PIM Coastal Area in Pekalongan City. The results of this study show that tidal studies are used to determine the planned water surface elevation for planning marine facilities, the characteristics of the types of tides that occur and predict water level fluctuations, where it is concluded that the waters on the coast of Pekalongan have a mixed tide, prevailing semi-diurnal type, which generally has two high waters and two low waters, and sometimes only one tide cycle per day with different heights and times.

A study by the Ministry of Maritime Affairs and Fisheries (MMAF) shows that the mangroves in Pekalongan have an index of 2.3 or a high level of vulnerability. Thus, the mangroves on the coast of Pekalongan City must be immediately recovered. To obtain a baseline description for the mangrove planting program and improve methods and techniques for effectiveness, a survey of mangrove forest vegetation on the coast of Pekalongan has also been carried out. The scope of the existing vegetation inventory survey includes collecting information and data on mangrove plants around the PIM area, accompanied by photo documentation of samples of each type of plant found. In 2012, the mangrove forest area was recorded at 9.2 ha. However, due to the critical condition of the land due to prolonged tidal flooding, only around 2.3 ha remains now. Information and experience from local residents show that the type of mangrove plant that is suitable and can survive is the api-api mangrove or *Avicennia alba* (Blume) sp. Thus, this type can be used as an option in reforestation efforts, which of course must involve active community participation in sustainable conservation efforts. This effort must also be accompanied by overcoming tidal floods and waves through the construction of coastal protection so that the planted mangrove seeds can grow to maturity.

To ensure that the construction of coastal protection will run smoothly, a survey has also been carried out on the availability, location and price of construction materials, including crushed rocks and ready-mix cement with a minimum quality of K-350. This survey includes location identification, on-site field survey, analysis of availability and accessibility regarding the distance from the quarry location to the development plan location in the PIM location in

Pekalongan. Based on this survey, information was obtained that natural stone material supplies were not available in Pekalongan City. The material in question was available outside Pekalongan City at the closest distance of 46.2 km, namely in Batang Regency. Meanwhile, the batching plant for providing ready mix concrete material is located in Pekalongan City, at a distance of 12.5 km from the PIM location. Hydro-sedimentation modeling was carried out to obtain an analysis of the water conditions at the work site and its surroundings before and after the breakwater was built. This modeling was carried out using secondary data in the form of wind speed and direction, tides, sedimentation and bathymetry data. Simulations for hydro-sedimentation modelling have been carried out using Delft3D software. Delft3D is a 3D modelling suite for assessing hydrodynamics, sediment transport, morphology, and water quality for fluvial, estuarine, and coastal environments.

Furthermore, the underlying provisions as stipulated in the Government Regulation of the Republic of Indonesia Number 5 of 2021 concerning the Implementation of Risk-Based Business Licensing, require that before development activities are implemented and are in operation, the business plan and/or activity must be accompanied by an Environmental Approval or Governmental Approval. Either approval document is published after the preparation of environmental documents.

Based on the provisions of the Republic of Indonesia Government Regulation Number 22 of 2021 concerning the Implementation of Environmental Protection and Management, Article 3 paragraph (1), Environmental approval must be obtained by every business and/or activity that has an important or non-important impact to the environment. In paragraph (4), it is stated that environmental approval is carried out through, a. Preparation of Environmental Impact Assessment (EIA/AMDAL) and EIA feasibility testing; or b. Preparation of the UKL-UPL Form and review of the UKL-UPL Form.

Furthermore, in compliance to the provisions of Minister of the Environment Regulation Number 4 of 2021 concerning List of Businesses and/or Activities that are Required to Have Environmental Impact Analysis, Environmental Management Efforts and Environmental Monitoring Efforts or Statement of Capability for Environmental Management and Monitoring Appendix II Letter D. Other Non-KBLI No. 4 Wave barrier (talud) and/or breakwater with UKL-UPL scale of  $500 \text{ m} > \text{Length} > 10 \text{ m}$ , and No. 5 Construction of coastal protection and improvement of river estuaries, a. Parallel to the coast (sea wall/revetment), with a scale of  $< 1 \text{ km}$ , UKL-UPL is mandatory. The Breakwater and Beach Protection Development Plan carried out by the Pekalongan City Government in collaboration with KEMITRAAN had a length of 150 meters long. Thus, based on the provisions as regulated in the Minister of Environment and Forestry Regulation Number 4 of 2021, it falls within the scope of the criteria for activities that are required to prepare UKL-UPL document.

Based on the provisions above, the Office of Tourism, Culture, Youth and Sports (DINPARBUDPORA) of Pekalongan City, as the party responsible for the business and/or activities of Preparation of UKL-UPL Documents for Beach Protection in PIM Coastal Area of Pekalongan City, is committed to obeying and adhering to existing regulations. The forms of obedience and adherence in efforts to control environmental damage and pollution as well as increasing efforts to manage and support the environment are realized through the preparation of documents for Environmental Management Efforts and Environmental



Monitoring Efforts (UKL-UPL) for the Construction of Beach Protection for the PIM Coastal Area of Pekalongan City.

## 2.2 Site Location

The project site refers to the location of the Rubble mound breakwater and the construction lay down area, in particular sea land. Based on the ToR, the work location is situated between Kelurahan Kandang Panjang and Kelurahan Bandengan in the north coastal area of Pekalongan. The work location is shown in Figure 2.1 and Figure 2.2.

The results of interpretation of the work location boundaries given in the three points above provide an overview of the work location along the 1,300 m x 2 x 250m coastline. Aerial montage in a satellite map is shown in Figure 1, while the results of interpretation of the work location are shown in Figure 2.

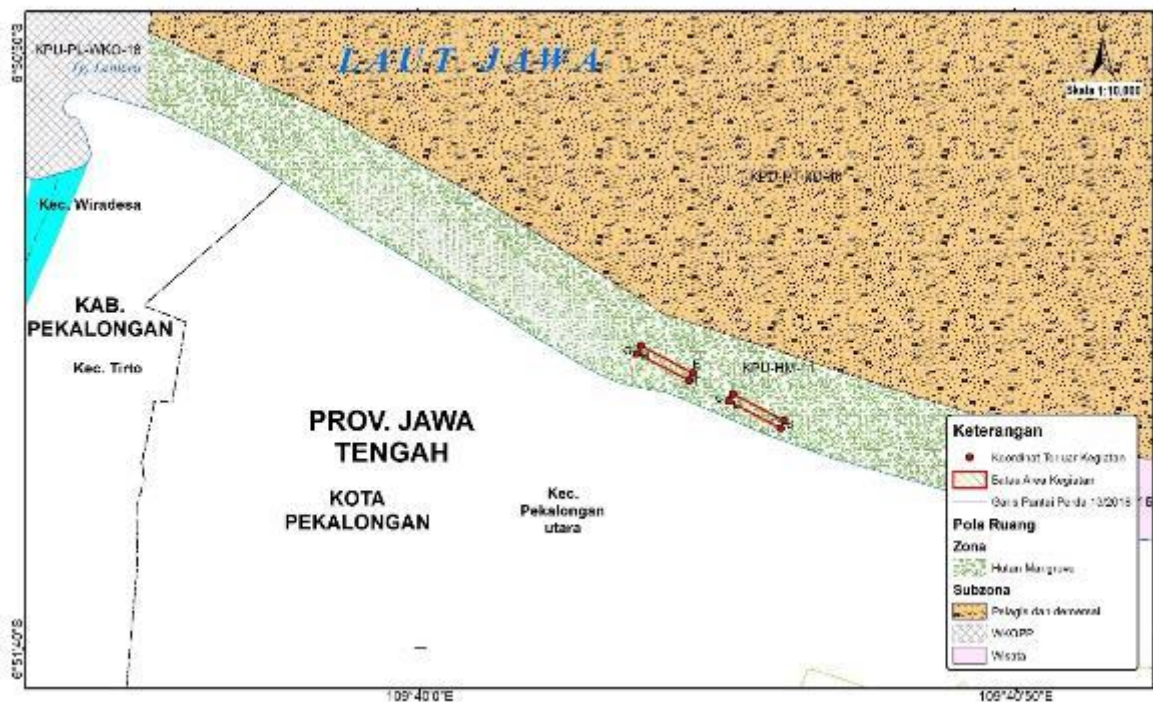




Figure 2-1 Satellite Image of the Work Location

**Figure 2-1. Satellite Image of the Work Location**

Source: 3S Project, KEMITRAAN, 2024.



Source: DED Feasibility Breakwater by Nawa Pancadasa Abadi

**Figure 2-2. Work Location Area**

## 2.3 Salient Features of the project

The salient feature of the project is presented in Table 2-1.

**Table 2-1. Salient Features of the Project**

No	Project Features	
1	Project Authority	KEMITRAAN
2	Selected Location	Kandang Panjang Village, North Pekalongan Sub-district

## 2.4 Site Connectivity

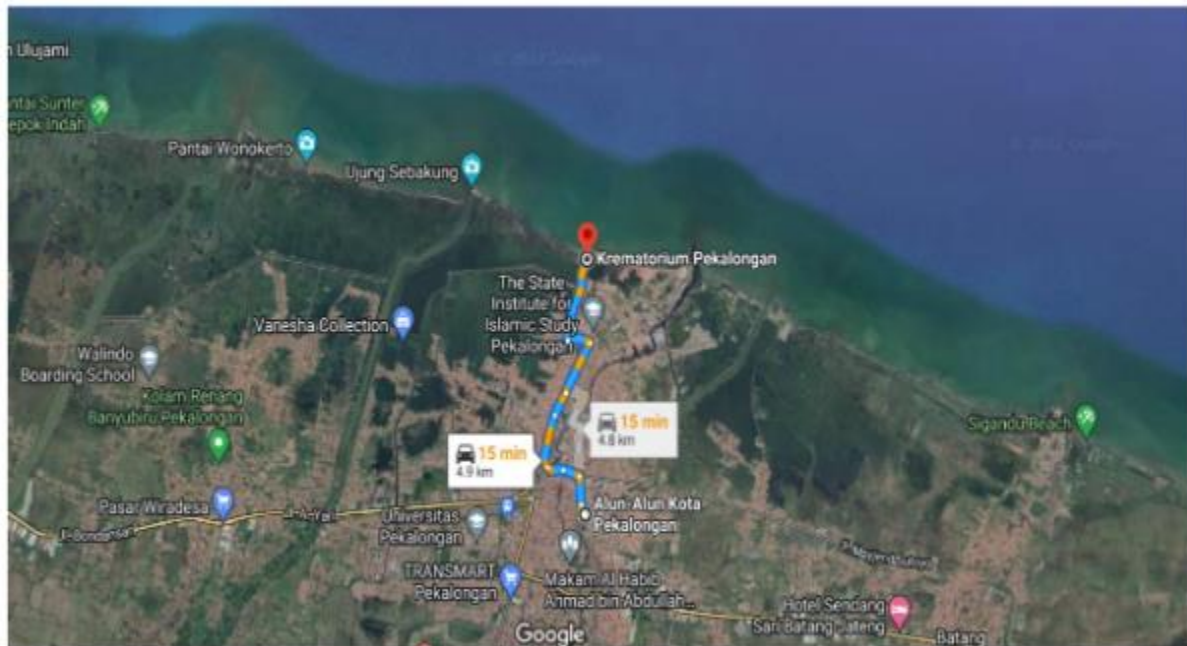
The site is connected by a local road in Kandang Panjang. This main road connects Kandang Panjang to the city of Pekalongan. The material for construction of breakwater will be carried out passing through this road.

Pekalongan City is located 101 km west of Semarang City, and 384 km east of Jakarta. Pekalongan is known as the City of Batik, due to its distinctive and varied batik patterns. In 2021, the population of Pekalongan City was 315,997 people with a density of 6,983 people/km<sup>2</sup>. Pekalongan is located in the province of Central Java, Indonesia, bordering the Java Sea to the north, Batang District to the East, and Pekalongan District to the South and West, and is located astride the North Coast Route (Pantura). which connects Jakarta and Surabaya via Semarang. Pekalongan City has an area of 4,525 ha, part of the 3254 thousand km<sup>2</sup> area of Central Java. The farthest distance from north to south is  $\pm 9$  km, while from west to east it is  $\pm 7$  km. The work location is the PIM Coastal Area, Pekalongan City, located on the north coast of Pekalongan City with the East and West boundaries as follows:

- Eastern Boundary: Pekalongan Crematorium building (Kandang Panjang Urban Village, North Pekalongan Subdistrict, Pekalongan City, 51149).
- Western Boundary: the coastal boundary of Pekalongan City in the western part (Bandengan Urban Village, North Pekalongan Subdistrict, Pekalongan City, Postal Code 51149). Official maps with high resolution to determine the administrative boundaries of Pekalongan City are not easy to obtain. One of the official maps can be seen in Pekalongan City Regional Regulation Number 9 of 2020 concerning Amendments to Pekalongan City Regional Regulation Number 30 of 2011 concerning Pekalongan City Regional Spatial Planning for 2009-2029.
- North and South Boundaries; following the measurement limits required in topographic and bathymetric surveys as far as 250 m respectively landward and seaward from the coastline
- North Pekalongan is a Coastal Conservation Area, part of a zone vulnerable to tidal flooding covering an area of approximately 60 ha in parts of the North Pekalongan Subdistrict including Degayu, Kranyak Lor, Pajang Wetan, Panjang Baru and Kandang Panjang Urban Villages.
- The distance from the central square of Pekalongan City to the Pekalongan Crematorium building can be reached in approximately 15 minutes (+/- 4.9 km) using 4-wheeled or 2-

wheeled vehicles. Road access to the crematorium building can be accessed by 4-wheeled and 2-wheeled vehicles. The access road to the work site or the location closest to the crematorium building is an asphalt road with good condition.

- Overall, the planned location for breakwater construction in PIM Pekalongan City can be accessed easily from land.



**Figure 2.3. Ease of access to the activity location**

## 2.5 Type of Equipment

The types of construction equipment needed to carry out BCPCC are presented in the following table.

**Table 2-2. Heavy Equipment Required for BCPCC**

No.	Equipment Type	Units	Function
1.	Excavator	3	Transporting and placing stones at the breakwater placement location"
2.	Barge	1	Transporting excavators and stones to the breakwater location point

3.	Dump Truck		Transporting stone materials from suppliers to the breakwater construction site
4.	Dozer	1	Levelling the land in the breakwater construction area

Source: UKL-UPL analysis, 2023

## 2.6 Land Availability

The overall land area required for the purpose of breakwater construction is about 8,889,92 m<sup>2</sup> with details in Table 2-1. It is a coastal area that doesn't need to be waste/scrub land which is required to be developed. This land area is appointed by the municipal government of Pekalongan City and not an individual property.

### Land Area

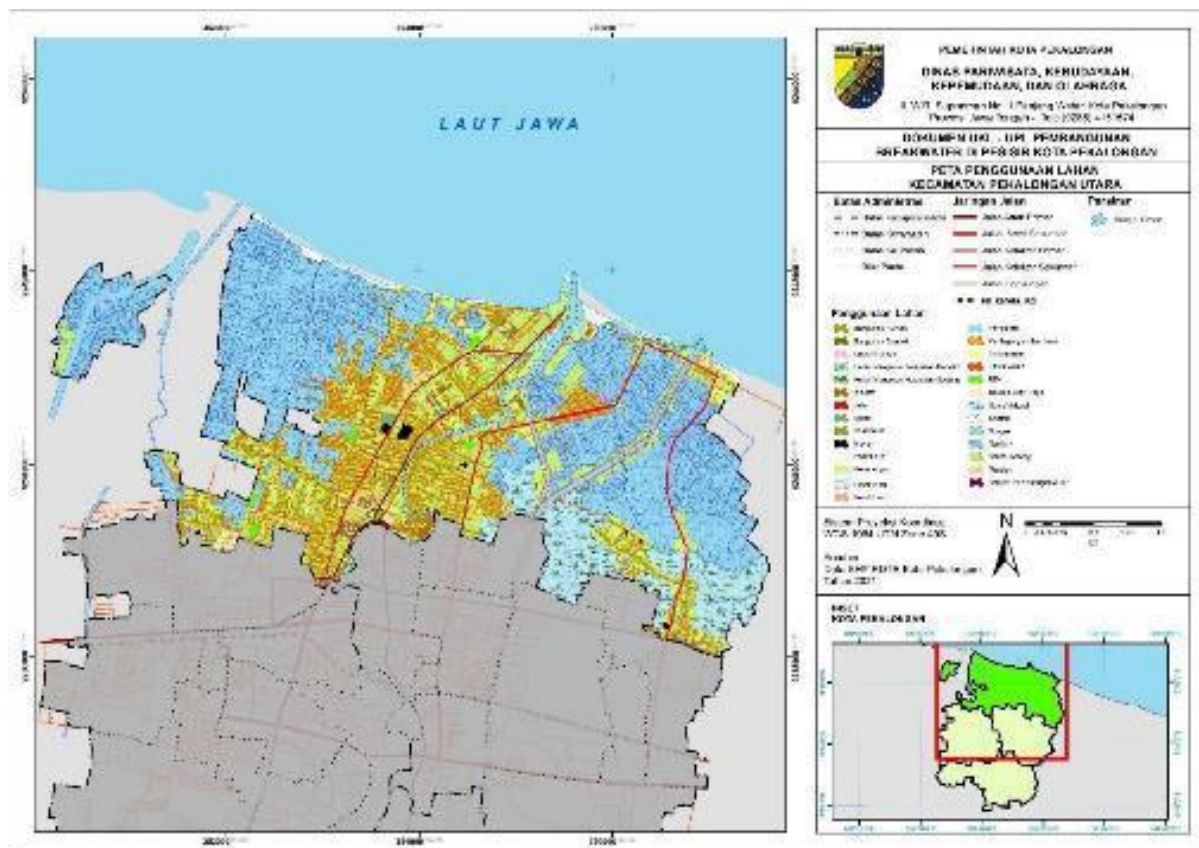
The planned BCPCC occupies an area of 8,889.92 m<sup>2</sup> with area details as follows:

**Table 2-3. Details of BCPCC Land Area**

No	Location	Area		Total (m <sup>2</sup> )
		Length (m)	Width (m)	
1	Area 1	150	21,37	3.205,5
2	Area 2	150	21,37	3.205,5
3	Distance between Area 1 and Area 2	116	21,37	2.478,92

Source: Consultant's calculation, 2023.





**Figure 2-4. North Pekalongan Subdistrict Land Use Map**

**Location of Rubble Mound breakwater**

The breakwater is located on the following coordinates in Table 2-4.

**Table 2-4. Location of Rubble Mound breakwater**

No.	Location Tie Points	Longitude	Latitude
Area 1			
1.	Point 1	6°51'21.04"S	109°40'30.78"E
2.	Point 2	6°51'21.66"S	109°40'30.48"E
3.	Point 3	6°51'19.36"S	109°40'26.12"E
4.	Point 4	6°51'18.78"S	109°40'26.48"E
Area 2			
5.	Point 5	6°51'17.01"S	109°40'23.13"E
6.	Point 6	6°51'17.63"S	109°40'22.80"E
7.	Point 7	6°51'15.37"S	109°40'18.45"E
8.	Point 8	6°51'14.72"S	109°40'18.81"E



Source: UKL-UPL, 2023.

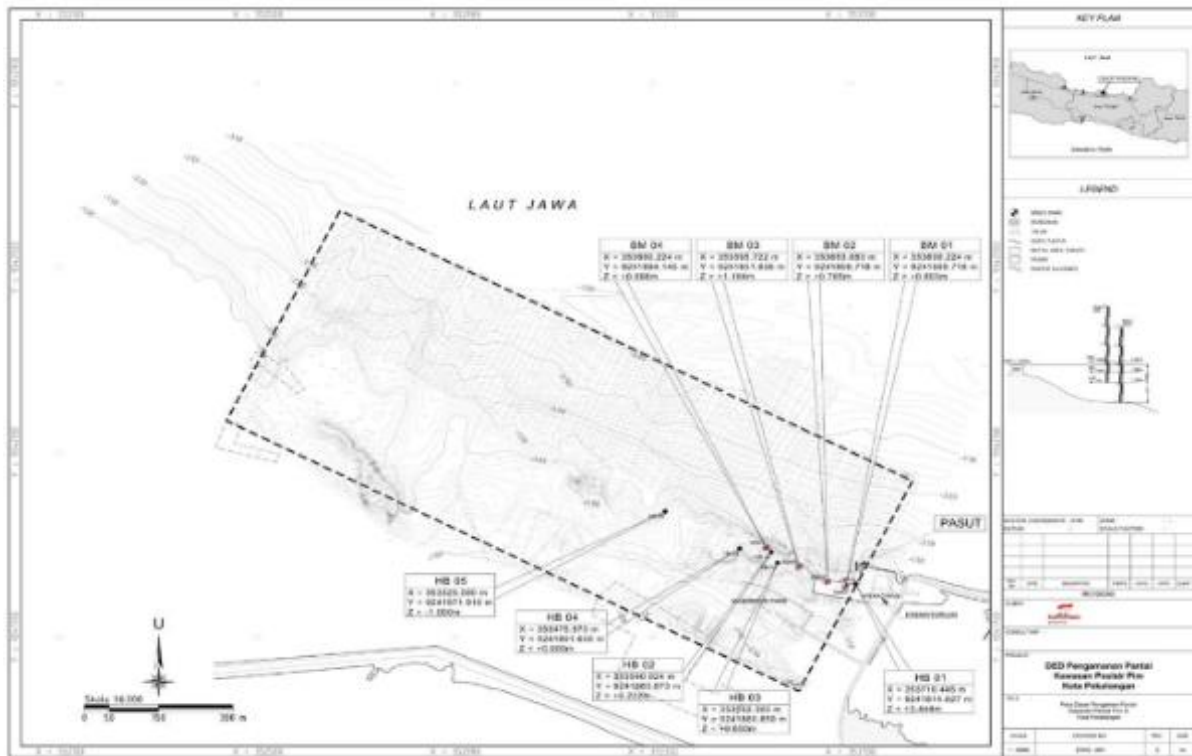


Figure 2-5. Situation of BCPCC

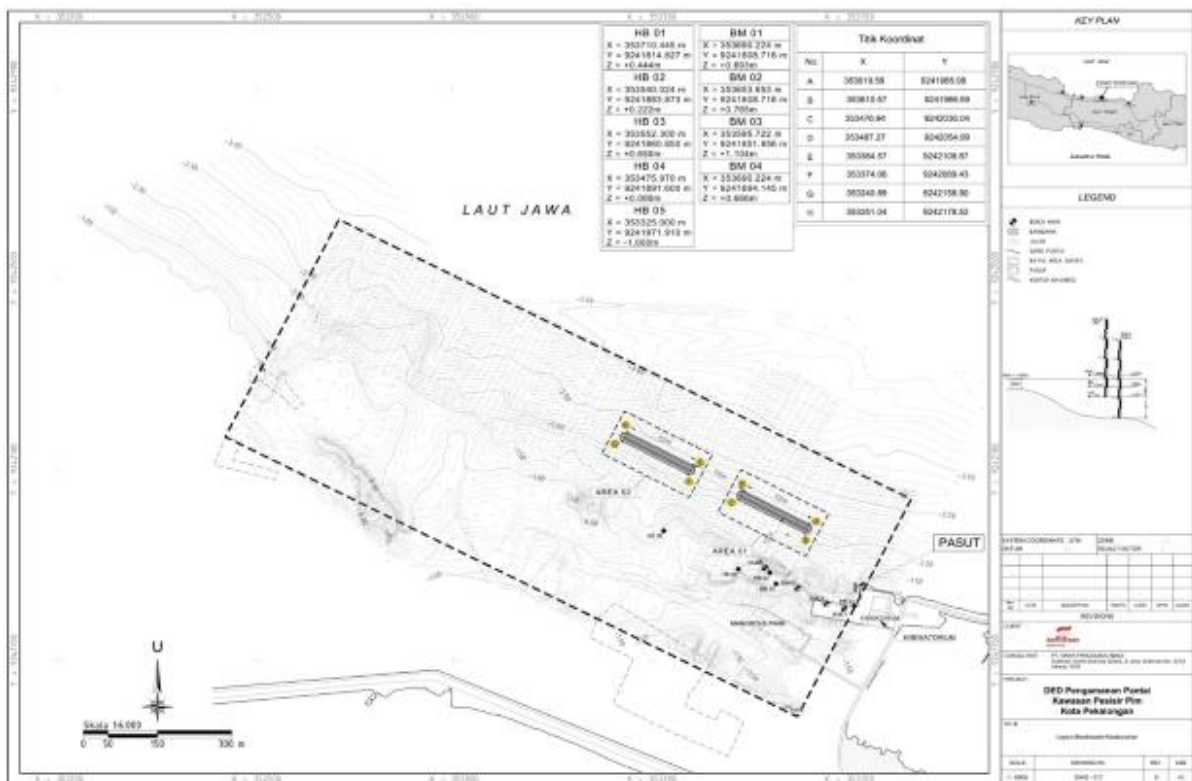


Figure 2-6. BCPCC Site Plan

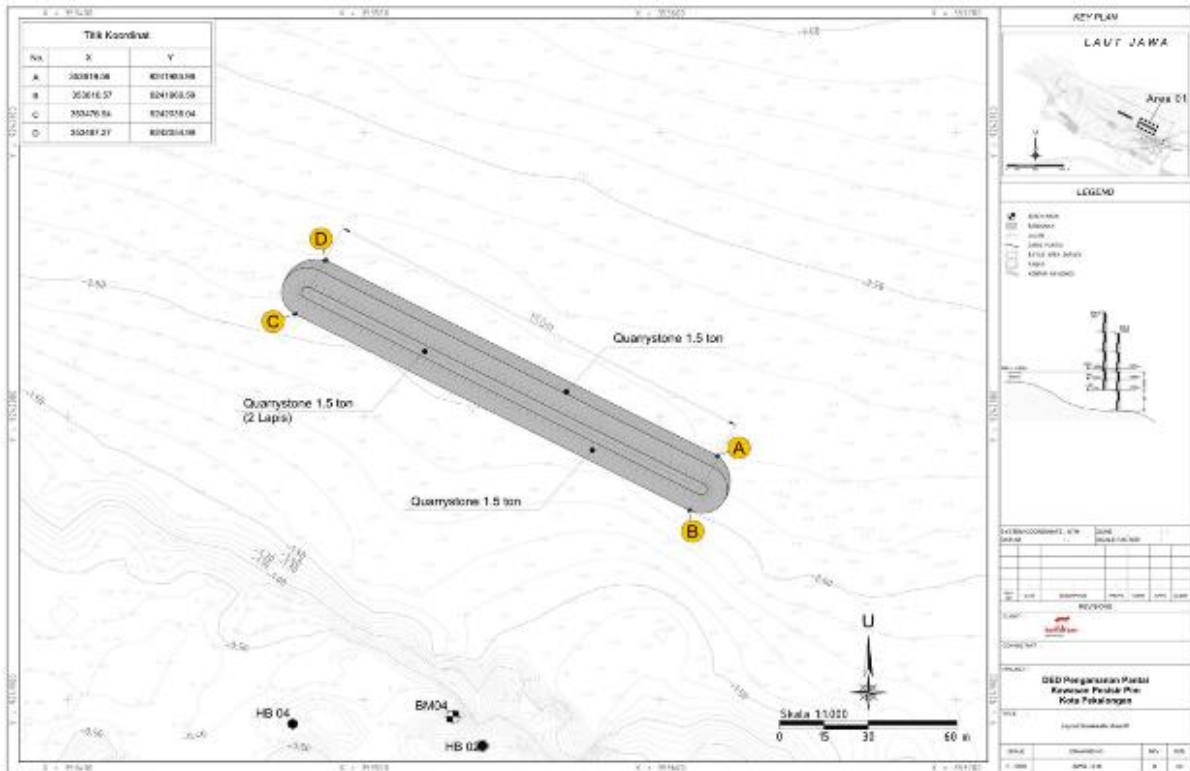


Figure 2-7. Layout of Breakwater Area 1

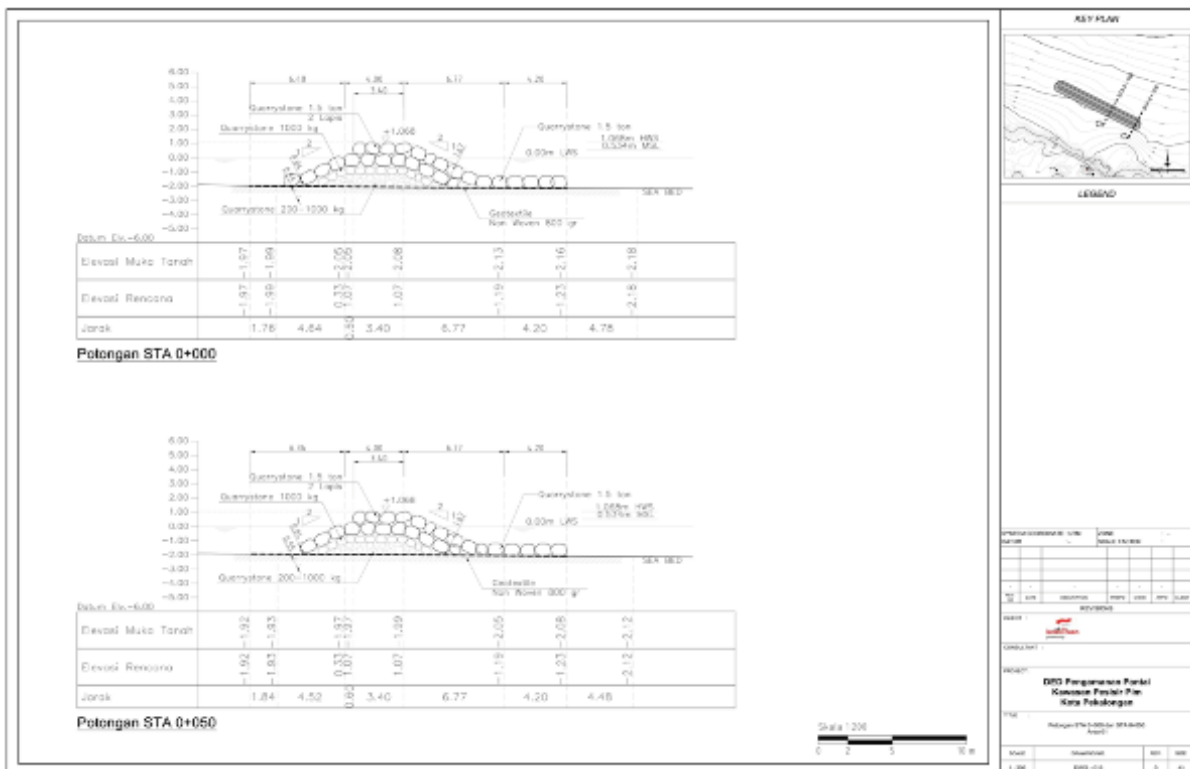


Figure 2-8. STA 0+000 Cross Section - STA 0+050 Area 1 Breakwater

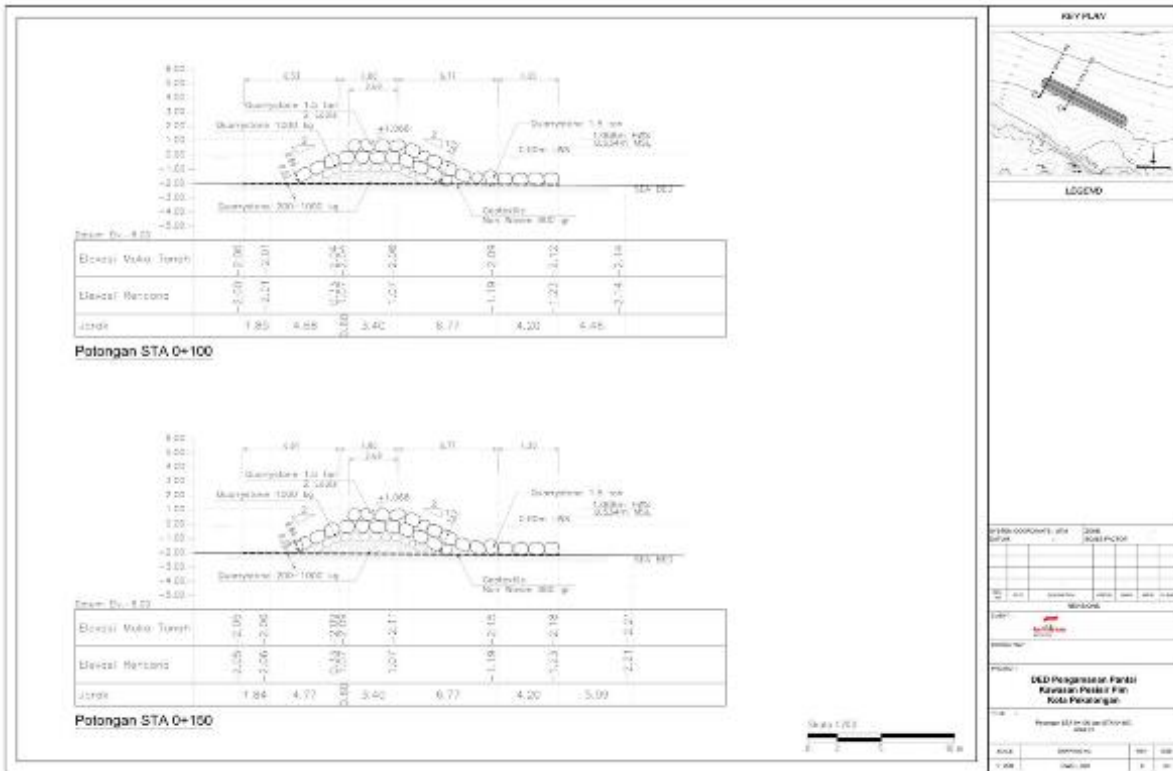


Figure 2-9. STA 0+100 Cross Section - STA 0+150 Area 1 Breakwater

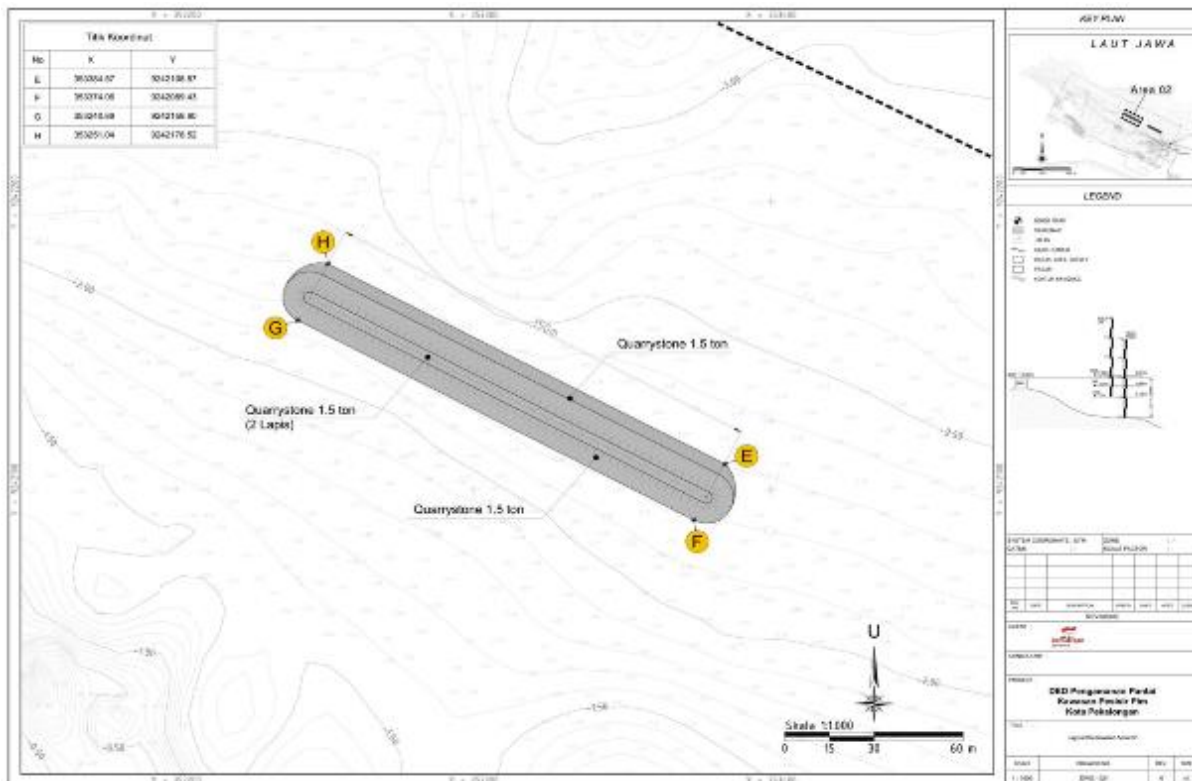


Figure 2-10. Layout of Breakwater Area 2

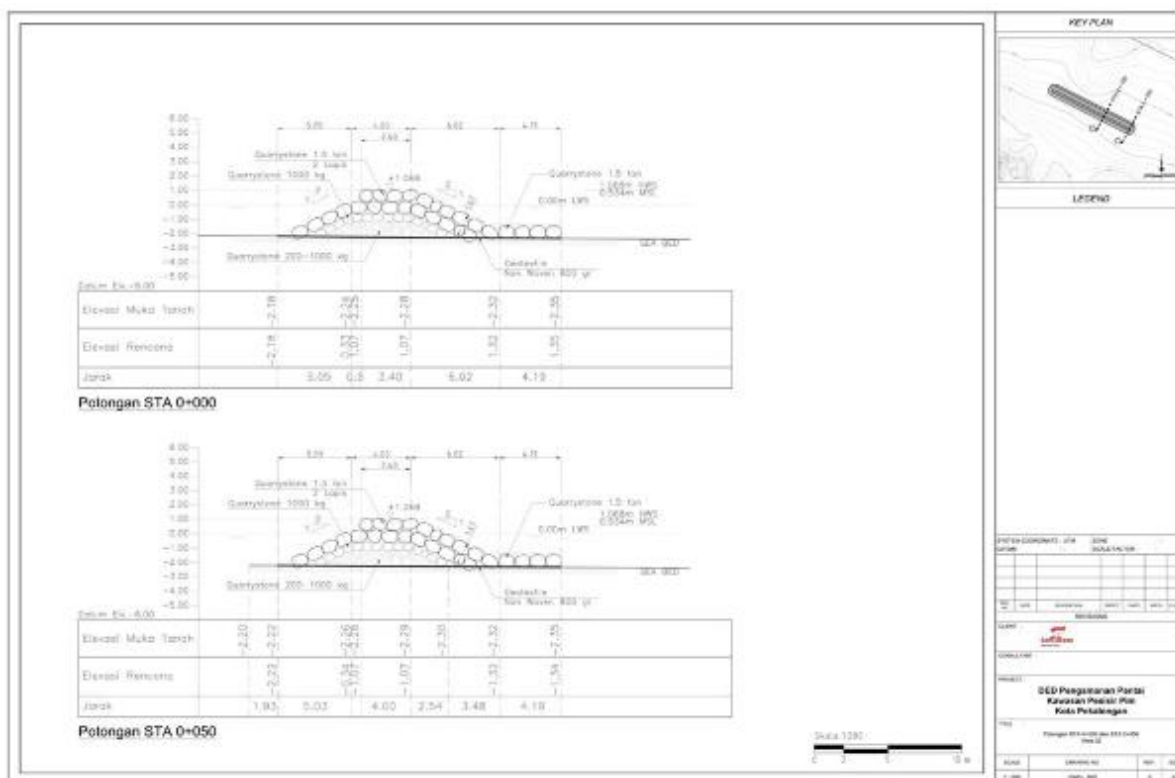
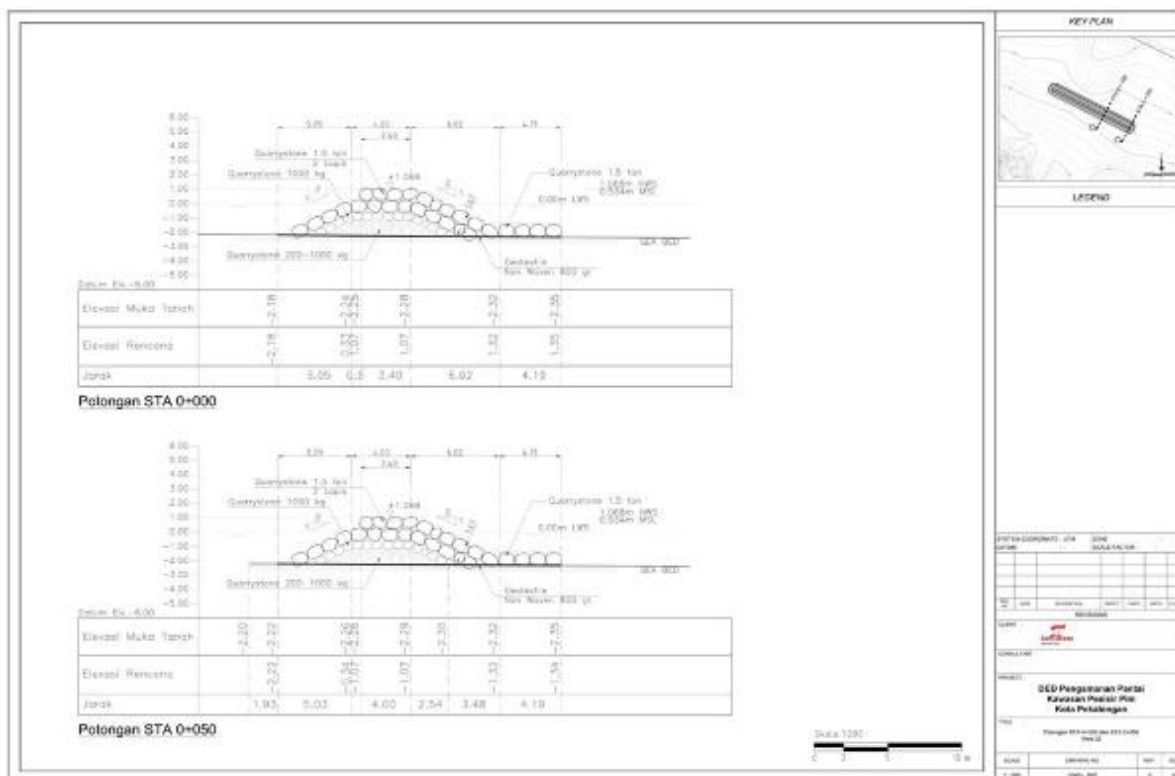


Figure 2-11. STA 0+000 Cross Section - STA 0+050 Area 2 Breakwater

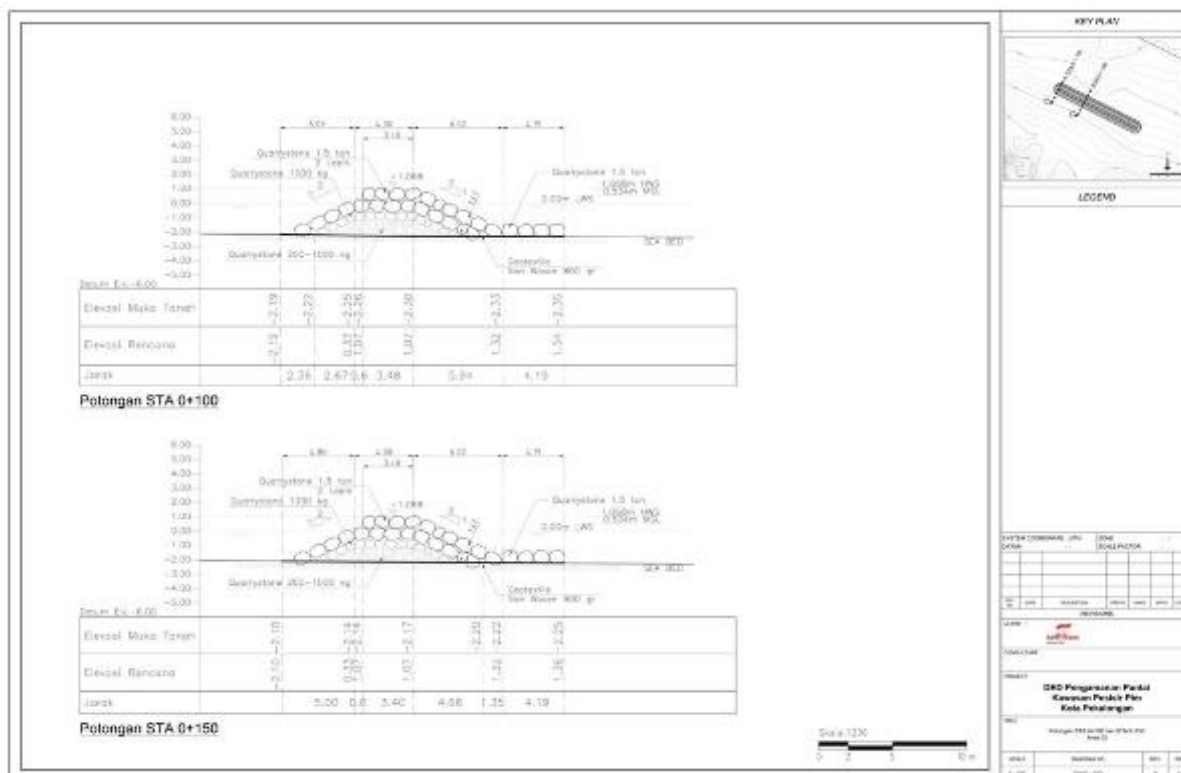


Figure 2-12. STA 0+100 Cross Section - STA 0+150 Area 2 Breakwater

## 2.7 Scale of Planned Business and/or Activities

### 2.7.1. Main Activities

The construction of BCPCC is intended for the purposes of controlling damage to the coastal area of Pekalongan City. The construction of BCPCC is designed with an offshore breakwater system built approximately 50 meters from the coast in the form of a metamorphic rock construction with a length of 150 m, a width of 21.37 m, and a height of 1 meter from the seabed. The breakwater is to be built in 2 units which are placed parallel to the coastline.

### 2.7.2. Energy Use and Sources

The provision of electrical energy in BCPCC is used to support construction phase activities, especially basecamp and field office activities. The source of electrical energy comes from a generator with an electrical capacity of 30 KVA. For the rest of the operational stage, no electrical energy is needed.

### 2.7.3. Water Use and Sources

Based on the details of the amount of work and construction activities for the breakwater construction, the amount of water needed for the construction activities of BCPCC can be found. Meanwhile, water needed for workers' domestic needs at the construction stage is 3.42

m<sup>3</sup>/day, so the amount of work water used is 1.0 m<sup>3</sup>/day. The following is a table detailing workers and their daily clean water needs:

**Table 2-5. Domestic Water Needs for BCPCC**

No.	Worker	Amount	Water needs (m <sup>3</sup> /day)	Total (m <sup>3</sup> /day)
<b>I</b>	<b>Domestic</b>			
1.	Site Engineer	5	0,06	0,3
2.	Site Supervisor	2	0,06	0,12
3.	Worker	50	0,06	3
	<b>Total I</b>	<b>57</b>		<b>3,42</b>
<b>II</b>	<b>Work Water</b>			
1.	Work Water			1
	<b>Total II</b>			<b>1</b>

*Source: Consultant's Analysis, 2023*

Providing water at the BCPCC site is a supporting component of workers' domestic activities, namely for workers' sanitation needs. Meanwhile, working water is needed to maintain the breakwater construction work area. The total amount of domestic water and working water is 4.42 m<sup>3</sup>/day. Clean water is supplied by the Pekalongan City PDAM, transported by tank to the location, and then stored in a reservoir system with a capacity of 1 x 5.0 m<sup>3</sup>.

#### **2.7.4. Material Requirements**

The breakwater is created as a form of coastal protection against erosion by destroying wave energy before it reaches the beach. There are several types of breakwater, including sloping side breakwater, vertical side breakwater and combined side breakwater. The material for constructing this breakwater depends on the shape of the type of breakwater that will be made according to the resulting modeling analysis. In general, breakwaters can be made from materials such as stone masonry, steel sheet pile cells filled with soil or stone, concrete piles, steel or concrete sheet pile walls, concrete caissons and so on.

Crushed natural rocks and concrete are provided from batching plants located in Pekalongan District, Batang District and outside the Pekalongan City area. The types of river stone, andesite (fractionated natural stone) and andesite (KW1) materials are available in sizes of 200 kg – 1,000 kg for core material and 1,500 kg for armor. The closest material source location is found in Broko, Wonotunggal, 23.5 km from the BCPCC location at PIM, Pekalongan City.



**Table 2-6. Crushed natural stone material for core material (200-1000 kg)  
and for armor (1,500kg)**

No	Lokasi	Jenis Batu	Spec	Harga per Ton/m <sup>3</sup>		Rank	Mutu		Jarak ke Lokasi		Skor
				Inc PPN 11%	Inc Transport s/d Lokasi		Mutu	Rank	Jarak	Rank	
1	Kec. Dukupantang, Kab Cirebon	Batu Andesit	200 Kg s/d ≤ 1000 Kg	350,000	6	Batu Andesit	8	175 Km	4	18	
			1.500 Kg	590,000							
2	Kec Limpung , Kab Batang	Batu Kali, Boulder	200 Kg s/d ≤ 1000 Kg	350,000	9	Batu Andesit	8	46,2 Km	6	23	
			1.500 Kg	350,000							
3	Majalengka, Cirebon	Batu Andesit	200 Kg s/d ≤ 1000 Kg	467,000	8	Batu Andesit (KW1)	7	175 Km	4	19	
			1.500 Kg	467,000							
4	Desa Kepuh, Cirebon	Batu Andesit	200 Kg s/d ≤ 1000 Kg	1,000,000	4	Batu Andesit	8	175 Km	4	16	
			1.500 Kg	1,000,000							
5	Area Sawah Dan Kebun, Brokoh, Wonotunggal, Kb Batang, Jawa Tengah* <i>*(tidak ada surat penawaran resmi)</i>	Batu Kali	200 Kg s/d ≤ 1000 Kg	505,000	3	Batu Kali	4	23,5Km	8	15	
			1.500 Kg	505,000							



**Figure 2.13. Documentation of natural stone material**

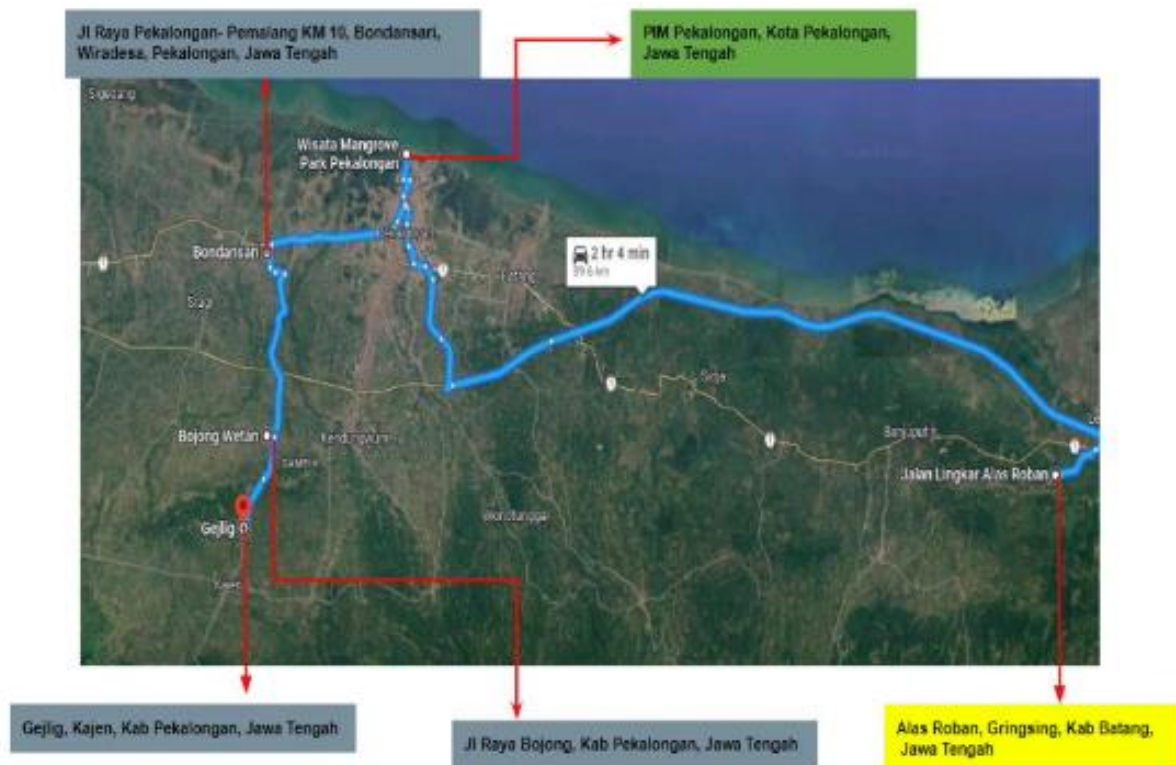


Figure 2-14. Distribution of natural stone material quarry locations



Figure 2-15. Distribution of batching plant locations

An alternative source of material for constructing the breakwater other than crushed natural stone is concrete with the qualification of ready-mix concrete of K350 or higher. Generally, the quality of concrete from different batching plants is almost the same. Distance and cost are specific assessments of the source of ready-mix concrete material. From the results of the primary and secondary inspections, it was found that 4 locations of batching plants providing K350 or K400 ready mix concrete were close to the planned location of the breakwater construction at the PIM Coastal Area, Pekalongan City.

The nearest batching plant location is on Jl. Raya Pekalongan-Pemalang Km 10 Bondansari, Wiradesa, which is +/-12.5 km from the planned location of the breakwater construction at PIM Coastal Area, Pekalongan City. Meanwhile, the farthest batching plant location from the 4 locations shown in Table 2-7 is located in Kajen, Pekalongan District, which is 24 km from the planned location of the breakwater construction. The tabulation results of cost, quality and distance analysis concluded that the source of K350 or K400 ready mix concrete material with the lowest cost, distance and highest quality according to the required qualifications was the batching plant in Tegalsari Village, Batang District, Central Java.

**Table 2-7. Ready Mix Materials with K350 or K400 Quality**

No	Lokasi	Harga per Ton/m <sup>3</sup>		Rank	Mutu		Jarak ke Lokasi		Skor
		Inc PPN 11%			Mutu	Rank	Jarak	Rank	
		Inc Transport s/d Lokasi							
1	Gejlig, Kec. Kajen, Kabupaten Pekalongan, Jawa Tengah	1,098,900		7	K350	8	24 Km	6	21
		1,154,000			K400				
2	Jl Raya Pekalongan- Pemalang KM 10	1,054,000		5	K350	8	12,5 Km	7	20
		1,087,000			K400				
3	Jl Raya Bojong- Kab Pekalongan	1,110,000		4	K350	8	14 Km	6	18
		1,148,000			K400				
4	Ds, Tegalsari Kabupaten Batang, Jawa Tengah	900,000		8	K350	8	15,6 Km	6	22
		950,000			K400				

## 2.8 Project Cost

The total figure budget cost of Rubble Mound breakwater project in Kandang Panjang is shown in Table 2-8 below.

**Table 2-8. Budget cost for Rubble Mound breakwater Project in Kandang Panjang, Pekalongan**

Detail	Budget (USD)
Consultant - DED, DED Supervisor, Modelling, ESIA, UKL UPL Consultant Fee	66.816
Workshop, FGD, Travel	36.307
Permit for Breakwater Development	4.939
Construction supervisor	44.470
Breakwater construction development	1.082.737
Retention cost for breakwater construction	57.176
<b>Total</b>	<b>1.292.443</b>

Source: Kemitraan 3S Project Budget, 2024.

### **3. METHODOLOGY FOR ESIA**

#### **3.1 Introduction**

The coastal area is defined as a land area that borders the sea, with onshore boundaries including waterlogged or non-waterlogged areas that are still affected by sea processes, such as: tide, sea breeze and salt intrusion and offshore boundaries including areas that are affected by natural onshore processes such as: sedimentation and the flow of fresh water into the sea, as well as sea areas that are affected by onshore human activities. The protection of coastal areas is carried out by reviewing and analyzing dynamic coastal phenomena visually by means of, among others: coastal erosion and accretion, direction and volume of sand transport parallel to the coast, weight and slope of armor, boundaries of the investigation area and others. Thereby, to maintain and improve the condition of coastal stability, several innovative construction alternatives have been developed for coastal protection and security in order to enable harmony and comfort for residents in coastal areas and other built infrastructure.

One of the objectives of this Project is to restore natural protection in order to increase resilience against the risks of coastal flooding and flood hazards, including vulnerability and exposure, by restoring the mangrove ecosystem and increasing coastal protection, where gaps still persist ('safekeeping' action approach).

This project aims to take a proactive approach to protecting coastal communities from the growing threats posed by flooding and flood hazards. By focusing efforts on restoring and rehabilitating mangrove ecosystems that act as natural buffers against storm surges, waves, and rising sea levels, the project can build resilience and adaptability to intensifying climate change impacts. Mangroves play a critical role in coastal protection with their dense root systems that stabilize shorelines and attenuate waves. Restoring mangroves in areas where they have been degraded or lost entirely will reinstate this vital natural infrastructure against flooding.

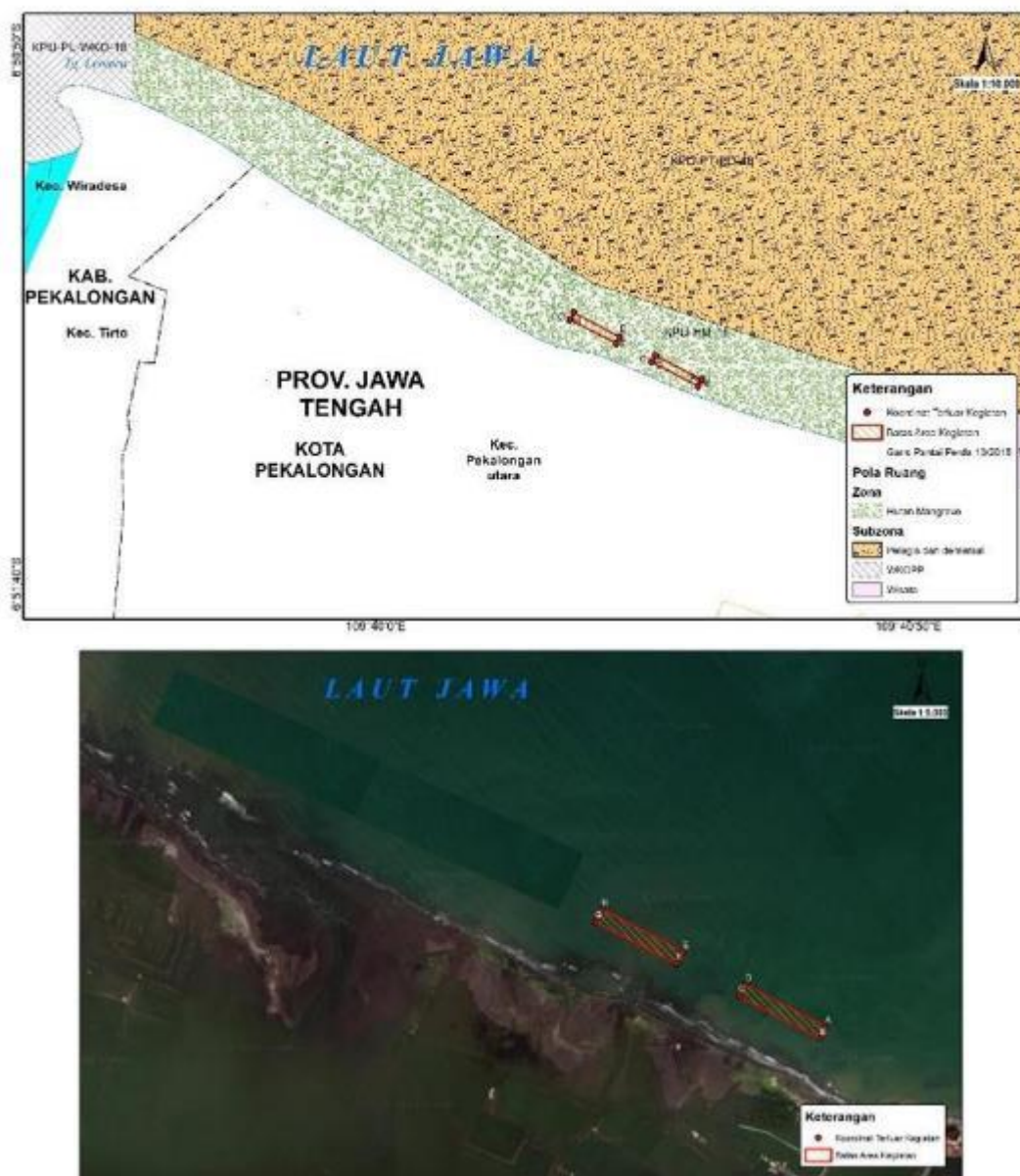
The project adopts a 'safekeeping' action framework that identifies persisting gaps in coastal protection from mangroves, even after restoration efforts, and targets interventions to increase protection in those vulnerable zones. This could involve engineering additional natural or hybrid infrastructure like wetland vegetation, etc. alongside mangroves to provide layered buffers. By combining mangrove restoration with targeted 'safekeeping' actions in gaps, the project takes a comprehensive approach to reinforcing natural coastal protection, managing risks, and building community resilience to flooding. The multi-pronged strategy accounts for both rebuilding degraded ecosystems and engineering specialized protections where risks remain high.



### 3.2 Study Area

The project site refers to the location of the Rubble Mound breakwater and the construction lay down area, in particular sea land. Based on the ToR, the work location is situated between Kelurahan Kandang Panjang and Kelurahan Bandengan in the north coastal area of Pekalongan. The work location is shown in Figure 3.1 and Figure 3.2.

The results of interpretation of the work location boundaries given in the three points above provide an overview of the work location along the 1,300 m x 2 x 250m coastline. Aerial montage in a satellite map is shown in Figure 1, while the results of interpretation of the work location are shown in Figure 3-1.



**Figure 3-1. Satellite Image of the Work Location**

Source: 3S Project, KEMITRAAN, 2024.



**Figure 3-2. Work Location Area**

*Source: DED Feasibility Breakwater by Nawa Pancadasa Abadi*

The Eastern and Western boundaries of the proposed breakwater infrastructure are as follows:

1. The Eastern boundary of the Work Location is the Crematorium building of Pekalongan (Kandang Panjang Sub-district, Pekalongan Utara, Pekalongan City, Postal Code 51149).
2. The Western boundary of the Work Location is the coastal boundary of Pekalongan City in the Western part. (Bandengan Sub-district, Pekalongan Utara, Pekalongan City, Postal Code 51149). It is not easy to obtain an official high-resolution map of the administrative boundaries of Pekalongan City. One of the official maps can be found in Regional Regulation of Pekalongan City Number 9 of 2020 on the Amendment to Regional Regulation of Pekalongan City Number 30 of 2011 on Spatial Layout Plan of Pekalongan City for 2009-2029.
3. The Northern and Southern boundaries follow the measurement limits required in the topographical and bathymetric surveys as far as 250 m landward and seaward respectively from the coastline.

### **3.2.1 Project Footprint Area**

The Project Footprint is the area that may reasonably be expected to be physically touched by Project activities, across all phases. Physically, there is no demarcation of fencing for the Project Site boundaries and hence it is contiguous with the rest of the area.



### 3.2.2 Area of Influence (AoI)

The effects of the Project activities on a particular resource or receptor will have spatial (distance) and temporal (time) dimensions. Some activities would impact a larger radius than other identified impact sources. The spatial and temporal dimensions have therefore been taken into account to define a Project's Area of Influence.

**Table 3-1. Area of Influence**

No	Environmental & Social Issues	Area of Influence	Justification	Mitigation
	Air Quality	Core Zone: Low Impact Buffer Zone: Low Impact	Core Zone is not residential area, so impact to the community is zero  Buffer Zone: Material transport will utilize public road which may temporarily affect surrounding community.	Develop a construction safety plan
	Noise Pollution	Core Zone: Low Impact Buffer Zone: Low Impact	Core Zone: the construction site is on the coast far from residential area  Buffer Zone: Temporarily noise pollution will affect surrounding community during material transport.	
	Water Environment	Core Zone: Zero Impact Buffer Zone: Zero Impact	The work does not affect and utilize source of clean water from both core and buffer zone.	
	Land Environment	Core Zone: Zero Impact Buffer Zone: Zero Impact	The construction does not utilize or source the soil from the environment from both core and buffer zone.	

	Socio-economic Conditions	Core Zone: Zero Impact  Buffer Zone: Zero Impact	The government at the local level (village level) and regency level pay close attention to the work of vulnerable groups and women. Their basic rights and interests will be protected in process of social economic development. All ethnic groups live and work together. The society is harmonious and stable without any social risk.	
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### 3.2.3 Core and Buffer Zones

The AoI defined above has been divided into a core and buffer zone:

**Core Zone:** the core zone is defined as the radius extending from the Project footprint area which would have majority of the impacts (during mobilization, construction, operation and decommissioning phase). The core zone area for the study is project foot print area and adjacent area within 500 m radius.

**Buffer Zone:** the buffer zone of the study area is in general 5 Km radius from the proposed hybrid park.



Figure 3-3: Core Zone and Buffer Zone of Study Area

### 3.3 Collection of Baseline Environmental and Social Data

#### 3.3.1 Secondary data Collection and Literature Review

Secondary data of the project area were collected for different environmental/social settings of the project area from different authentic secondary sources like published literatures from various government agencies, or institutions. The secondary data were collected to cover the information on physiography, geology, soil, water body, drainage pattern, meteorology, forest and vegetation, flora and fauna, protected areas, other ecological sensitive area, land use pattern, demography, socio economic aspects within study area. The data were reviewed and verified for establishing existing environmental and ecological status within the project area. The source of secondary data is given in **Table 3-2**.

**Table 3-2: Sources of Secondary Information**

No	Type of Information	Source
1	Topography, Planning Maps	Breakwater Technical Plan Document
2	Meteorological Data	
3	Geological data	
4	Land use pattern	
5	Air & water Quality	
6	Demographic Profile	
7	Legislative Acts and Regulations	
8	Census Data	

#### 3.3.2 Baseline Environment and Socio-Economic Survey

##### A. Environmental Survey

The primary baseline information on different environmental and social components were collected through field survey. Field survey were carried out to collect information on the major environmental features such as settlement facilities, drainage pattern of the area, forest, flora fauna, water bodies, river crossing, sensitive receptors, air, water, noise and soil quality etc. and were studied in detail, which helped in identifying areas of concern along the stretch and critical issues. Consultation with the local officials and public were carried out also on the salient environmental features of the project area.

Further primary samples surveys for the environmental quality attributes, such as air, surface water, noise and soil characteristics that are critical in the context of the project were carried out.

##### B. Socio-Economic Profile

##### Socio-Economic Overview of Kandang Panjang and Bandengan

##### *Kandang Panjang*

The population of Kandang Panjang Village is quite sizeable at 12,985 people. Of that total population, there is a nearly equal split between men and women, with 6,552 male residents making up just over half at 50.5% and 6,433 female residents comprising the remaining 49.5%. This results in a sex ratio of 101.85 males for every 100 females, indicating a slight skew toward more men than women in the village's demographic makeup.

With 4,321 families residing in Kandang Panjang Subdistrict, the average family size is small at about 3 people per household. This suggests that most families in the area are nuclear families of parents and one or two children. The total population divided across the subdistrict's land area results in a population density of 8,657 people per square kilometer. This is a moderately high density, meaning households are closely situated together throughout the village rather than being sparsely spread out over a large area.

Overall, the demographics of Kandang Panjang Village reveal a sizable but balanced population distributed densely over a compact residential area, with nuclear families of three being the norm. The data indicates a community of families living in close proximity to one another in the village environment.

The age demographics and family economic status in Kandang Panjang Subdistrict provide insight into the makeup and livelihoods of the residents. With regards to age, data shows that the majority of the population, 9,286 people, are of working age between 15-64 years old. This large segment of productive residents forms the backbone of the local economy. Comparatively, there are far fewer residents who are dependents - only 2,877 youth under age 14 and 819 elderly over age 64. The predominance of working-age individuals enables economic development.

In terms of family prosperity, 1,659 households are categorized as prosperous, meaning they have met basic needs and have disposable income. A larger segment, 1,139 families, are moderately prosperous, meeting basic needs but lacking excess income. And 303 families still struggle in poverty, unable to reliably meet basic needs. The goal would be to continue growing the prosperous segment through job creation and skills training.

Overall, the main livelihoods and occupations for locals are as private sector employees and traders/merchants. The availability of these private sector jobs provides employment for the high number of working-age adults. And a subgroup has established merchant businesses, likely small local shops and services. With a large labor pool and emerging business community, the potential for economic growth in Kandang Panjang Subdistrict is strong. Targeted workforce development and business support could further develop the area.

**Table 3-3. Livelihoods of Kandang Panjang Village residents**

Occupation	Amount (people)
Workers/Private Sector	1,527
Government Employees (ASN)	341
Craftsman	176

Trader	1.478
Tailor/dressmaker	274
Bricklayer	451
Carpenter	376
Breeder	89
Fisherman	152
Mechanic	92
Doctor	31
Driver	151
Rickshaw/becak driver	25
Bajaj driver	25
Police/ army	19
Entrepreneur	43
Others	76

Source: Kandang Panjang Subdistrict Monograph, 2023

The livelihood of residents in Kandang Panjang is characterized by several key features as shown in Table 1. The majority of residents, approximately 46%, work in the manufacturing sector, indicating that factory and industrial jobs are a main source of employment in the area. Another large segment, around 26%, are employed in the wholesale and retail trade industry, reflecting the presence of shops, markets, and commercial business activities. About 10% have jobs in the accommodation and food services sector, likely supported by tourism and hospitality venues catering to visitors.

Meanwhile, smaller percentages of the population have livelihoods in sectors like construction (5%), transportation (4%), education (3%), and human health/social work activities (2%). This distribution across industries reveals the diverse economic makeup of Kandang Panjang, where residents are engaged in manufacturing, trade, tourism, infrastructure building, education, healthcare, and more.

Overall, the livelihood profile shows Kandang Panjang to be a mixed urban/semi-urban environment with both industrial and service sector jobs available. The variety of occupations, though dominated by manufacturing, represents the blend of blue-collar and white-collar work supporting the community. Understanding these employment patterns allows for informed infrastructure development, workforce training programs, and economic policies to sustain Kandang Panjang's livelihood structure.

### ***Bandengan***

Most of the main livelihoods of Bandengan Village residents consist of workers, entrepreneurs/traders, and working in the private sector. The people of this village rely on a diverse range of jobs and businesses to support themselves and their families. Many residents work as laborers, construction workers, drivers, and factory employees, providing manual

and skilled labor across various industries. Others run small shops, food stalls, and other enterprises, buying and selling goods and services within the village and to customers from surrounding areas. Some operate as traders, middlemen who connect regional producers with urban markets. Beyond these conventional roles, a number of tech-savvy residents are employed by private companies in administrative, sales, and technical positions, taking advantage of opportunities created by development and modernization. Though the livelihoods span a spectrum, most of the village relies on hard work, entrepreneurship, and adaptability to thrive in a rapidly changing economy. The industriousness and flexibility of the villagers has allowed them to find diverse ways to earn income by leveraging the village's regional connections, labor force, and increasingly modernized landscape.

Table 2 paints a picture of the range of economic activities Bandengan villagers undertake. Fishing and farming form the backbone of the local economy, but livestock, small businesses and other work also contribute to the mix of livelihoods supporting these communities. The diversity of occupations shown reflects the resourcefulness and industry of Bandengan residents in making a living.

**Table 3-4. Livelihoods of Bandengan Village residents**

Occupation	Amount (people)
Workers/Private Sector	339
Government Employees (ASN)	31
Craftsman	9
Entrepreneur/Trader	594
Farmer	8
Laborer	2.210
Retired	26
Service provider	57
Trader	16
Employee of regional owned enterprise	3
Employee of state-owned enterprise	1
Temporary employee	5

*Source: Kandang Panjang Subdistrict Monograph, 2023*

The livelihood of Bandengan villages is diverse and shows the range of economic activities supporting these communities, as outlined in Table 2. This table provides a breakdown of the primary occupations held by villagers across fishing, farming, small business ownership and other jobs. Specifically, it indicates that fishing is the predominant occupation, with 38% of villagers engaged in catching and selling fish as their main source of income. Farming also plays a major role, with 32% of people working in agriculture and cultivating crops like rice, vegetables and fruits. Beyond these primary sectors, 10% of villagers run small businesses like food stalls, shops and services to generate income. The remaining 5% have miscellaneous other jobs to make ends meet. Overall, Table 2 paints a picture of the range of economic



activities Bandengan villagers undertake. Fishing and farming form the backbone of the local economy, but livestock, small businesses and other work also contribute to the mix of livelihoods supporting these communities. The diversity of occupations shown reflects the resourcefulness and industry of Bandengan residents in making a living.

### Socio-Demographic Profile of Kandang Panjang and Bandengan

#### *Kandang Panjang*

**Education situation:** The education level of the population of Kandang Panjang Subdistrict is mostly at the level Elementary, Junior and high school. As for the tertiary level, it is available starting from D1 up to S3. This means the education level of the population of Kandang Panjang Subdistrict is various, from lower level to upper level. Education level of the population of Kandang Panjang Subdistrict is shown in Table 3-5.

**Table 3-5. Education level of the population of Kandang Panjang Subdistrict**

Education Level	Amount (people)
Not attending school yet	636
Ages 7 - 45 years, never attended school	123
Attended elementary school but not graduated	154
Elementary school	2.945
Junior high school	2.144
High school	2.154
Diploma-1	76
Diploma-2	83
Diploma-3	139
Bachelor degree	681
Master degree	29
Doctoral	11

*Source: Kandang Panjang Subdistrict Monograph, 2023*

The population of Kandang Panjang Subdistrict displays a wide range of educational attainment, from elementary school all the way through doctoral degrees. As detailed in Table 2, the majority of residents have completed elementary, junior high, or high school. This indicates that basic education is readily available in the area, allowing most people to obtain at least a high school diploma. At the same time, there are also opportunities for higher education, with some residents holding associate, bachelor's, master's, and even doctoral degrees. The presence of tertiary institutions, whether vocational schools, colleges, or

universities, enables citizens to pursue studies past the high school level if they desire and have the means. An education system encompassing all levels from primary to postgraduate reflects a community where academic development is valued and supported. While lower levels like elementary school predominate, the diversity of attainment up to doctorates shows that Kandang Panjang Subdistrict caters to students of all ages and ambitions. The distribution across the spectrum demonstrates an educated populace with knowledge and skills spanning the gamut from basic to highly advanced.

### **Medical and health situation**

Kandang Panjang is a village in North Pekalongan subdistrict in Pekalongan Regency, Central Java, Indonesia that faces challenges in providing adequate healthcare access to its population. With only one Puskesmas, or community health center, available to serve the nearly 50,000 residents, preventative care and basic medical services are limited. The sole Puskesmas struggles to meet demand across its large coverage area that spans two districts, Kandang Panjang and Bandengan. This solitary clinic is responsible for providing immunizations, maternal and child health services, basic dental care, and minor emergency treatment. Any cases needing more advanced care must be referred out to hospitals in other towns, creating difficulties for patients without reliable transportation.

Posyandu or integrated service posts, scattered throughout Kandang Panjang, community-run clinics focus on maintaining the health of mothers and children under five by providing growth monitoring, nutrition education, immunizations, and basic healthcare. While beneficial, their limited hours of operation and reliance on volunteers prevent Posyandu from fully meeting community needs. The lack of clinics, doctors, and preventative care resources in Kandang Panjang leaves many residents struggling to access the healthcare services they require. Establishing additional Puskesmas, expanding Posyandu capabilities, and improving transportation access could help strengthen this subdistrict's overburdened healthcare system. With more infrastructure and staffing support, the foundations laid by the existing Puskesmas for comprehensive preventative care and community medicine could be built upon to better serve Kandang Panjang's people.

### ***Bandengan***

Bandengan sub-district, situated on the north coast of Pekalongan, Central Java, has a modest population of 6,158 people, nearly evenly split between 3,149 males and 3,009 females. With a slightly higher number of men than women, the sub-district has a sex ratio of 104.65 males for every 100 females. The population is distributed among 2,002 families, meaning each family consists of an average of 3 people. Given Bandengan sub-district's total land area of 2.21 square kilometers, the population density is 2,786 people per square kilometer. This relatively dense concentration of residents likely reflects Bandengan's coastal location and role as a hub for fishing and trade. The families living in the simple houses and compounds throughout the sub-district sustain themselves through fishing the rich waters offshore as well as small-scale farming of rice, vegetables and fruits.

The number of people based on category of productive and unproductive in Bandengan sub-district is shown in Table 3-6.

**Table 3-6. Number of productive and unproductive based on age in Bandengan sub-district**

Category	Age	Number (people)
<b>Productive</b>	15 – 64	4.346
<b>Unproductive</b>	0 - 14	1.482
	Over 64	330

Based on the above table, the productive group, aged 15-64, are the prime working-age citizens who drive the economy through employment and entrepreneurship. With 4,346 people, this group forms the backbone of the workforce. They are educated, skilled, experienced, and contribute the most in taxes and production.

The unproductive group includes children aged 0-14 years. Although they do not directly add economic value, they represent the future workforce. With 1,482 young people, this group requires healthcare, nutrition and education to develop into healthy, skilled adults.

Lastly, there is the dependent group of citizens over 64 years. Though many continue working voluntarily beyond this age, most are retired pensioners. With 330 people, this group has contributed to society in their working years and now require care, financial support and access to healthcare in their old age. Together, the three age groups form the population that policymakers must plan for in terms of housing, jobs, infrastructure, pensions and social services. The productivity of the working-age group sustains the dependent young and elderly.

Based on prosperity of the family (using the indicator of family income), table 3-7 shows the category of prosperous family in Bandengan.

**Table 3-7. Prosperity level of family in Bandengan Sub-district**

Category	Number (families)
<b>Pre-prosperous</b>	176
<b>Prosperous Level 1</b>	885
<b>Prosperous</b>	1559

### Education situation

The education level of community in Bandengan subdistrict is mostly at elementary and kindergarten levels. For the university level, some people have the education at diploma level to bachelor degree level. This means the level of education in Bandengan Village is diverse, from the low levels to the higher levels.

The level of education of the community will influence the level of knowledge and Where the higher the level of community education will of course have an influence on level of knowledge of a problem.

**Table 3-8. Education level of the population of Bandengan Subdistrict**

Education Level	Amount (people)
Not attending school yet	636
Ages 7 - 45 years, never attended school	123
Attended elementary school but not graduated	154
Elementary school	2.945
Junior high school	2.144
High school	2.154
Diploma-1	76
Diploma-2	83
Diploma-3	139
Bachelor degree	681
Master degree	29
Doctoral	11

The education level of the community in Bandengan subdistrict is quite diverse, spanning from the basic elementary and kindergarten levels to more advanced diplomas and bachelor's degrees. This indicates a mix of educational backgrounds among the villagers. While a sizeable portion of the population has only completed primary or secondary schooling, focusing more on fundamental literacy and numeracy skills, there are also those who have embarked on higher education at local colleges or universities. These more educated individuals have delved deeper into academic disciplines and acquired specialized knowledge in certain fields, whether that be engineering, teaching, business, or healthcare. Their advanced studies nurture critical thinking and problem-solving aptitudes beyond the basics learned in grade school.

The variability in education levels directly impacts the distribution of knowledge within Bandengan. Those with only an elementary background often grasp everyday concepts and practical skills for routine tasks, but they generally lack exposure to abstract ideas or theories. Their knowledge is confined to tangible, observable matters in their immediate surroundings. Meanwhile, the university graduates have a wider grasp of complex systems, critical analysis, and even specialization in a certain subject. Their knowledge extends beyond the concrete and literal into conceptual relationships. This education-based knowledge gap has implications for how informed and involved the community is regarding more complex social, economic, and political issues affecting their village. The higher the level of education among citizens, the more likely they will comprehend the nuances of problems and contribute solutions.

### **Medical and health situation**

Bandengan, with its modest population of around 5,000 people, is served by only one Puskesmas (community health clinic) and six Posyandu (integrated health service posts) for all of its healthcare needs. This extremely limited number of healthcare facilities poses significant challenges for the residents of this village. With just one health clinic and a handful of health posts for thousands of people spread across an expansive area, many in Bandengan struggle to access even basic medical services. The lone Puskesmas, while staffed by a dedicated team, is overwhelmed by the demand and often has long wait times for appointments. Those needing urgent care have no choice but to make the hours-long journey to the nearest hospital in the city. The Posyandu, meanwhile, can only provide very basic care and preventative services on the one day per month they are open. Transportation is another major barrier, as those without private vehicles have no public transit options to reach the clinic or health posts. Many residents simply forgo preventative screenings and routine checkups due to the difficulty of getting to their limited healthcare options. With an aging population and rising rates of chronic illness, Bandengan is in critical need of expanded healthcare access. More clinics, health posts, and visiting community health workers could help bridge the gaps. Creative solutions like mobile clinics and telehealth offerings may also help bring services to the people when transportation is a challenge. Until greater investments are made in healthcare infrastructure and accessibility, the residents of Bandengan will continue to struggle to get the medical services they need and deserve.

## **4. LEGAL FRAMEWORK**

### **4.1 Introduction**

The legal instruments identified below have been specifically developed for the purposes of providing National controls and regulations to all infrastructure in Indonesia. The Rubble Mound breakwater developments will therefore be governed by this legal framework.

### **4.2 Policies and Legal Framework in Indonesia**

#### **A. Laws**

1. Law Number 5 of 1960 concerning Basic Regulations on Agrarian Principles;
2. Law Number 18 of 2008 concerning Waste Management;
3. Law Number 32 of 2009 concerning Environmental Protection and Management;
4. Law Number 2 of 2012 concerning Land Acquisition for Development in the Public Interest;
5. Law Number 27 of 2007 concerning Management of Coastal Areas and Small Islands;
6. Law Number 23 of 2014 concerning Regional Government;
7. Law Number 1 of 2014 concerning Amendments to Law Number 27 of 2007 concerning Management of Coastal Areas and Small Islands;
8. Law Number 6 of 2023 concerning the Stipulation of Government Regulations in Lieu of Law Number 2 of 2022 concerning Job Creation into Law.

#### **B. Government Regulations**

1. Government Regulation Number 18 of 2012 concerning Management of Household Waste and Similar Household Waste;
2. Government Regulation Number 5 of 2021 concerning Implementation of Risk-Based Business Licensing;
3. Government Regulation Number 22 of 2021 concerning the Implementation of Environmental Protection and Management;
4. Government Regulation Number 21 of 2021 concerning the Implementation of Spatial Planning;
5. Government Regulation Number 19 of 2021 concerning Implementation of Land Acquisition for Development in the Public Interest.

### **C. Ministerial Regulations**

1. Minister of Environment Regulation Number 5 of 2014 concerning Waste Water Quality Standards;
2. Minister of Maritime Affairs and Fisheries Regulation Number 31/PERMEN-KP/2020 concerning Conservation Area Management;
3. Minister of Environment and Forestry Regulation Number 4 of 2021 concerning List of Businesses and/or Activities Required to Have Environmental Impact Analysis, Environmental Management Efforts and Environmental Monitoring Efforts or a Statement of Capability for Environmental Management and Monitoring;
4. Minister of Environment and Forestry Regulation Number 5 of 2021 concerning Procedures for Issuing Technical Approvals and Operational Feasibility Documents in the Field of Environmental Pollution Control;
5. Minister of Environment and Forestry Regulation Number 6 of 2021 concerning Procedures and Requirements for Management of Hazardous and Toxic Waste;
6. Regulation of the Minister of Maritime Affairs and Fisheries Number 26 of 2021 concerning Prevention of Pollution, Prevention of Damage, Rehabilitation and Improvement of Fish Resources and the Environment;
7. Minister of Maritime Affairs and Fisheries Regulation Number 28 of 2021 concerning Implementation of Marine Spatial Planning;
8. Minister of Public Works and Public Housing Regulation Number 10 of 2021 concerning Guidelines for Construction Safety Management Systems;
9. Minister of Environment Decree Number Kep-48/MENLH/11/1996 concerning Noise Level Standards.

### **D. Regional Regulations**

1. Pekalongan City Regional Regulation (PERDA) Number 7 of 2020 in Amendment to Pekalongan City Regional Regulation Number 16 of 2012 concerning Waste Management;
2. Pekalongan City Regional Regulation Number 3 of 2010 concerning Environmental Protection and Management of Pekalongan City;
3. Pekalongan City Regional Regulation Number 9 of 2015 concerning Waste Water Management;
4. Pekalongan City Regional Spatial Planning for 2018-2038 (Pekalongan City Regional Gazette 2020 Number 9).



5. Pekalongan City Regional Regulation 13 of 2022 Concerning Boundary Lines (Pekalongan City Regional Gazette 2022 Number 13, Supplement to Pekalongan City Regional Gazette Number 13)
6. Pekalongan City Regional Regulation Number 17 of 2017 concerning Amendments to Pekalongan City Regional Regulation Number 3 of 2010 concerning Protection and Management of the Environment of Pekalongan City.

#### 4.3 Review of Policies, Regulations and Institutional Arrangements

All legal requirements for the construction of the breakwater has complied with the above rules and regulations. The construction has been consulted with the related government offices and ministries at local, provincial and national levels.

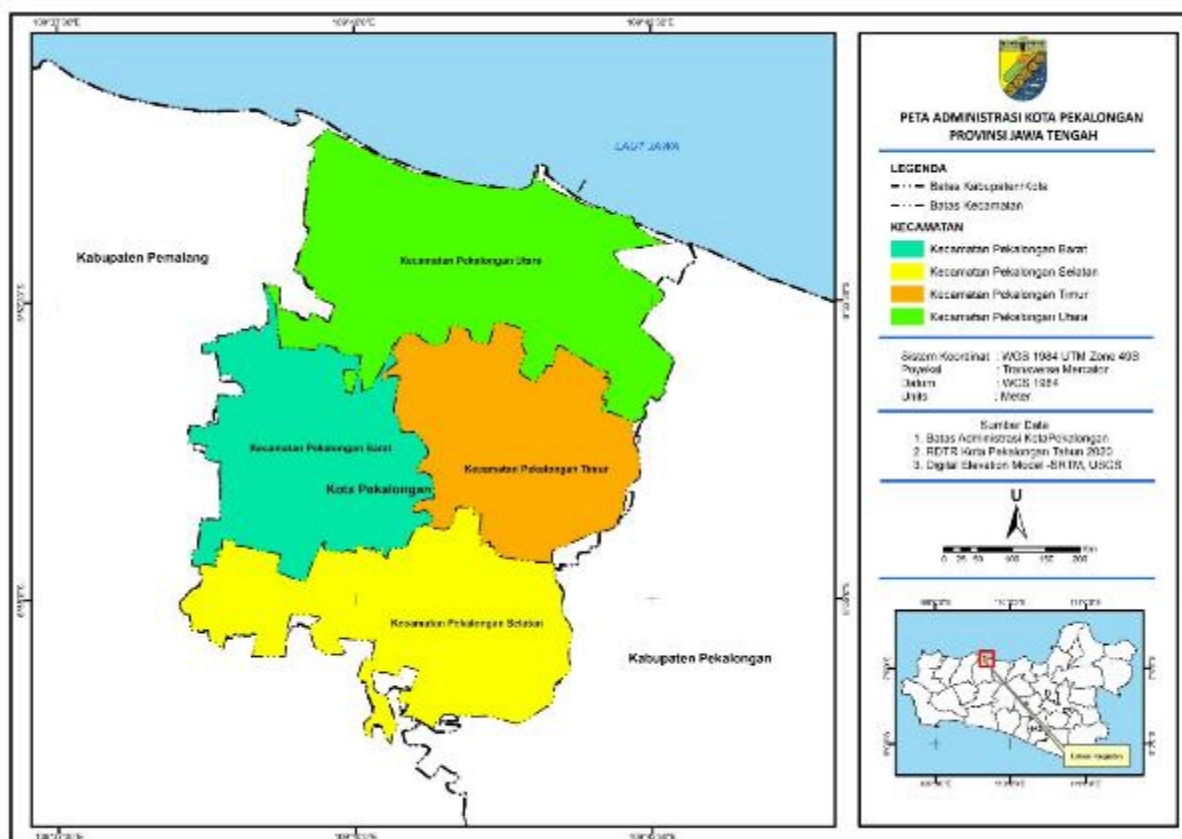
## 5. ENVIRONMENTAL AND SOCIAL BASELINE

This chapter presents an overview of the existing environmental and social status of the project area. As defined in the scope of works, baseline data on various physical, biological and social aspects has been collected, analyzed and compiled in order to get an overview of the existing environmental and social conditions in the project area. The data on different environmental and social components were collected and collated based on secondary data from authentic sources and ground truthing followed by actual field surveys. All the data have been collected and collated to identify the overall environmental condition within the project catchment area and major environmental issues to be addressed during the design and project implementation phase. The extent of study is at a 5 Km radius from the proposed buffer zone and within 500 m of the core zone. The focus of the study was on the areas within and directly influenced by the project.

The following sections describe the Physical Environment, Ecological Environment and Socio-economic Environment.

### 5.1 Position and Geographical Condition

Based on astronomical position, Pekalongan City is located at coordinates 6°50'42"–6°55'44" South Latitude and 109°37'55"–109°42'19" East Longitude. The farthest distance from north to south is ± 9 km, while from west to east it is ± 7 km. Based on its topography, the location of Pekalongan City, which is close to the coast, means that most of its area is in the lowlands with the height of the land ranging from 0 meters to 8 meters above sea level.



**Figure 5-1. Administrative Map of Pekalongan City**

### 5.1.1 Topography

Topographically, the Pekalongan City area is located in the lowlands of the north coast of Java Island with an altitude of between 0-6 meters above sea level. The entire area is on a slope of 0-8 percent. This condition illustrates that the entire area of Pekalongan City is very flat, the height difference is very small and in certain places the altitude is below sea level, such as in the Pabean area of Padukuhan Kraton Urban Village, North Pekalongan Subdistrict. This condition indicates land subsidence in the Pekalongan City area.

The topographic condition of Pekalongan City is in relatively low plains with an average height of approximately 1 meter above sea level. Based on data from Pekalongan City in Figures, the highest point in Pekalongan City is found in South Pekalongan Subdistrict with an altitude of 6 meters above sea level. Meanwhile, the three other subdistricts (North Pekalongan, East Pekalongan and West Pekalongan) have the same altitude of 1 m above sea level. The topographic map can be seen in Figure 5.2.

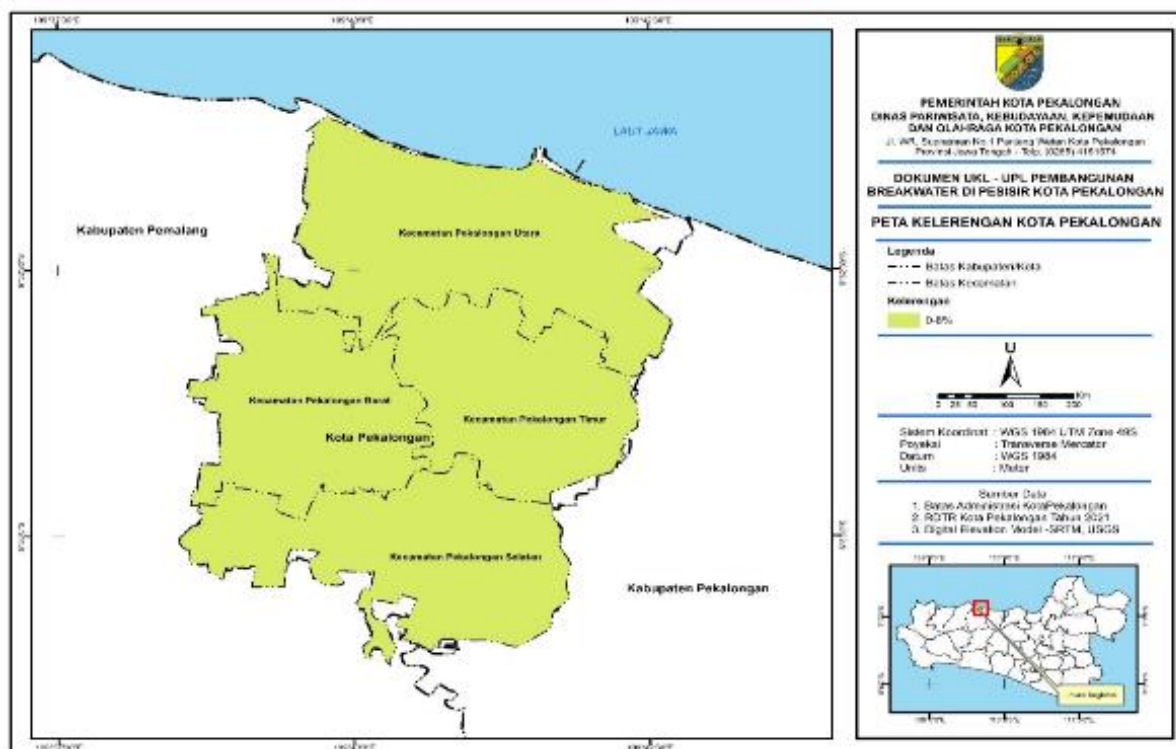


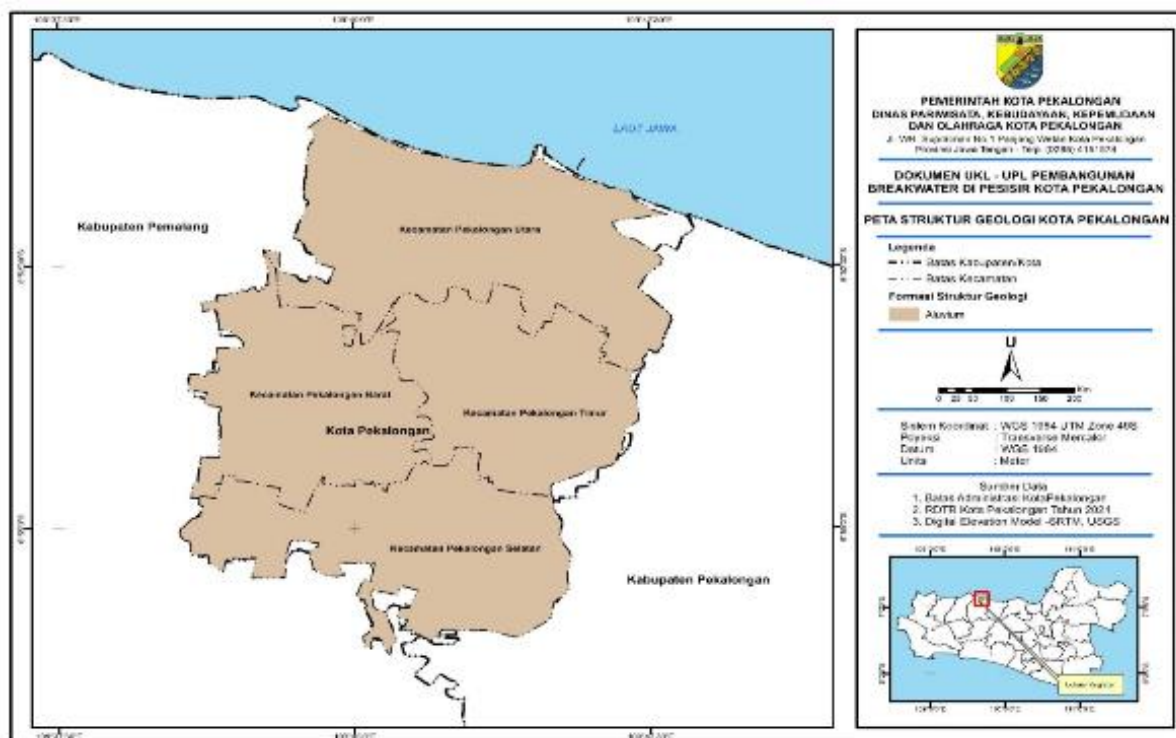
Figure 5-2. Topographic Map of Pekalongan City

### 5.1.2 Geology

Based on rock information originating from the analysis of the Pekalongan Geological Map Sheet, 1:1000 scale, sourced from the Bandung Geological Research and Development Center, the rock lithology in Pekalongan City consists of alluvium sedimentary deposits, formed in the Holocene era of the Tertiary period with a thickness of  $\pm 150$  m consisting of gravel, sand, silt and clay, river and swamp deposits. These alluvial deposits were formed covering the rock layers of the breccia member of the Ligung formation which is composed of andesite, hornblende andesite lava and tuff, making up the upper part of the Ligung formation, which was formed in the late-early Pliocene era. The alluvium layer on the surface along the coast is dominated by sand, while in the estuary area it is dominated by clay, river sediment and swamp.

The morphology of the beach in the western part is fine sand mixed with vegetation such as bushes or fields and in the eastern part the beach is sandy and tends to be muddy. The landforms in Pekalongan City are divided into two formations, namely alluvial plains and coastal alluvial plains. Alluvial plains are the result of fluvial processes, while coastal alluvial plains are the result of marine processes.

The landform units in the alluvial plain group are all composed of rocks originating from the deposition of material carried by water flows. Because they are deposited by water flows, there is good sorting. Fine sized material will be deposited later than coarse sized material. The following Figure 1.3 shows the distribution of the geological structure of Pekalongan City.



**Figure 5.3. Geological Structure Map of Pekalongan City**

### 5.1.3 Hydrology

Pekalongan City, bordering directly on the Java Sea, is passed by several rivers. There are 4 rivers that pass through the Pekalongan City area, namely the Meduri, Bremi, Pekalongan and Banger Rivers. These four rivers are included in 3 (three) river basins (DAS), namely the Sengkarang DAS, Kupang DAS and Gabus DAS.

Irrigation areas (DI) in the Pekalongan City area include DI under the authority of the Government, DI under the authority of the Central Java Provincial Government and DI under the authority of the Pekalongan City Government. The Government's authority includes DI Kupang - Kroempeng covering an area of 919 ha and DI Pesantren Kletak covering an area of 271 ha. The authority of the Central Java Provincial Government includes DI Asem Siketek/Kesetu covering an area of 262 ha. Meanwhile, the authority of the Pekalongan City Government includes DI ponds located in the northern area of Pekalongan City.

Based on Minister of Energy and Mineral Resources Regulation Number 2 of 2017 concerning Ground Water Basins (CAT) in Indonesia, the Pekalongan City area is included in the Pekalongan-Pemalang CAT section. This CAT is located at 1090 18' 45.31" - 1090 51' 52.35" East Longitude and 060 46' 33.52" - 070 13' 24.20" South Latitude, which covers the area of Pemalang, Pekalongan, Batang Districts and Pekalongan City.

The source for Pekalongan City's clean water comes from Pekalongan City, Batang District and Pekalongan District. Raw water sources from the Pekalongan and Batang district areas include:

1. Raw water source from the Petanglong Regional SPAM Program Phase 1 located in Jambangan Village, Talun Subdistrict, Pekalongan District;
2. Raw water source from the Kupang Sambong River in Cepagan Village, Warungasem Subdistrict, Batang District, utilized through a Water Treatment Plant (IPA);
3. Raw water source from the spring of Kembanglangit Village, Blado Subdistrict, Batang District, utilized by direct extraction;
4. Raw water source from springs in Rogoselo Village, Doro Subdistrict, Pekalongan District, utilization by direct extraction, and utilization through IPA (Water Treatment Plant). The raw water sources for drinking water in the Pekalongan City area comes from the use of ground water because there are no springs, and the unsuitability of surface water to use as a raw water source.

The following Figure 5-4 shows the hydrological map of Pekalongan City.

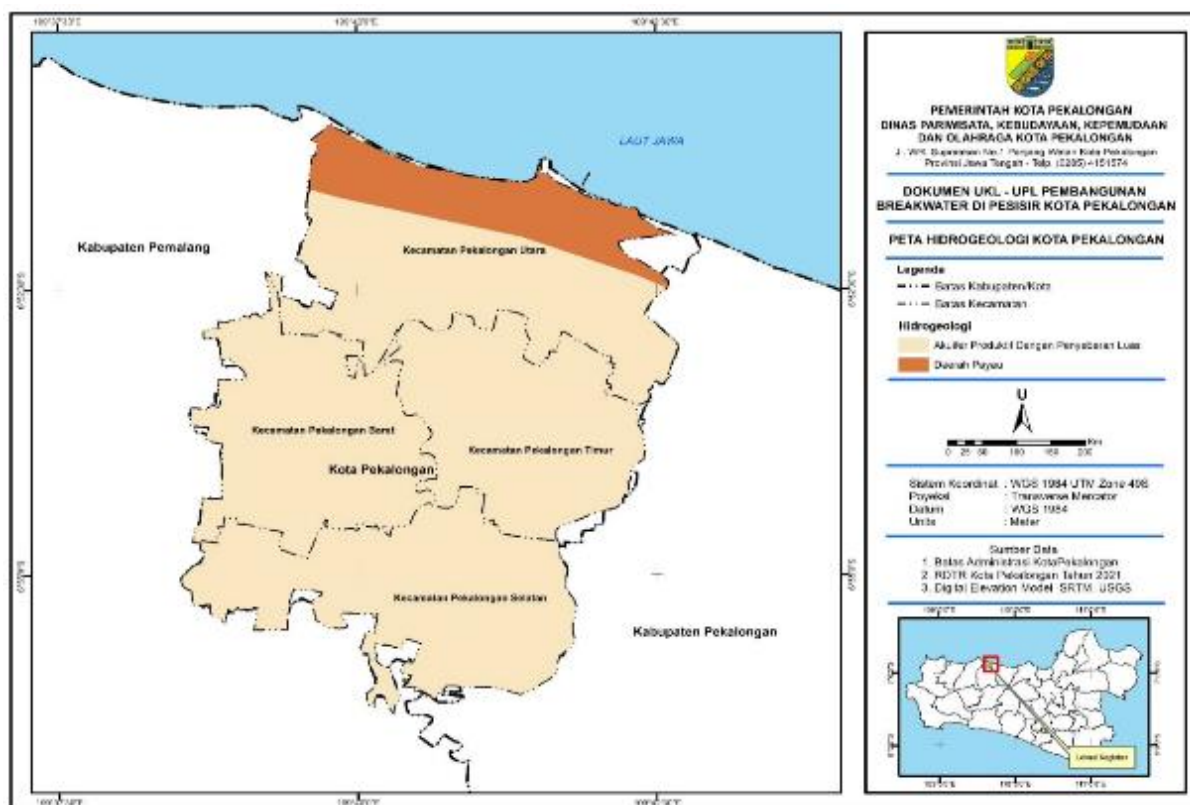


Figure 5.4. Hydrological Map of Pekalongan City

### 5.1.3.1 Ground Water

Based on topographic factors, geology and hydrogeological conditions, groundwater resources in the Pekalongan City area are included in the coastal plain groundwater category, located a short distance under the surface. The groundwater of the coastal plain is covered by alluvium and coastal deposits as a result of the breakdown of older rocks. This condition can be found in most areas, through digging a 1 m deep hole, groundwater will immediately seep out. By taking into account the distribution of rocks, vegetation and slope, it is estimated that



30 percent of the rainfall is a surplus for groundwater recharge.

Due to the adequate availability of groundwater, deep ground wells have been drilled in several locations which are managed by PDAM Pekalongan City and PAMSIMAS (Community Based Drinking Water and Sanitation Supply). However, with the trend of increasing demand pressure, both housing/residential needs and processing industry needs, and the coastal condition of the Pekalongan City area, it is hoped that groundwater extraction in the Pekalongan City area can be controlled so that it does not disrupt its availability.

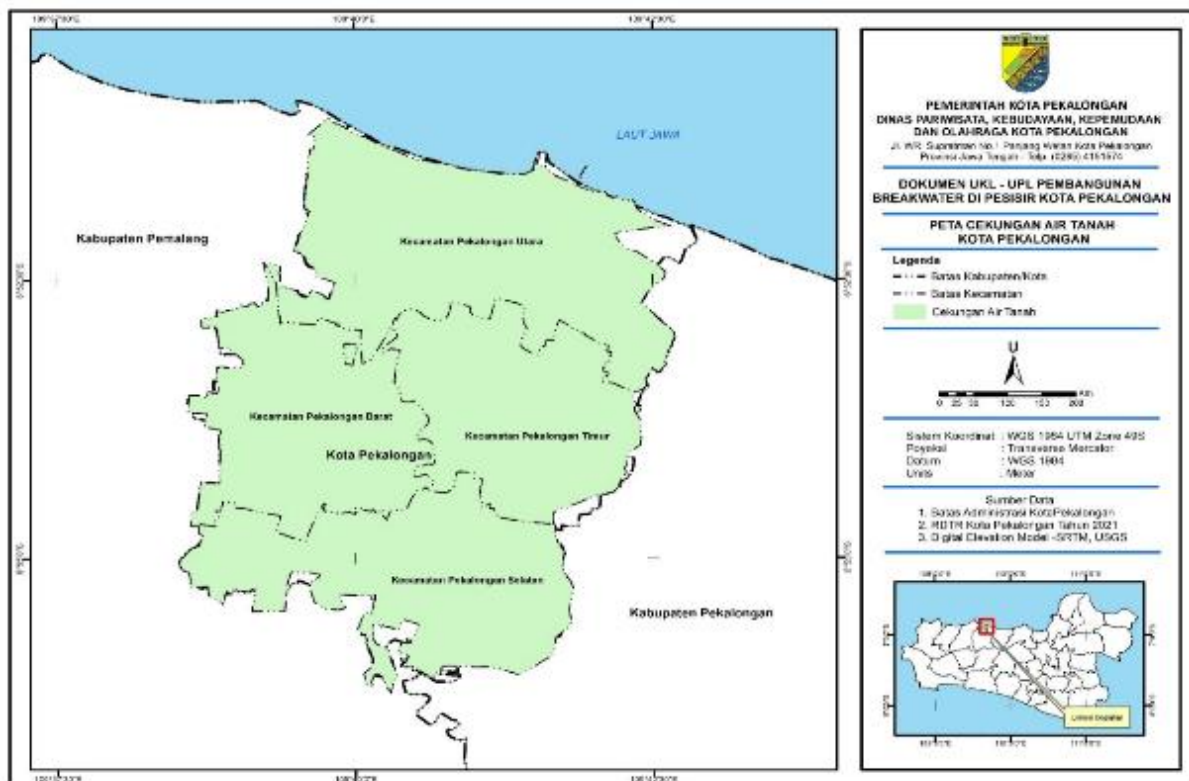


Figure 5.5. Groundwater Basin Map

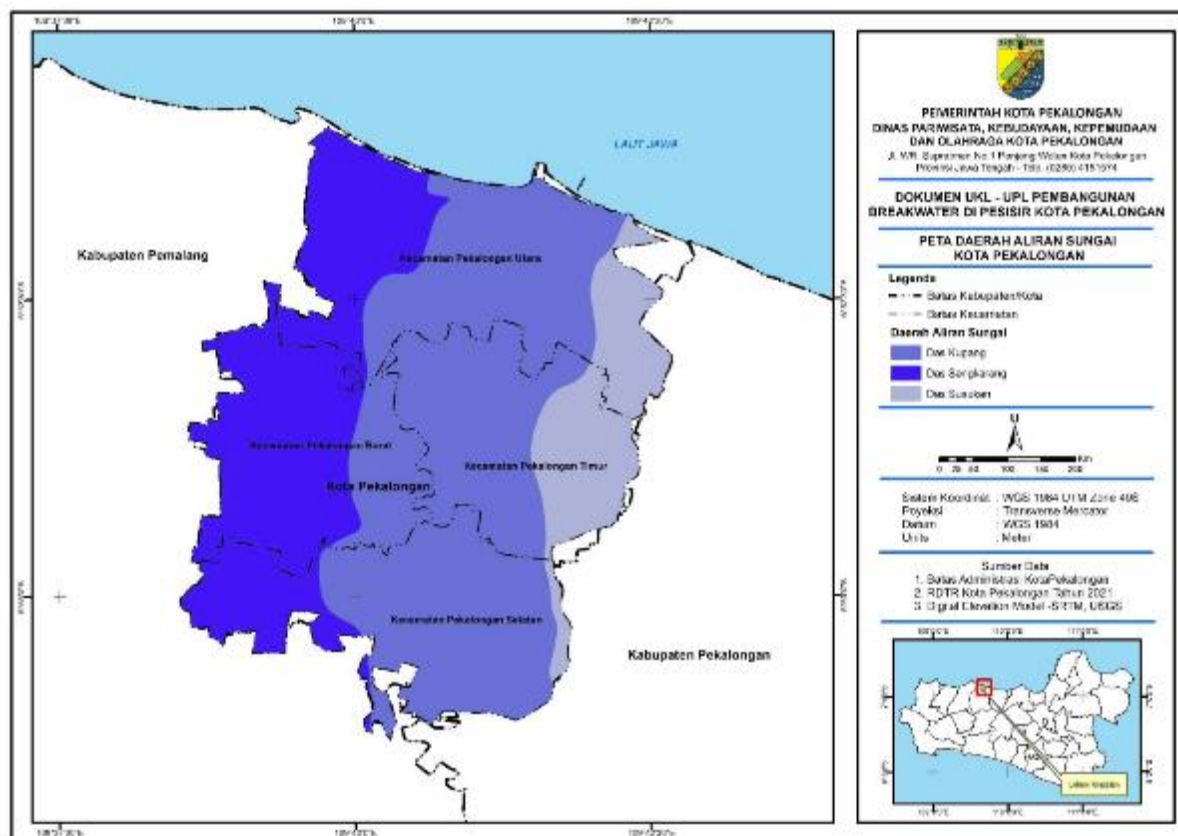


Figure 5-6. Watershed Map

### 5.1.4 Climatology

In 2022, the annual amount of rainfall in Pekalongan City was 2272 mm<sup>3</sup>, with an average monthly rainfall of 189.33 mm<sup>3</sup>. The number of rainy days is 126 days, January being the wettest month with 19 rainy days during the month and August being the driest month with only 2 rainy days.

There are 10 wet months (rainfall >100mm/month), namely January-May, July and September-December, and 2 dry months (<60 mm/month) in June and August. This condition illustrates that in 2022 the rainy season was longer than the dry season.

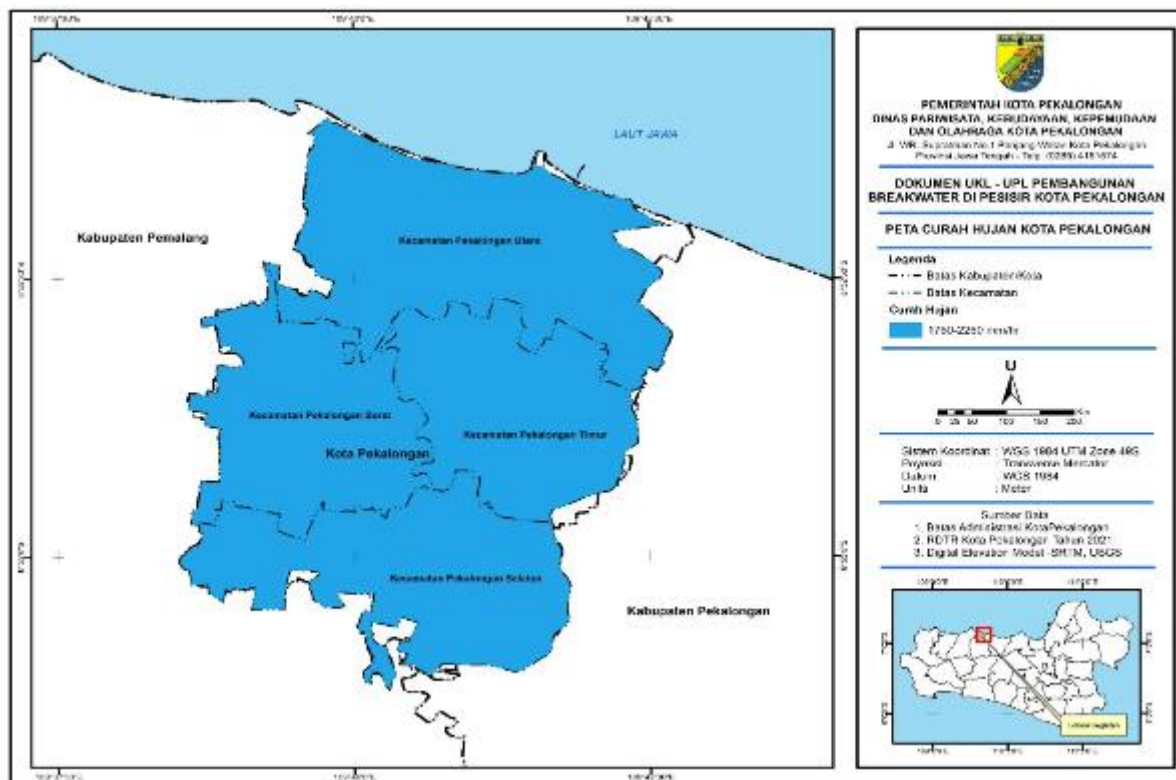


Figure 5-7. Rainfall Map

### 5.1.5 Soil Type

The types of soil found in Pekalongan City are generally divided into 2 types, slightly gray soil types, yellowish gray alluvial types and hydromorphic alluvial types.

Alluvial soil type is a type of soil that occurs due to mud deposits, usually carried by river flows. Alluvial soil type is usually located in the lowlands. This type of soil has the physical characteristics of a gray color, clay texture, and slow permeability (water runoff). This type of soil is usually flooded with water so the color is dark gray to black. The following Figure 5.8 shows the Soil Type Map.

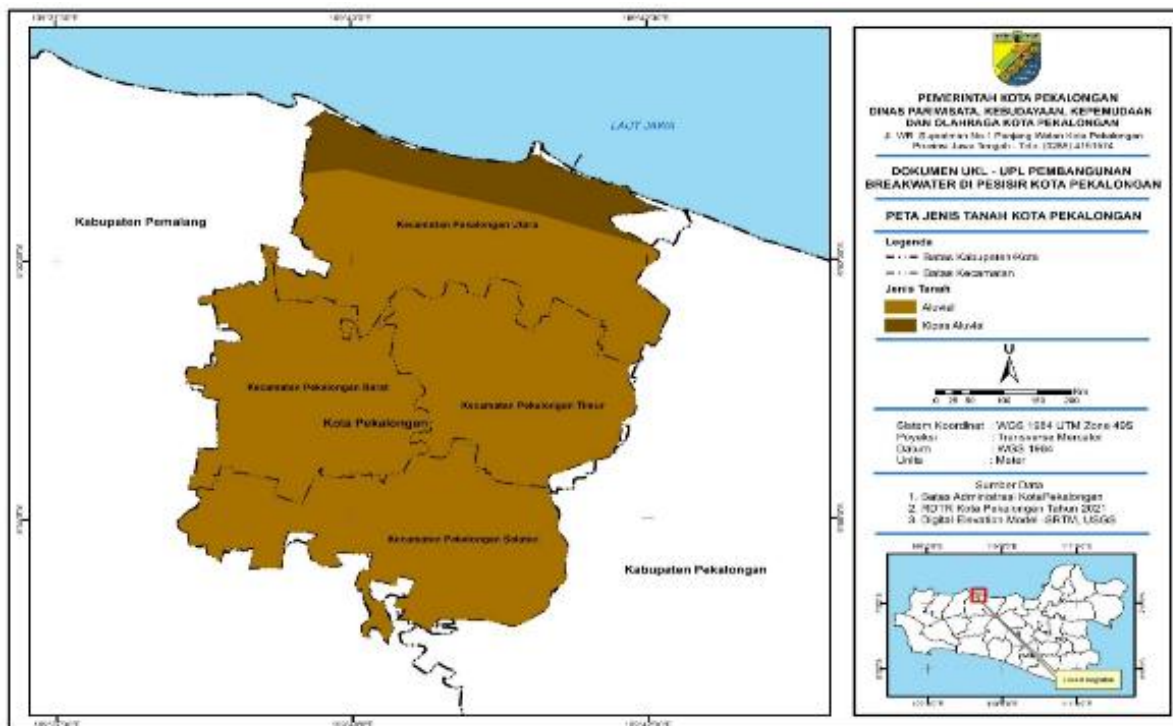


Figure 5.8. Soil Type Map

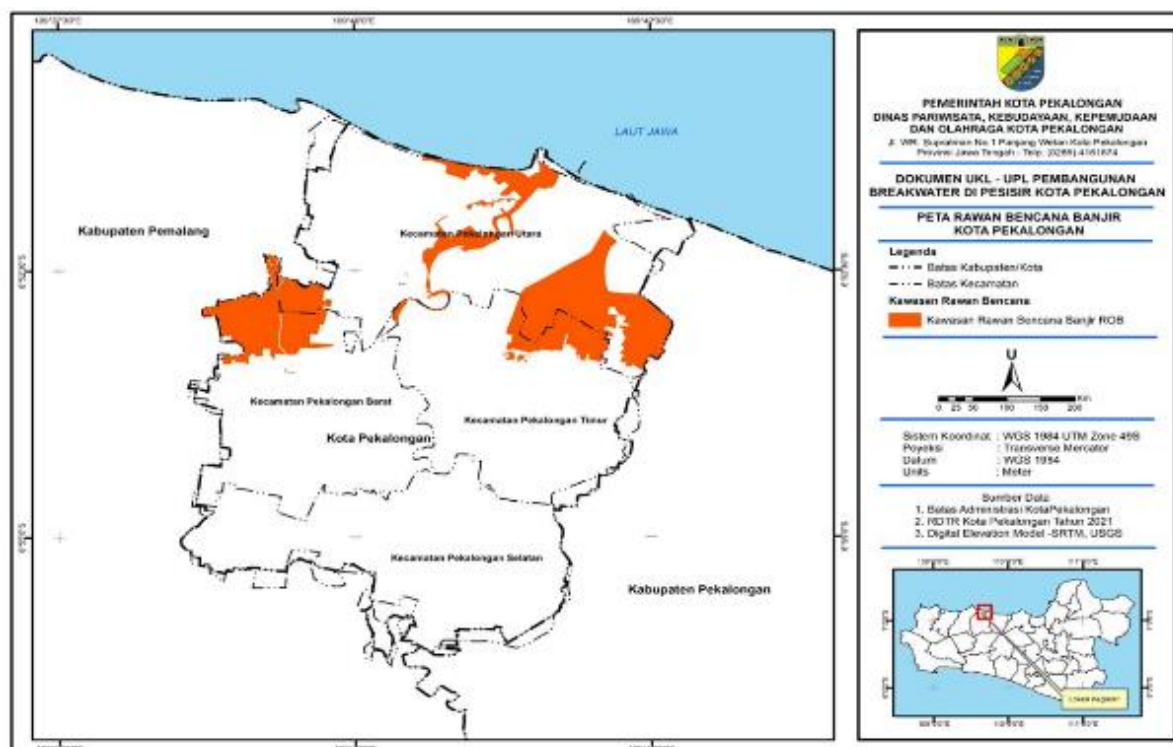


Figure 5.9. Disaster

### 5.1.6 Analysis of Tide Observations

Tide observations were carried out manually using a tide gauge installed in the crematorium area. Tide readings are carried out by observers, with a distance between the observer and the tide gauge of  $\pm 10$  meters. At night, tide readings can be done using flashlights.

**Table 5-1. Coordinate of tide station position**

Station	Latitude	Longitude	Easting	Northing
Crematorium Area	6°51'25.34"S	109°40' 33.79"E	353712. 6930	9241853.2690



**Figure 5.10. Location of tide observation in the study area**

*Source: Adapted from Google Earth, 2022*

Tide observations were carried out at 60 minute intervals for 24 consecutive hours for 15 days. The results of these tidal values will later be used to determine the chart datum/vertical control point. The results of the graphic documentation of sea level at the time of observation are presented in the following table.



Hour	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
15 Mei 2022													89.00	95.00	105.00	113.00	117.00	118.00	119.00	109.00	106.00	94.00	85.00	78.00
16 Mei 2022	51.00	51.00	62.00	63.00	78.00	96.00	96.00	98.00	92.00	97.00	99.00	95.00	89.00	99.00	107.00	112.00	116.00	114.00	119.00	108.00	95.00	98.00	89.00	85.00
17 Mei 2022	78.00	68.00	78.00	78.00	84.00	87.00	96.00	98.00	105.00	109.00	117.00	108.00	109.00	108.00	109.00	101.00	109.00	109.00	105.00	95.00	95.00	98.00	95.00	87.00
18 Mei 2022	67.00	58.00	65.00	65.00	77.00	79.00	78.00	89.00	96.00	99.00	99.00	109.00	105.00	117.00	119.00	119.00	108.00	109.00	105.00	105.00	117.00	95.00	99.00	95.00
19 Mei 2022	85.00	85.00	78.00	79.00	85.00	85.00	89.00	92.00	96.00	102.00	105.00	123.00	136.00	136.00	137.00	115.00	129.00	125.00	125.00	119.00	105.00	105.00	100.00	102.00
20 Mei 2022	99.00	99.00	105.00	105.00	99.00	99.00	99.00	99.00	99.00	95.00	99.00	109.00	129.00	135.00	139.00	125.00	124.00	118.00	114.00	110.00	108.00	107.00	103.00	95.00
21 Mei 2022	75.00	87.00	84.00	87.00	79.00	74.00	79.00	79.00	79.00	79.00	84.00	89.00	99.00	115.00	129.00	129.00	109.00	108.00	109.00	105.00	105.00	89.00	75.00	69.00
22 Mei 2022	57.00	57.00	65.00	79.00	85.00	89.00	96.00	99.00	85.00	89.00	95.00	89.00	109.00	119.00	125.00	139.00	145.00	145.00	139.00	125.00	119.00	105.00	95.00	89.00
23 Mei 2022	79.00	79.00	85.00	85.00	88.00	89.00	99.00	99.00	99.00	99.00	99.00	94.00	95.00	119.00	125.00	139.00	145.00	145.00	161.00	169.00	169.00	155.00	139.00	125.00
24 Mei 2022	95.00	89.00	75.00	79.00	95.00	99.00	95.00	105.00	109.00	109.00	109.00	119.00	124.00	135.00	134.00	134.00	149.00	165.00	165.00	165.00	163.00	159.00	145.00	125.00
25 Mei 2022	65.00	55.00	59.00	65.00	69.00	75.00	85.00	95.00	105.00	105.00	119.00	109.00	115.00	119.00	125.00	139.00	145.00	145.00	155.00	134.00	115.00	105.00	99.00	79.00
26 Mei 2022	68.00	65.00	79.00	79.00	84.00	95.00	99.00	105.00	105.00	99.00	105.00	95.00	79.00	55.00	49.00	55.00	59.00	65.00	75.00	79.00	79.00	85.00	89.00	95.00
27 Mei 2022	104.00	104.00	115.00	119.00	125.00	125.00	135.00	139.00	105.00	95.00	85.00	99.00	55.00	55.00	65.00	65.00	69.00	69.00	69.00	75.00	79.00	79.00	89.00	95.00
28 Mei 2022	95.00	99.00	99.00	105.00	105.00	109.00	105.00	95.00	89.00	75.00	75.00	69.00	65.00	59.00	49.00	49.00	51.00	65.00	75.00	79.00	79.00	85.00	85.00	89.00
29 Mei 2022	89.00	95.00	95.00	94.00	95.00	95.00	89.00	85.00	69.00	59.00	54.00	54.00	45.00	49.00	59.00	65.00	69.00	75.00	84.00	95.00	95.00	95.00	95.00	99.00
30 Mei 2022	105.00	109.00	109.00	95.00	95.00	95.00	89.00	85.00	79.00	75.00	75.00	69.00	65.00	59.00	59.00	65.00	79.00	79.00	79.00	85.00	85.00	85.00	95.00	95.00

Table 5-2. Recapitulation of 15 Days of Field Observation of Tides

Based on a 15-day observation of tides in the location, the following can be concluded:

- Highest tide : 1.69 m
- Lowest tide : 0.45 m
- Variation : 1.24 m



Figure 5.11 Tidal elevation graph based on 15 days of observations with reference to MSL field

### 5.1.7 Comparison of BIG Tide Data

The BIG tidal data used comes from observations from the Pekalongan City Nusantara Fisheries Harbor Station (PPN). Figure 2.6 shows the application form to obtain the tidal data in question. BIG tidal data that has been acquired respectively:

1. Tidal data for 2021
2. Tidal data for April 2022
3. Tidal data for May 2022



Hour	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1-May-22	246.00	152.00	152.00	152.00	154.00	150.00	153.00	162.00	171.00	180.00	183.00	186.00	189.00	192.00	194.00	196.00	198.00	172.00	163.00	154.00	152.00	156.00	156.00	160.00
2-May-22	159.00	160.00	161.00	159.00	158.00	160.00	163.00	176.00	178.00	186.00	194.00	197.00	194.00	198.00	196.00	196.00	182.00	175.00	173.00	165.00	163.00	162.00	161.00	160.00
3-May-22	161.00	159.00	155.00	160.00	158.00	156.00	158.00	164.00	173.00	183.00	184.00	188.00	191.00	188.00	183.00	177.00	172.00	172.00	172.00	179.00	164.00	165.00	166.00	166.00
4-May-22	163.00	160.00	158.00	157.00	159.00	153.00	154.00	155.00	166.00	170.00	174.00	176.00	176.00	175.00	171.00	171.00	169.00	163.00	167.00	166.00	167.00	168.00	167.00	168.00
5-May-22	167.00	163.00	166.00	164.00	166.00	170.00	173.00	179.00	184.00	184.00	185.00	183.00	175.00	178.00	173.00	168.00	169.00	166.00	167.00	166.00	163.00	166.00	167.00	162.00
6-May-22	158.00	154.00	154.00	153.00	159.00	164.00	167.00	173.00	176.00	180.00	179.00	175.00	170.00	165.00	157.00	158.00	156.00	159.00	161.00	164.00	166.00	169.00	173.00	174.00
7-May-22	165.00	159.00	159.00	161.00	165.00	173.00	177.00	188.00	190.00	195.00	189.00	180.00	171.00	161.00	156.00	152.00	149.00	159.00	158.00	163.00	168.00	164.00	171.00	168.00
8-May-22	163.00	159.00	148.00	150.00	151.00	161.00	172.00	178.00	185.00	185.00	186.00	177.00	167.00	154.00	146.00	145.00	141.00	141.00	141.00	141.00	156.00	164.00	173.00	174.00
9-May-22	167.00	162.00	157.00	151.00	154.00	162.00	174.00	184.00	191.00	197.00	202.00	195.00	179.00	164.00	154.00	147.00	141.00	141.00	141.00	141.00	151.00	162.00	171.00	172.00
10-May-22	164.00	160.00	154.00	152.00	150.00	156.00	165.00	174.00	183.00	189.00	191.00	180.00	162.00	145.00	135.00	131.00	129.00	137.00	134.00	141.00	153.00	165.00	173.00	173.00
11-May-22	169.00	162.00	155.00	147.00	148.00	151.00	162.00	176.00	190.00	199.00	203.00	198.00	189.00	175.00	158.00	146.00	141.00	140.00	137.00	131.00	145.00	157.00	167.00	174.00
12-May-22	172.00	166.00	157.00	151.00	149.00	153.00	163.00	176.00	189.00	200.00	206.00	204.00	195.00	179.00	164.00	151.00	141.00	140.00	140.00	141.00	141.00	158.00	165.00	171.00
13-May-22	172.00	169.00	160.00	155.00	152.00	156.00	165.00	176.00	189.00	198.00	208.00	207.00	200.00	190.00	173.00	156.00	144.00	140.00	140.00	139.00	141.00	141.00	159.00	168.00
14-May-22	169.00	170.00	163.00	155.00	151.00	153.00	161.00	173.00	184.00	194.00	202.00	204.00	202.00	191.00	180.00	166.00	151.00	144.00	141.00	141.00	141.00	141.00	157.00	166.00
15-May-22	170.00	170.00	167.00	160.00	154.00	157.00	162.00	173.00	185.00	192.00	196.00	201.00	201.00	197.00	186.00	172.00	167.00	151.00	144.00	147.00	141.00	147.00	156.00	159.00
16-May-22	164.00	164.00	162.00	161.00	151.00	154.00	158.00	167.00	177.00	186.00	192.00	196.00	197.00	191.00	184.00	174.00	163.00	152.00	145.00	145.00	141.00	159.00	161.00	
17-May-22	168.00	170.00	179.00	167.00	162.00	158.00	160.00	165.00	178.00	184.00	190.00	196.00	198.00	206.00	204.00	193.00	175.00	162.00	157.00	154.00	154.00	166.00	167.00	
18-May-22	164.00	172.00	175.00	173.00	173.00	168.00	170.00	173.00	179.00	183.00	186.00	191.00	194.00	201.00	200.00	183.00	177.00	173.00	167.00	165.00	163.00	161.00	162.00	
19-May-22	164.00	170.00	171.00	178.00	177.00	181.00	183.00	186.00	187.00	181.00	183.00	185.00	181.00	178.00	175.00	168.00	167.00	166.00	168.00	164.00	167.00	158.00	153.00	
20-May-22	151.00	157.00	159.00	164.00	171.00	178.00	185.00	190.00	193.00	191.00	183.00	178.00	173.00	170.00	167.00	167.00	167.00	167.00	172.00	167.00	173.00	172.00	167.00	
21-May-22	161.00	160.00	160.00	167.00	168.00	178.00	187.00	197.00	195.00	196.00	184.00	171.00	157.00	151.00	152.00	151.00	154.00	158.00	165.00	177.00	174.00	172.00	168.00	
22-May-22	157.00	151.00	153.00	160.00	169.00	181.00	192.00	206.00	211.00	208.00	198.00	181.00	166.00	151.00	143.00	143.00	143.00	149.00	158.00	170.00	178.00	183.00	183.00	
23-May-22	168.00	158.00	153.00	154.00	161.00	174.00	189.00	203.00	210.00	214.00	207.00	199.00	179.00	164.00	148.00	142.00	141.00	141.00	148.00	161.00	175.00	183.00	187.00	
24-May-22	178.00	166.00	162.00	157.00	158.00	167.00	180.00	199.00	210.00	215.00	214.00	206.00	191.00	176.00	146.00	141.00	141.00	140.00	139.00	143.00	152.00	170.00	178.00	
25-May-22	177.00	167.00	161.00	154.00	152.00	158.00	174.00	196.00	209.00	213.00	211.00	214.00	204.00	186.00	164.00	149.00	141.00	141.00	141.00	141.00	141.00	160.00	174.00	
26-May-22	187.00	185.00	177.00	168.00	163.00	165.00	169.00	181.00	181.00	206.00	210.00	211.00	208.00	195.00	177.00	155.00	142.00	141.00	141.00	139.00	136.00	147.00	158.00	
27-May-22	174.00	174.00	169.00	164.00	161.00	167.00	173.00	181.00	182.00	201.00	208.00	213.00	211.00	206.00	183.00	164.00	143.00	142.00	141.00	141.00	141.00	141.00	164.00	
28-May-22	172.00	173.00	164.00	164.00	152.00	162.00	169.00	174.00	190.00	197.00	205.00	206.00	202.00	198.00	187.00	170.00	160.00	143.00	142.00	142.00	141.00	144.00	153.00	
29-May-22	162.00	167.00	167.00	167.00	161.00	163.00	161.00	172.00	177.00	184.00	194.00	197.00	195.00	196.00	184.00	178.00	164.00	153.00	146.00	143.00	146.00	151.00	160.00	

Table 5-3. BIG Tide Data in the Study Area

Based on 30-day BIG data of tides in the Pekalongan Station, the following can be concluded:

- Highest tide : 2.21 m
- Lowest tide : 1.34 m
- Variation : 0.87 m

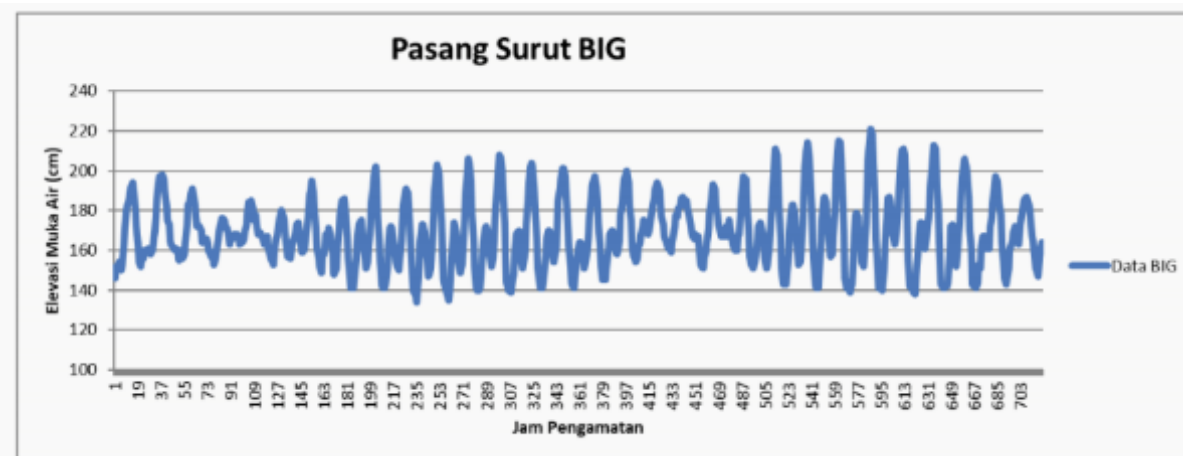
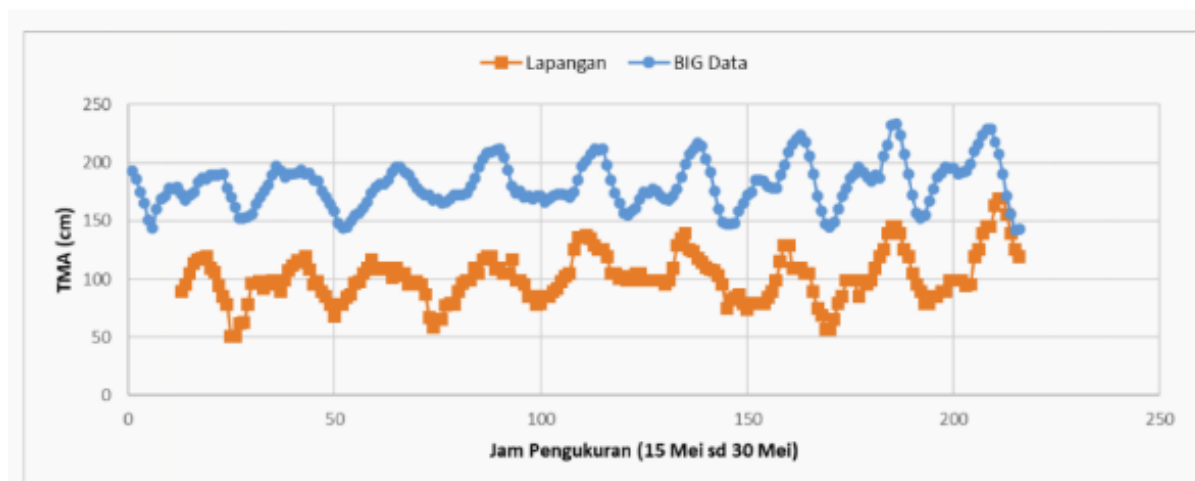


Figure 5-12 Tidal elevation based on 30-day BIG Data with reference to the MSL plane



**Figure 5-13 BIG tidal elevation with MSL reference field data**

From the results of data identification between observations and BIG data, it can be concluded that the trend of rise and fall in sea level is the same, so that the tides used in modeling are BIG tides for 30 days. The method used to analyze tidal data is the Admiralty and Least Square method to obtain 9 main tidal components (M2, S2, N2, K1, O1, M4, MS4, K2, and P1).

### 5.1.8 Conclusions of the Tide Data Processing Results

Further, data from processing using two methods, namely Admiralty and Least Square, can be concluded for determining LWS, MSL and HWS using Admiralty data with the differences shown in Table 5.3.

**Table 5-4. Comparison of tide variations**

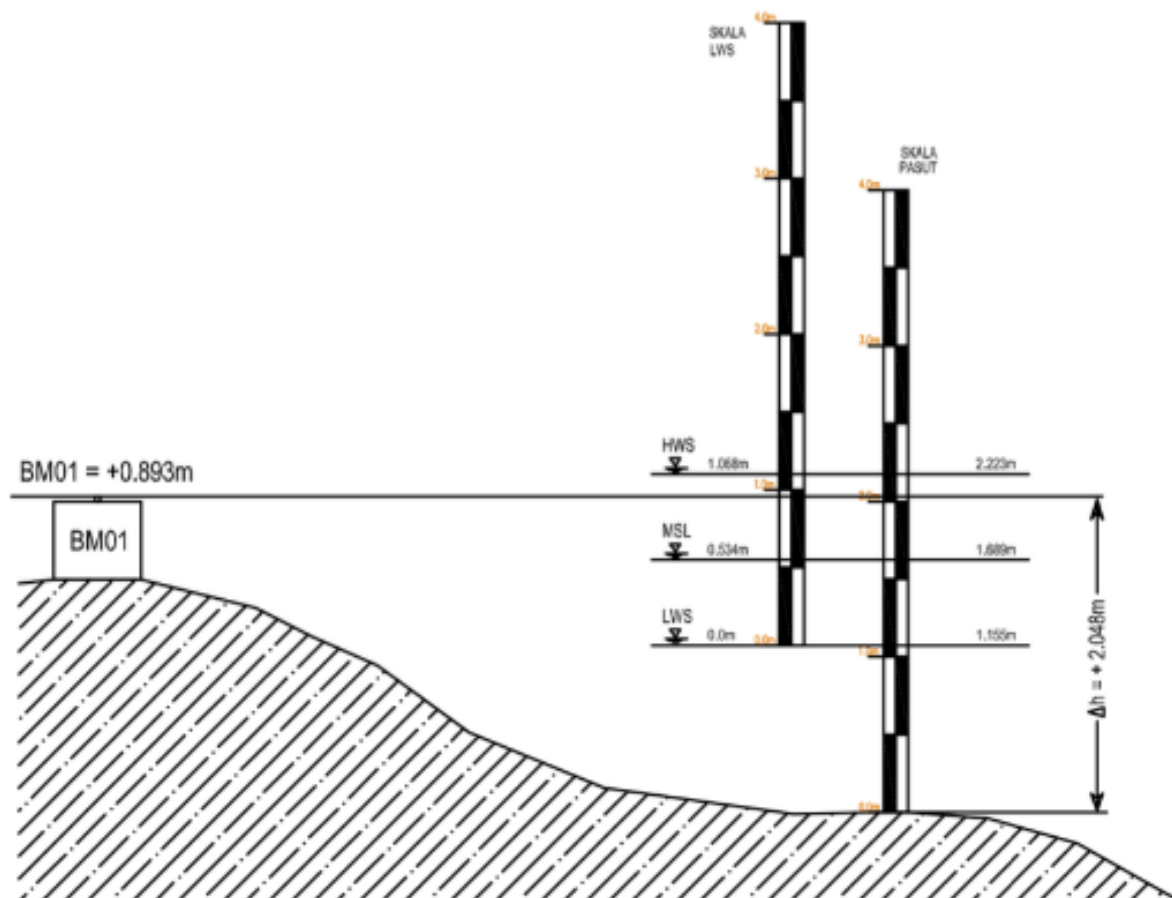
Tidal Variation based on Observation	Tidal Variation based on Admiralty Method	Tidal Variation based on Least Square Method
124 cm	106.75 cm	97.58 cm

**Table 5-5. Comparison of Important Elevation Results of Admiralty and Least Square Methods**

Type of Elevation		Elevation (cm) Admiralty	Elevation (cm) Least Square	Difference
Highest High Spring	HWS	222.26	224.78	-2,52

Mean High Water Spring	MHWS	196.02	210.92	-14,90
Mean Sea Level	MSL	168.89	168.93	-0,04
Mean Low Water Spring	MLWS	141.76	137.66	4,10
Lowest Water Spring	LWS	115.52	127.20	-11,68
Tidal Difference (HWS-LWS)		53.37	41.73	11,64
Z0 (MSL-LWS)		106.75	97.58	9,17

Based on the results of analysis of tidal data using both methods, namely Admiralty and Least Square, the next stage is to determine which method to use in determining the lowest water level (LWS) for the need to determine the vertical control point. Both Admiralty and Least Square methods result in tidal variation values that are close to the field observation. However, the result of the Admiralty method is closer to field data, so it will be used in determining reference values for tidal elevation for determining bathymetric elevation and topographic measurements.

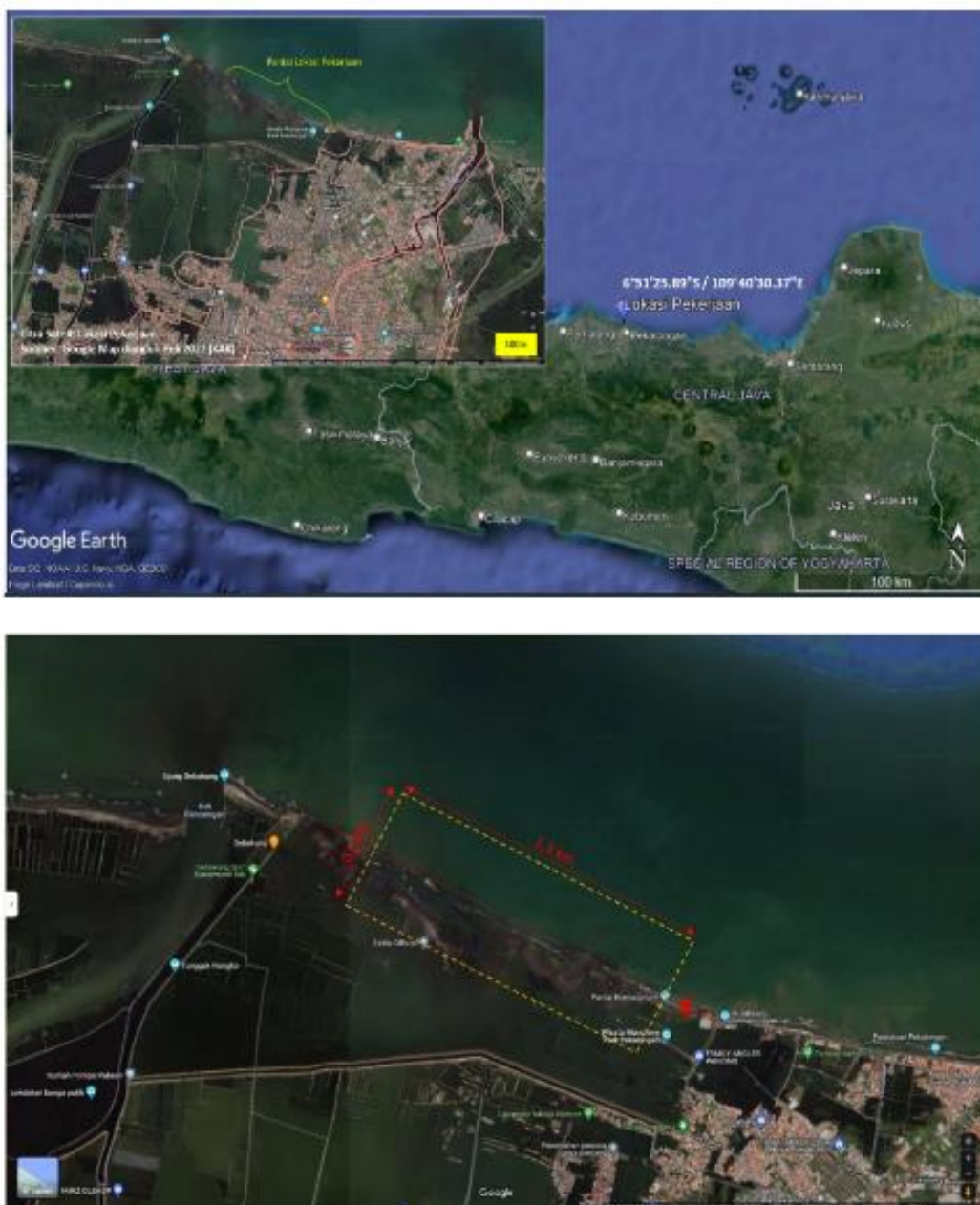


**Figure 5-14. Sketch of binding important elevation values to benchmarks**

The Formzahl number obtained from the Least Square calculation results at the work location is 1.23. This number shows that the waters have a mixed tide, prevailing semi-diurnal type, which generally has two high waters and two low waters, and sometimes only one tide cycle per day with different heights and times.

### 5.1.9 Topography and Bathymetry

The scope of geodetic measurements, topographic measurements and bathymetric measurements. Hydrographic and oceanographic survey data aim to obtain an overview of the location of the planned coastal protection development. This survey activity is to obtain the seabed configuration around the coastal protection plan area.





**Figure 5-15. Topographic and Bathymetric Survey Location Orientation**

Source: Google Earth with adjustments, 2022, KAK.

### 5.1.9.1 Topographic and Bathymetric Survey Results

#### 1) Situation Measurement

The benchmark is intended to determine a permanent point in the survey area, whose coordinates are then determined using Global Navigation Satellite System (GNSS) equipment or commonly known as GPS. This benchmark position is then used as a reference point to determine the position (coordinates) of all measurement points, so that they can be depicted on a map. To set the azimuth direction of all measurement points, at each location a pair of benchmarks is built, namely a Primary Benchmark and a Secondary Benchmark. The main and secondary benchmarks are concrete stakes measuring  $40 \times 40 \times 40 \text{ cm}^3$ , and buried +/- 60 cm deep underground, constructed in a safe place where the possibility of being moved is very small. Four benchmarks, measuring  $40 \times 40 \times 100 \text{ cm}^3$ , were planted 100 cm deep. The Benchmarks were constructed on 16 November 2021.

#### 2) Bathymetry Measurements

The bathymetry survey was carried out on 7-10 August 2022. The bathymetry survey was carried out in the study area with an area of 57.23 ha. The distance between survey lines is 10 m. The calibration process using the bar check calibration method is carried out to ensure that the transducer draft value and sound propagation speed used are correct.



**Figure 5-16. Location of study area for Pekalongan Beach protection plan**

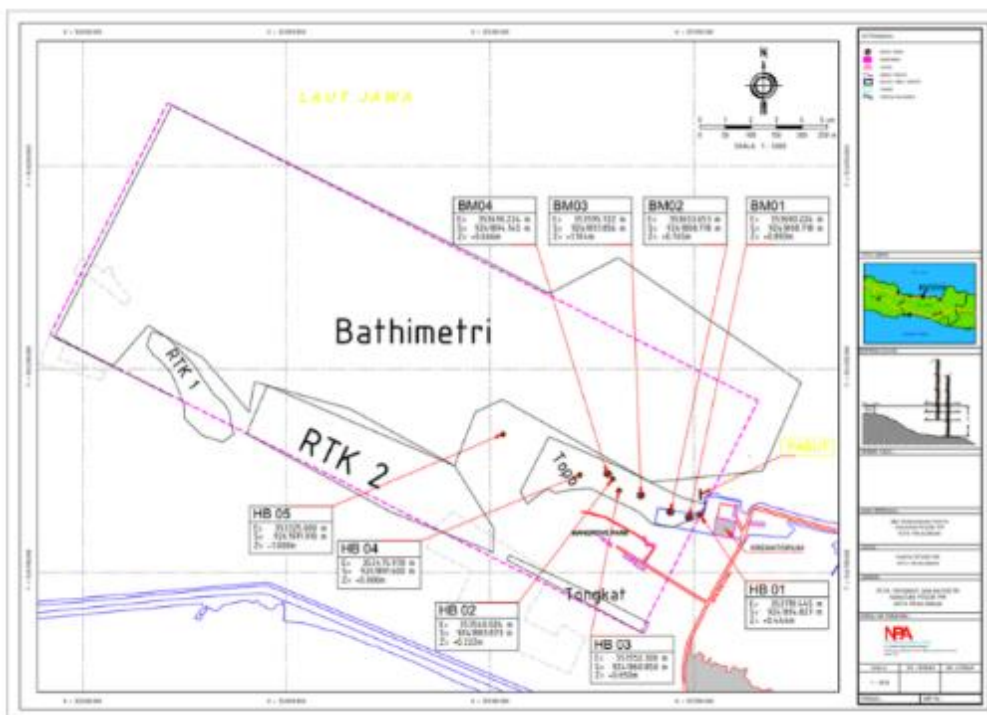


Figure 5-17. Distribution of study area measurement methods based on field conditions

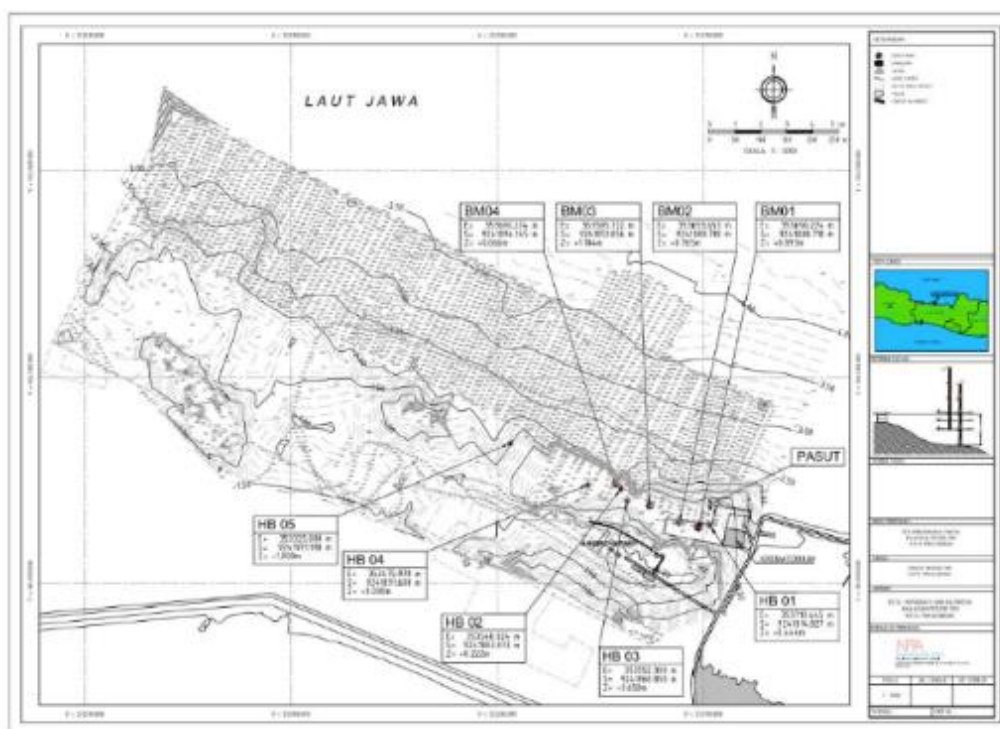


Figure 5-18. Combined Snapshot of Situation and Bathymetry Measurement Results



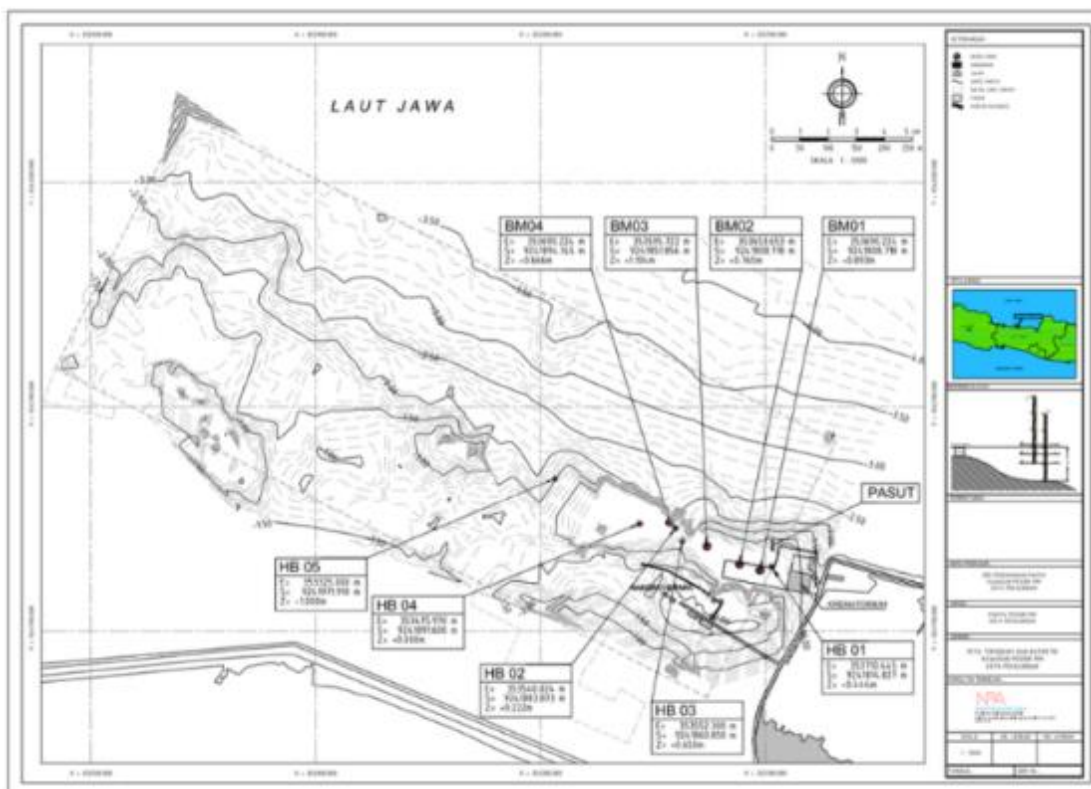


Figure 5-19. Snapshot of Situation and Bathymetry Measurement Contour Results

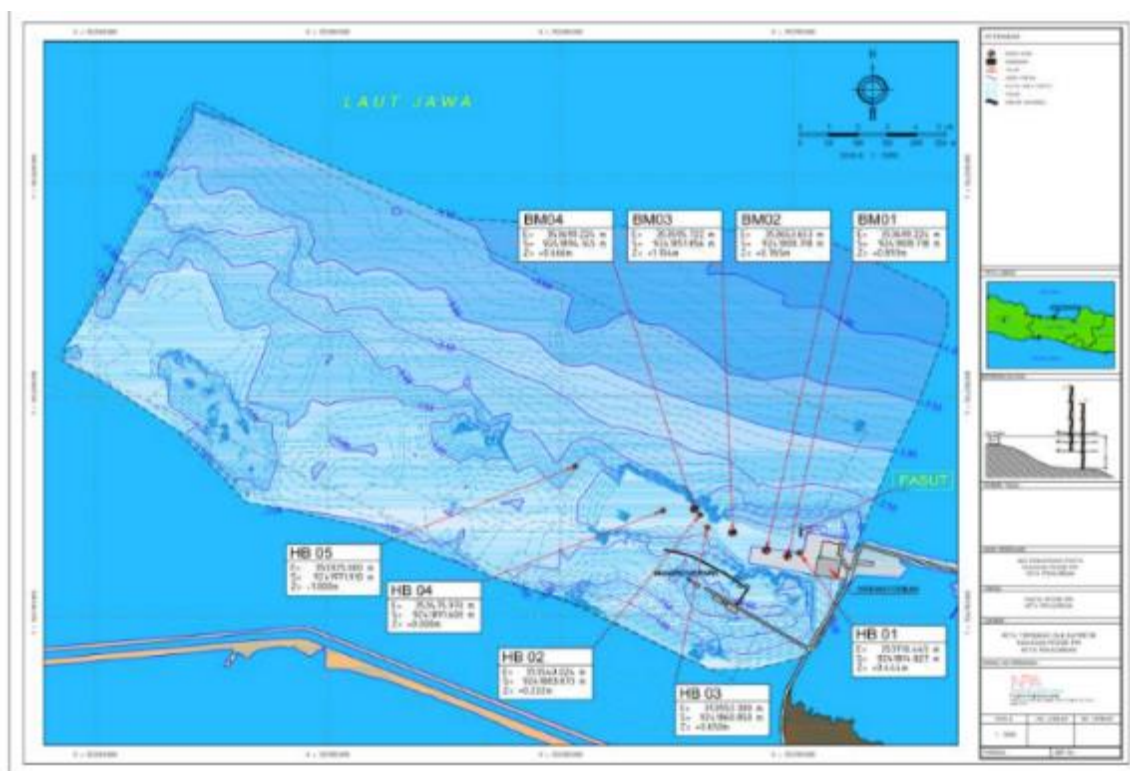


Figure 5-20. Snapshot of Situation and Bathymetry Measurement Gridding Results (1)

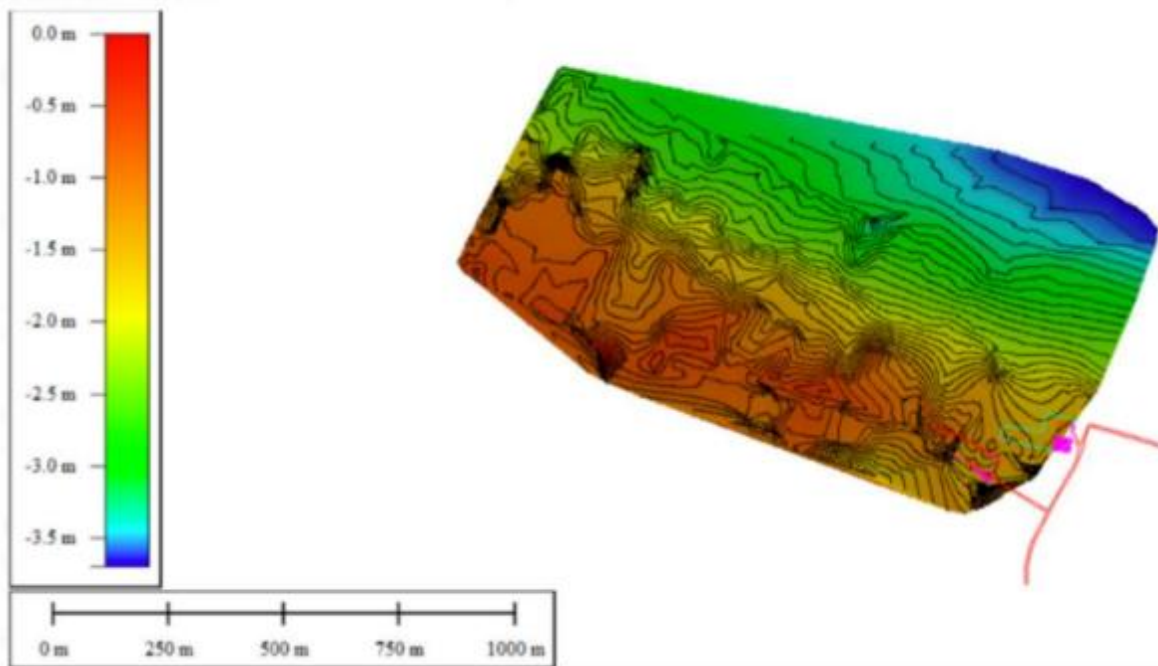


Figure 5-21. Snapshot of Situation and Bathymetry Measurement Gridding Results (2)

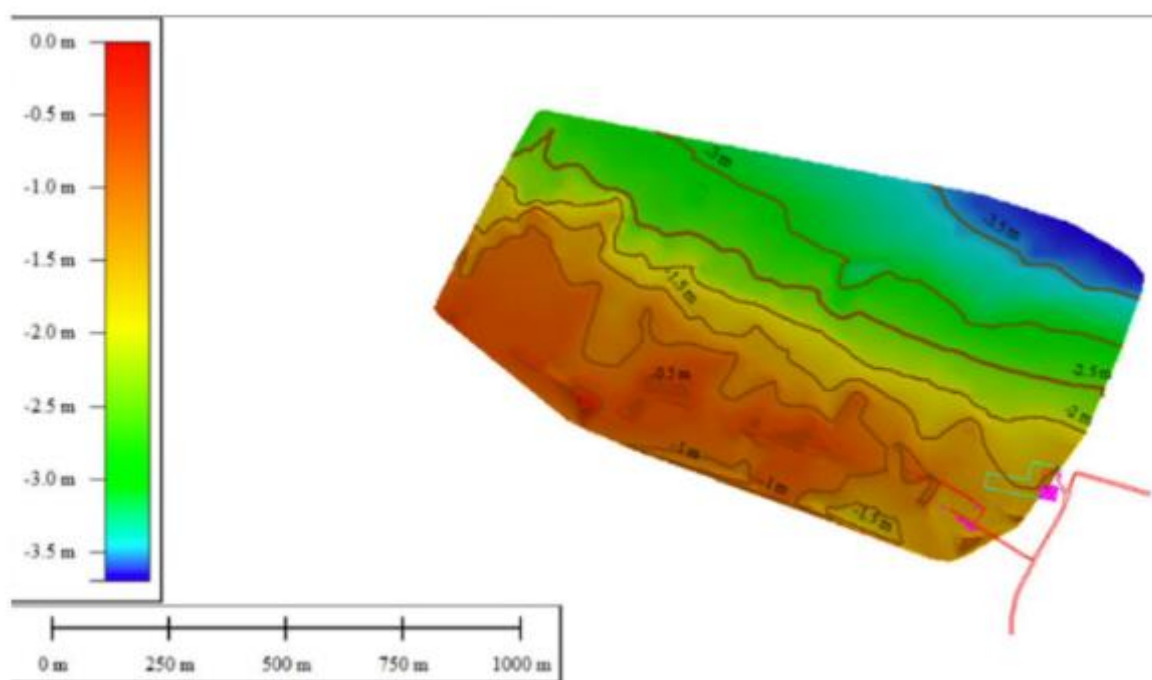


Figure 5-22. Snapshot of Situation and Bathymetry Measurement Gridding Results (3)

### 5.1.10 Hydro-Oceanographic Studies

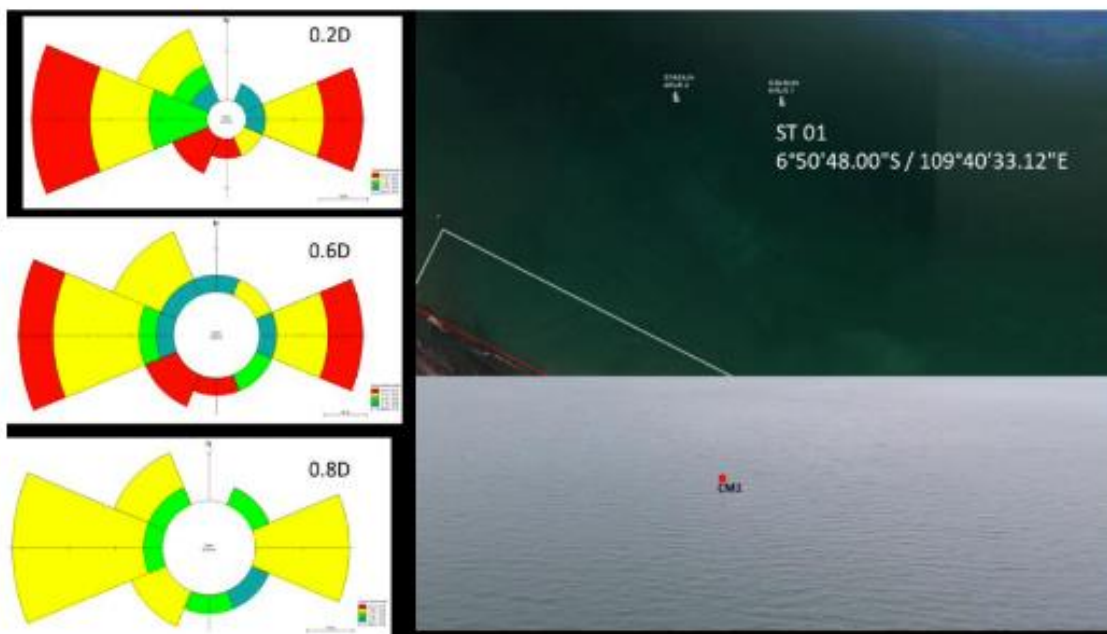
Current measurement surveys are carried out to identify the current speed of the conditions during the survey and identify the type of surface base material. This hydro-oceanographic survey activity is to support the Detail Engineering Design work which is the first piece of work to be done. However, field implementation has been adapted to the stages of work that must be carried out at PIM Pekalongan.

#### a) Station 1 Current Measurement

**The results of current measurements at station 1 are shown in Table 5-5.**

**Table 5-6. Current Measurement Results at Station 1**

No	Date	Time	Data Pengamatan							Konversi Kecepatan						
			Kedalaman							Pasut (m)	0.2D		0.6D		0.8D	
			0.2	Arah	0.6	Arah	0.8	Arah	Arah		(m/s)	Dir (deg)	(m/s)	Dir (deg)	(m/s)	Dir (deg)
1	5/15/2022	16:00	13	270	15	270	16	270	1.17	0.35471	270	0.40805	270	0.43472	270	
2	5/15/2022	17:00	14	270	14	270	15	270	1.18	0.38138	270	0.38138	270	0.43472	270	
3	5/15/2022	18:00	14	320	14	320	14	320	1.19	0.38138	320	0.38138	320	0.38138	320	
4	5/15/2022	19:00	11	320	13	320	13	320	1.09	0.30137	320	0.35471	320	0.35471	320	
5	5/15/2022	20:00	14	290	14	290	16	290	1.06	0.38138	290	0.38138	290	0.43472	290	
6	5/15/2022	21:00	12	290	15	290	15	290	0.94	0.37804	290	0.40805	290	0.40805	290	
7	5/15/2022	22:00	6	340	9	340	9	340	0.85	0.16802	340	0.24803	340	0.24803	340	
8	5/15/2022	23:00	9	320	9	320	9	320	0.78	0.24803	320	0.24803	320	0.24803	320	
9	5/16/2022	0:00	8	40	13	40	13	40	0.51	0.27136	40	0.35471	40	0.35471	40	
10	5/16/2022	1:00	7	90	8	90	8	90	0.51	0.13469	90	0.22136	90	0.22136	90	
11	5/16/2022	2:00	14	90	14	90	14	90	0.62	0.38138	90	0.38138	90	0.38138	90	
12	5/16/2022	3:00	13	90	15	90	15	90	0.63	0.35471	90	0.40805	90	0.40805	90	
13	5/16/2022	4:00	15	90	16	90	15	90	0.78	0.40805	90	0.43472	90	0.40805	90	
14	5/16/2022	5:00	16	90	15	90	16	90	0.96	0.43472	90	0.40805	90	0.43472	90	
15	5/16/2022	6:00	15	120	10	120	10	120	0.96	0.40805	120	0.2747	120	0.2747	120	
16	5/16/2022	7:00	16	190	16	190	13	190	0.98	0.43472	190	0.43472	190	0.35471	190	
17	5/16/2022	8:00	17	80	17	80	14	80	0.92	0.46139	80	0.46139	80	0.38138	80	
18	5/16/2022	9:00	17	270	17	270	15	270	0.97	0.46139	270	0.46139	270	0.40805	270	
19	5/16/2022	10:00	13	310	14	310	14	310	0.99	0.35471	310	0.38138	310	0.38138	310	
20	5/16/2022	11:00	11	290	9	290	9	290	0.95	0.30137	290	0.24803	290	0.24803	290	
21	5/16/2022	12:00	10	280	12	280	12	280	0.89	0.2747	280	0.32804	280	0.32804	280	
22	5/16/2022	13:00	16	270	14	270	14	270	0.99	0.43472	270	0.38138	270	0.38138	270	
23	5/16/2022	14:00	16	270	16	270	14	270	1.07	0.43472	270	0.43472	270	0.38138	270	
24	5/16/2022	15:00	16	220	16	220	15	220	1.12	0.43472	220	0.43472	220	0.40805	220	
25	5/16/2022	16:00	17	220	17	220	16	220	1.16	0.46139	220	0.46139	220	0.43472	220	
									Max	0.46139	Max	0.46139	Max	0.43472		
									Ave	0.16802	Ave	0.22136	Ave	0.22136		



The results of the current processing and current rose plotting above at station 1 in the survey area show that the current speed ranges from 0.16 to 0.46 m/s with the dominant current direction from east to west and vice versa.

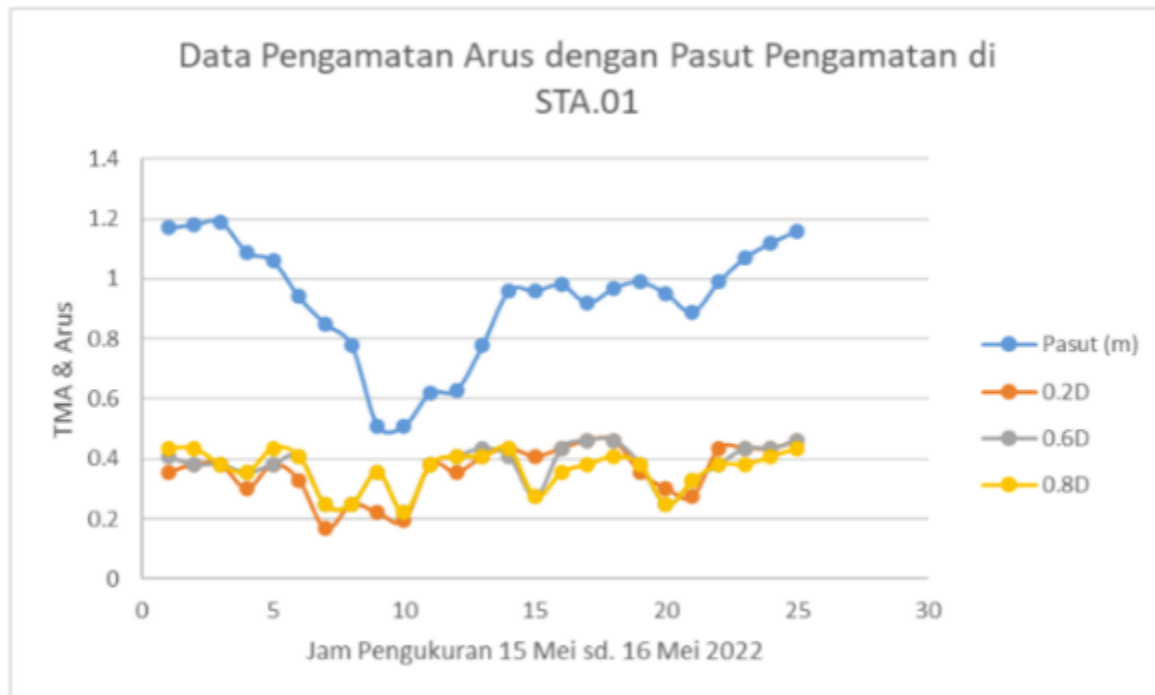


Figure 5-23. Current Observation Data with Tide Observations in STA.01

b) Station 2 Current Measurement

The results of current measurements at station 2 are shown in Table 5-6.

Table 5-7. Current Measurement Results at Station 2



Data Pengamatan									Konversi Kecepatan						
No	Date	Time	Kedalaman						Pasut (m)	0.2D		0.6D		0.8D	
			0.2	Arah	0.6	Arah	0.8	Arah		(m/s)	Dir (deg)	(m/s)	Dir (deg)	(m/s)	Dir (deg)
1	5/15/2022	16:00	15	270	14	270	15	270	1.17	0.41	270.00	0.38	270.00	0.41	270.00
2	5/15/2022	17:00	15	270	14	270	14	270	1.18	0.41	270.00	0.38	270.00	0.38	270.00
3	5/15/2022	18:00	14	320	14	320	14	320	1.19	0.38	320.00	0.38	320.00	0.38	320.00
4	5/15/2022	19:00	12	290	12	320	15	320	1.09	0.33	290.00	0.33	320.00	0.41	320.00
5	5/15/2022	20:00	13	270	12	290	14	290	1.06	0.35	270.00	0.33	290.00	0.38	290.00
6	5/15/2022	21:00	12	290	12	290	15	290	0.94	0.33	290.00	0.33	290.00	0.41	290.00
7	5/15/2022	22:00	5	340	6	340	7	340	0.85	0.14	340.00	0.17	340.00	0.19	340.00
8	5/15/2022	23:00	8	30	7	320	7	320	0.78	0.22	30.00	0.19	320.00	0.19	320.00
9	5/16/2022	0:00	7	80	7	40	8	40	0.51	0.19	80.00	0.19	40.00	0.22	40.00
10	5/16/2022	1:00	7	90	8	90	8	90	0.51	0.19	90.00	0.22	90.00	0.22	90.00
11	5/16/2022	2:00	11	90	13	90	14	90	0.62	0.30	90.00	0.35	90.00	0.38	90.00
12	5/16/2022	3:00	12	90	14	90	14	90	0.63	0.33	90.00	0.38	90.00	0.38	90.00
13	5/16/2022	4:00	14	90	15	90	14	90	0.78	0.38	90.00	0.41	90.00	0.38	90.00
14	5/16/2022	5:00	14	120	15	90	15	90	0.96	0.38	120.00	0.41	90.00	0.41	90.00
15	5/16/2022	6:00	15	180	14	120	13	120	0.96	0.41	180.00	0.38	120.00	0.35	120.00
16	5/16/2022	7:00	15	80	15	190	13	190	0.98	0.41	80.00	0.41	190.00	0.35	190.00
17	5/16/2022	8:00	16	270	16	80	14	80	0.92	0.43	270.00	0.43	80.00	0.38	80.00
18	5/16/2022	9:00	16	310	16	270	14	270	0.97	0.43	310.00	0.43	270.00	0.38	270.00
19	5/16/2022	10:00	12	290	14	310	14	310	0.99	0.33	290.00	0.38	310.00	0.38	310.00
20	5/16/2022	11:00	11	280	9	290	9	290	0.95	0.30	280.00	0.25	290.00	0.25	290.00
21	5/16/2022	12:00	11	270	12	280	8	280	0.89	0.30	270.00	0.33	280.00	0.22	280.00
22	5/16/2022	13:00	13	270	14	270	12	270	0.99	0.35	270.00	0.38	270.00	0.33	270.00
23	5/16/2022	14:00	14	205	14	270	12	270	1.07	0.38	205.00	0.38	270.00	0.33	270.00
24	5/16/2022	15:00	14	220	14	220	14	220	1.12	0.38	220.00	0.38	220.00	0.38	220.00
25	5/16/2022	16:00	15	221	15	220	14	220	1.16	0.41	221.00	0.41	220.00	0.38	220.00
									Max	0.43472	Max	0.43472	Max	0.40805	
									Ave	0.14135	Ave	0.16802	Ave	0.19469	

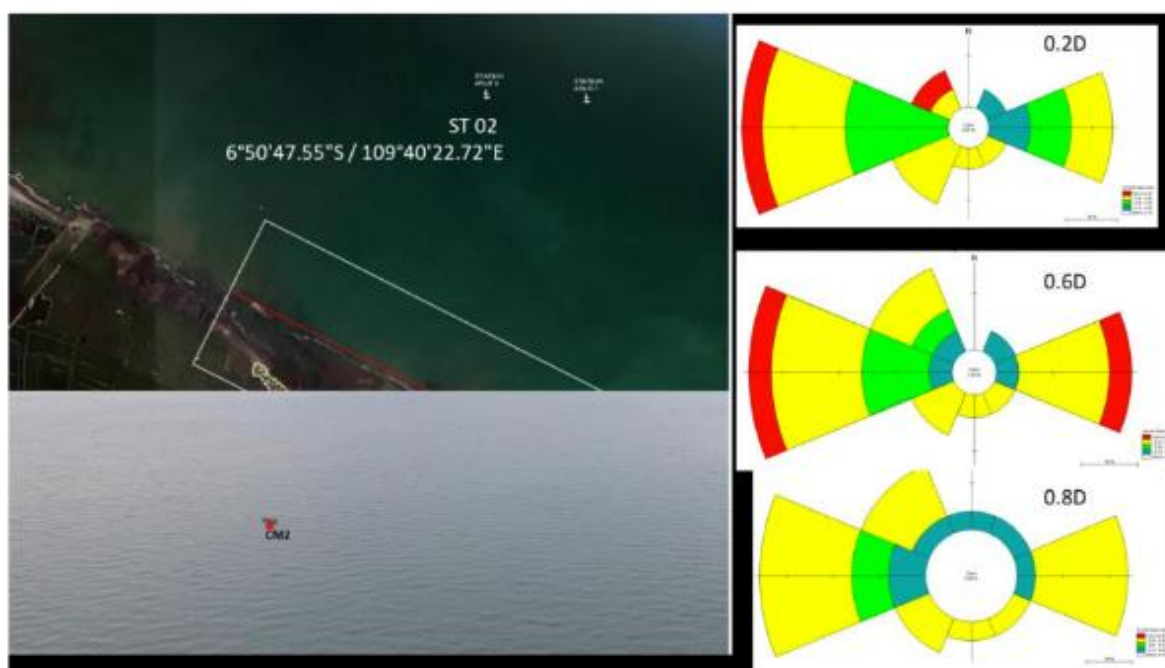


Figure 5-24. Current Direction and Speed at Station 2

The results of the current processing and current rose plotting above at station 2 in the survey area show that the current speed ranges from 0.14 to 0.43 m/s with the dominant current direction from east to west and vice versa.



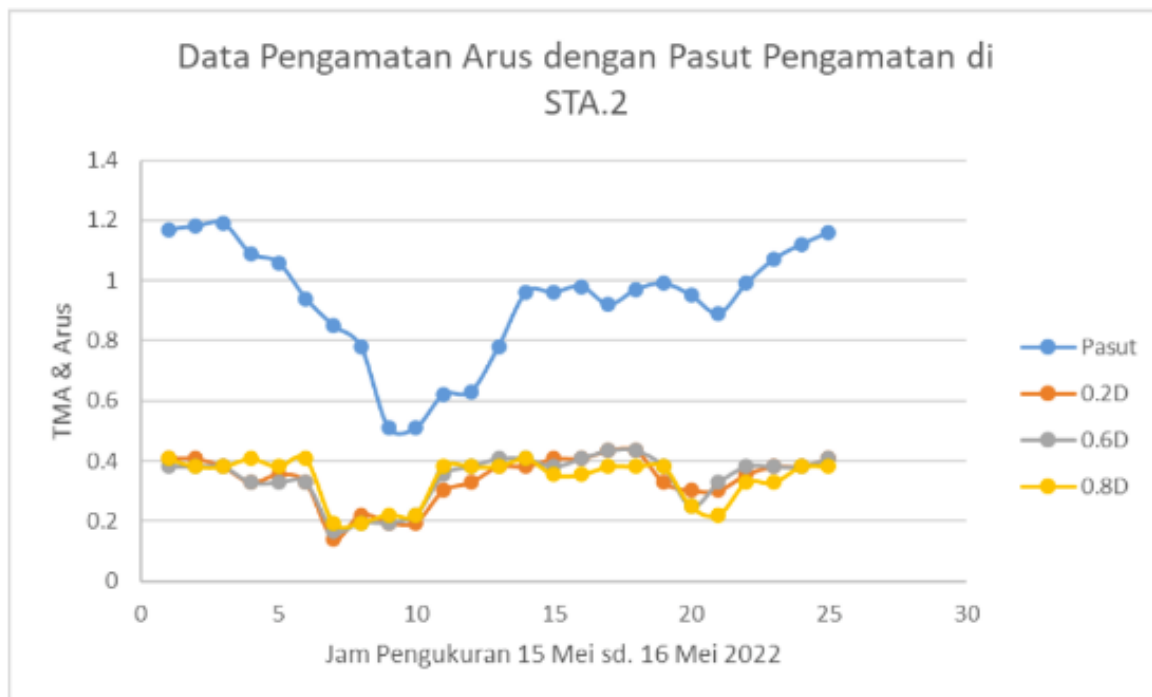


Figure 5-25. Current Observation Data with Tide Observations in STA.02

### 5.1.11 Geotechnic Analysis

In order to begin constructing the structure, it is necessary to find out the subgrade layer. The subsoil layer is original soil that is formed naturally. The carrying capacity of subgrade soil is not evenly distributed in areas with very different types of soil layers.

Different soil layers will have an effect on differential settlement in construction, so it is necessary to know the soil layers carefully and take action to repair the soil layers. Careful soil investigations can be carried out using a handheld auger tool. Hand boring is the simplest and most economical drilling method for the shallow depth. This is done by pressing and rotating the auger into the subgrade. The drilling capabilities of augers are limited and are only suitable for shallow depths and are not suitable for drilling below the groundwater level. The advantages of auger drilling are: simple, easy to operate and resulting in minimal soil disturbance.

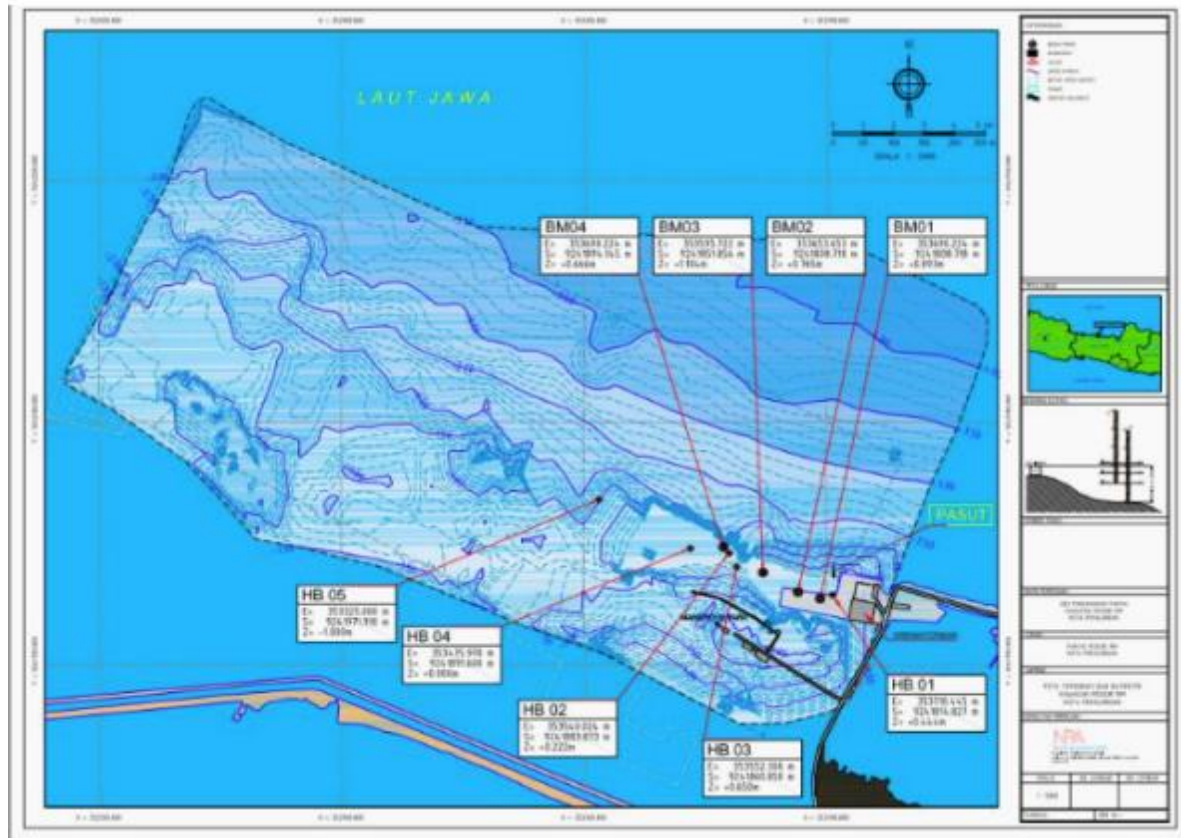


Figure 5-26. Coordinates of the location where hand boring was carried out

Table 5-8. Atterberg Limits test results HB 03

Project		Rencana Bangunan	
Job No.		Date	4-Aug-2022
Tested By	Hans	Checked By	Whd

### ATTERBERG LIMITS

ASTM D 4318

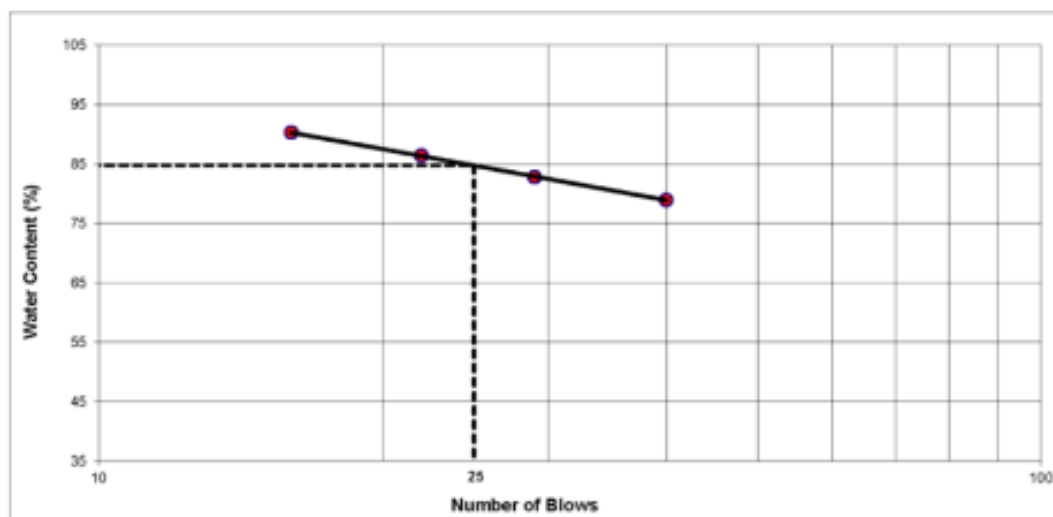
Location : Pekalongan - Jawa Tengah  
 Bore Hole No. : HB - 3  
 Sample Depth : 6.00 - 6.50 m

Sample No. : 1  
 Sample Type : UDS  
 Soil Description : Silty CLAY

#### LIQUID LIMIT

No. of Blows	40	29	22	16	PLASTIC LIMIT	
Container No.	55	37	49	43	61	67
Wt. Container + Wet Soil (g)	15.41	14.52	15.12	15.09	9.31	9.88
Wt. Container + Dry Soil (g)	10.61	9.99	10.22	10.07	8.13	8.56
Wt. Water (g)	4.80	4.53	4.90	5.02	1.18	1.32
Wt. Container (g)	4.53	4.52	4.55	4.51	4.53	4.55
Wt. Dry Soil (Ws) (g)	6.08	5.47	5.67	5.56	3.60	4.01
Water Content (w) (%)	78.95	82.82	86.42	90.29	32.78	32.92

#### FLOW CURVE



#### RESULT SUMMARY

LIQUID LIMIT	%	84.76
PLASTIC LIMIT	%	32.85
PLASTICITY INDEX	%	51.91
CLASSIFICATION		CH

Table 5-9. Atterberg Limits test results HB 04

	Project	Rencana Bangunan		
	Job No.	Date	4-Aug-2022	
	Tested By	Hans	Checked By	Whd

**ATTERBERG LIMITS**  
ASTM D 4318

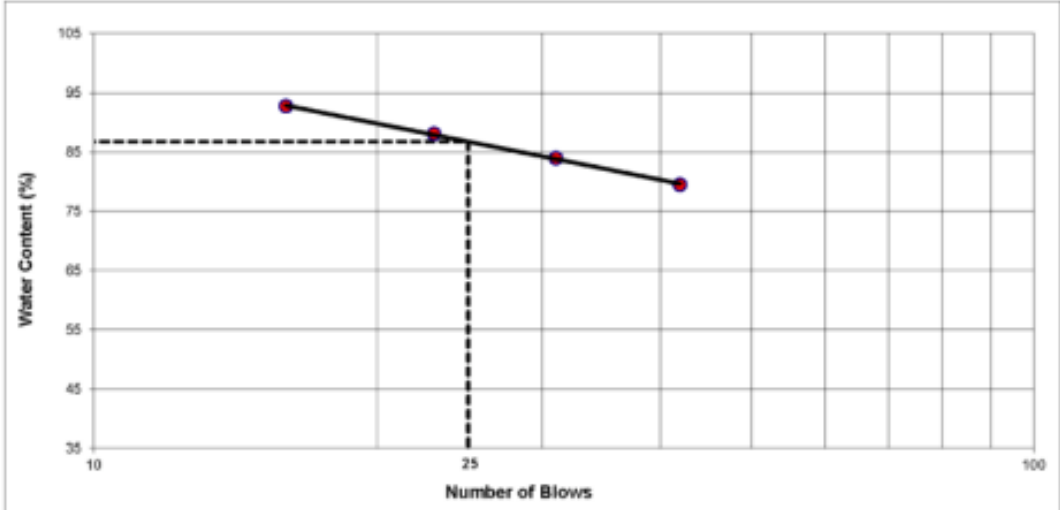
Location : Pekalongan - Jawa Tengah	Sample No. : 1
Bore Hole No. : HB - 4	Sample Type : US
Sample Depth : 6.00 - 6.50 m	Soil Description : Silty CLAY

	42	31	23	16	PLASTIC LIMIT	
No. of Blows	42	31	23	16		
Container No.	25	7	13	19	1	31
Wt. Container + Wet Soil	g 16.11	15.75	14.31	14.12	10.02	9.18
Wt. Container + Dry Soil	g 10.99	10.63	9.74	9.53	8.63	8.02
Wt. Water	g 5.12	5.12	4.57	4.59	1.39	1.17
Wt. Container	g 4.55	4.53	4.55	4.58	4.52	4.59
Wt. Dry Soil (Ws)	g 6.44	6.10	5.19	4.95	4.11	3.43
Water Content (w)	% 79.50	83.93	88.05	92.73	33.82	34.01

**FLOW CURVE**

**RESULT SUMMARY**

LIQUID LIMIT	%	86.78
PLASTIC LIMIT	%	33.92
PLASTICITY INDEX	%	52.86
CLASSIFICATION		CH

Table 5-10. Atterberg Limits test results HB 05

Project	Rencana Bangunan		
Job No.		Date	4-Aug-2022
Tested By	Hans	Checked By	Whd

### ATTEBERG LIMITS

ASTM D 4318

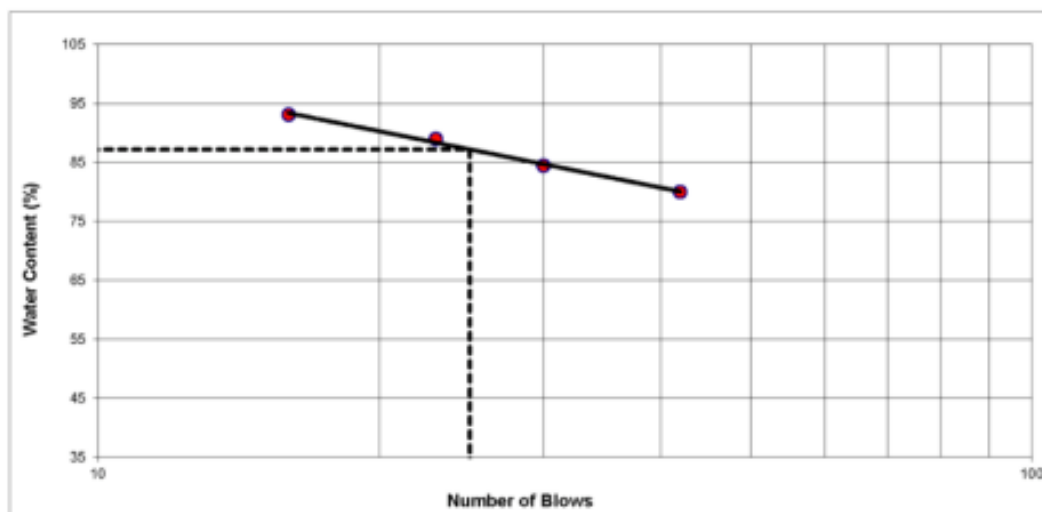
Location : Pekalongan - Jawa Tengah      Sample No. : 1  
 Bore Hole No. : HB - 5      Sample Type : UDS  
 Sample Depth : 6.00 - 6.50 m      Soil Description : Silty CLAY

#### LIQUID LIMIT

#### PLASTIC LIMIT

No. of Blows	42	30	23	16		
Container No.	85	91	73	103	79	97
Wt. Container + Wet Soil	8 16.18	8 15.66	8 14.52	8 14.10	8 9.51	8 9.30
Wt. Container + Dry Soil	8 11.02	8 10.56	8 9.85	8 9.51	8 8.25	8 8.11
Wt. Water	8 5.16	8 5.10	8 4.67	8 4.59	8 1.26	8 1.19
Wt. Container	8 4.57	8 4.52	8 4.60	8 4.58	8 4.57	8 4.59
Wt. Dry Soil (Ws)	8 6.45	8 6.04	8 5.25	8 4.93	8 3.68	8 3.52
Water Content (w)	% 80.00	% 84.44	% 88.95	% 93.10	% 34.24	% 33.81

#### FLOW CURVE



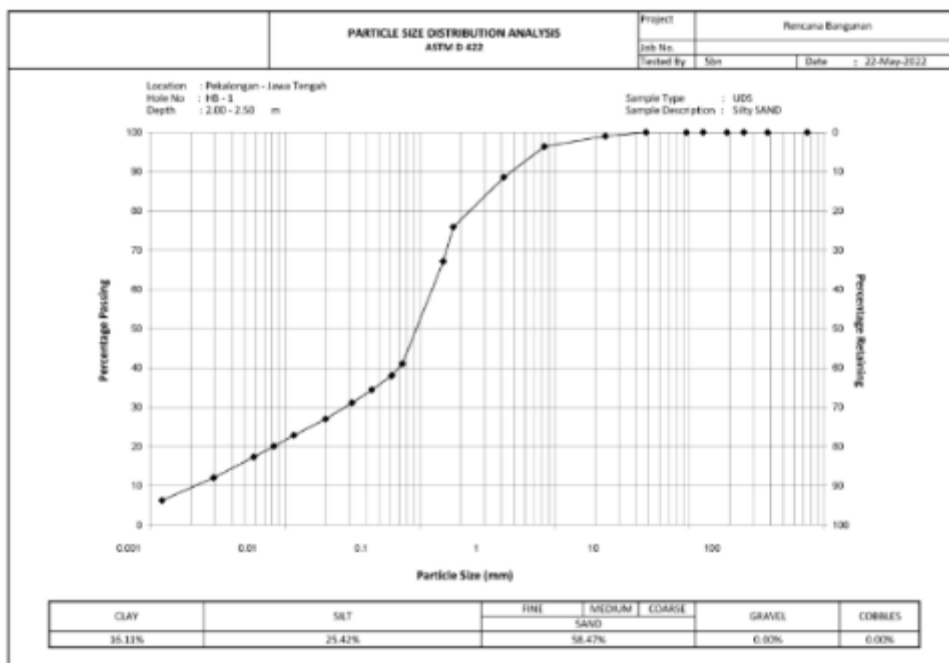
#### RESULT SUMMARY

LIQUID LIMIT	%	87.22
PLASTIC LIMIT	%	34.03
PLASTICITY INDEX	%	53.19
CLASSIFICATION		CH

### 5.1.12 Hydrometric Measurements

The results of hydrometric measurements are as shown in the following Table 5-10-Table 5-14.

**Table 5-11. HB 01 Hydrometry test results**



**Table 5-12. HB 02 Hydrometry test results**

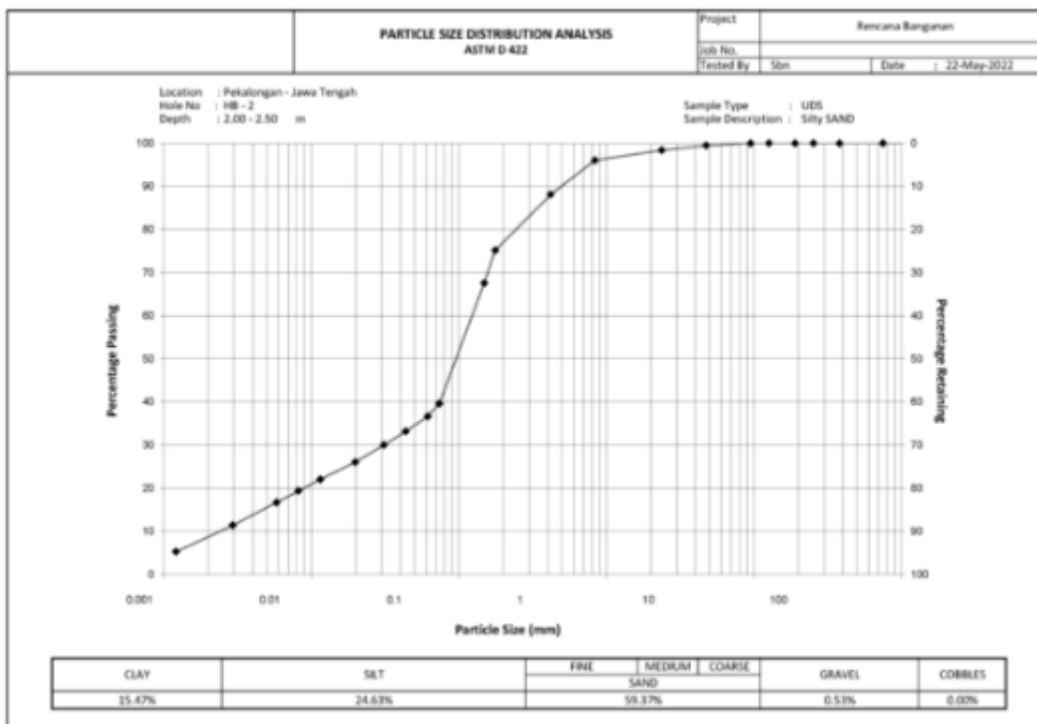




Table 5-13. HB 03 Hydrometry test results

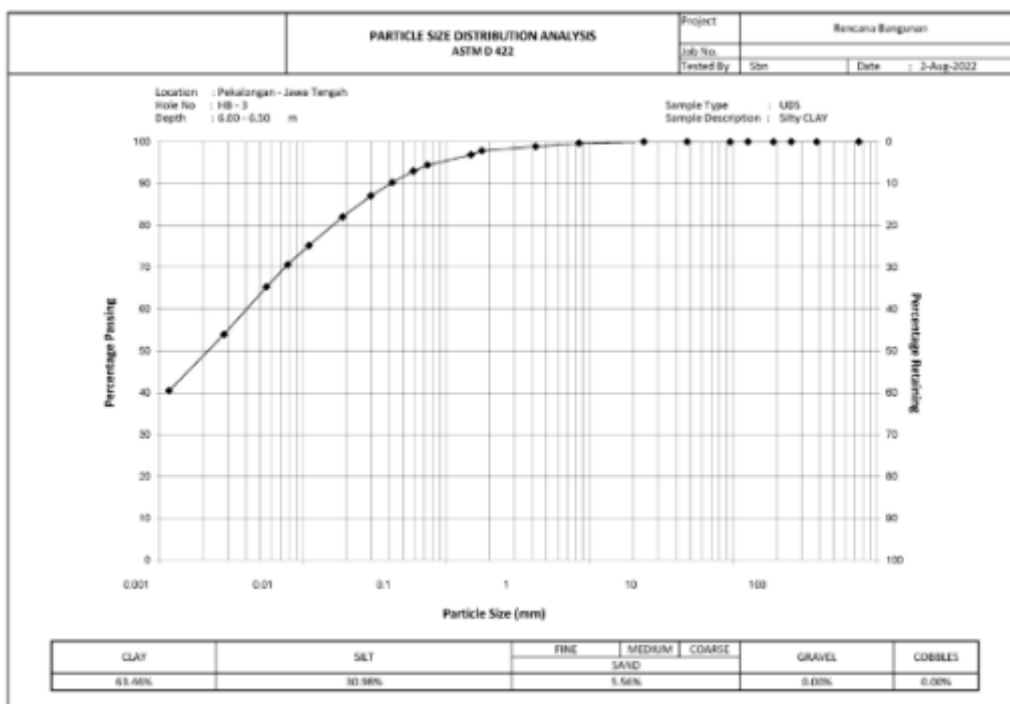


Table 5-14. HB 04 Hydrometry test results

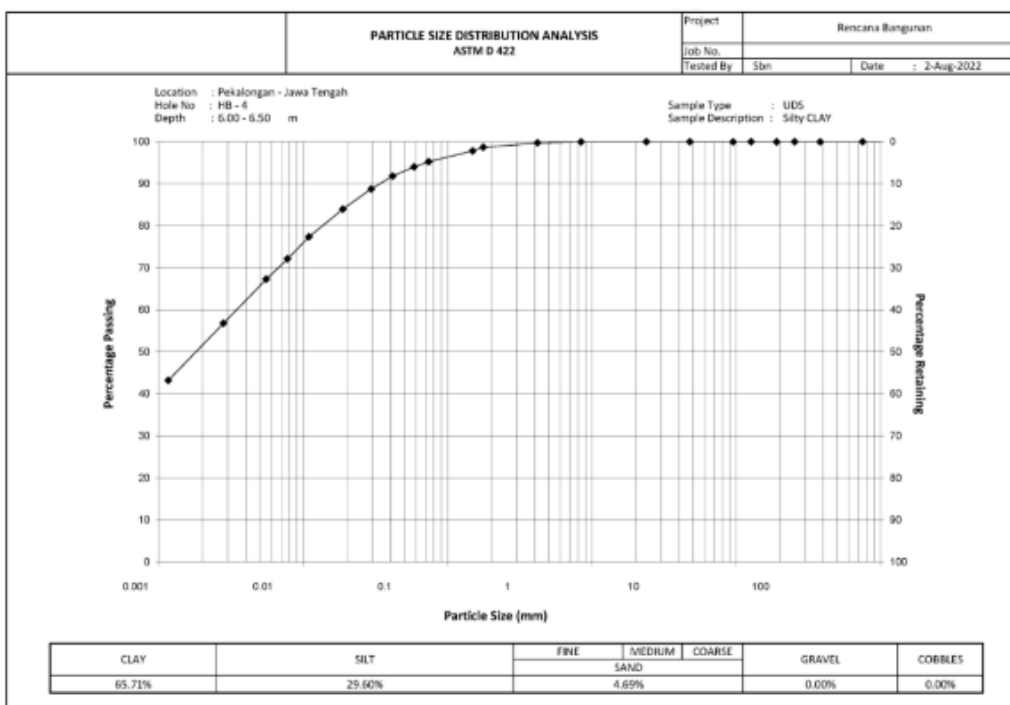
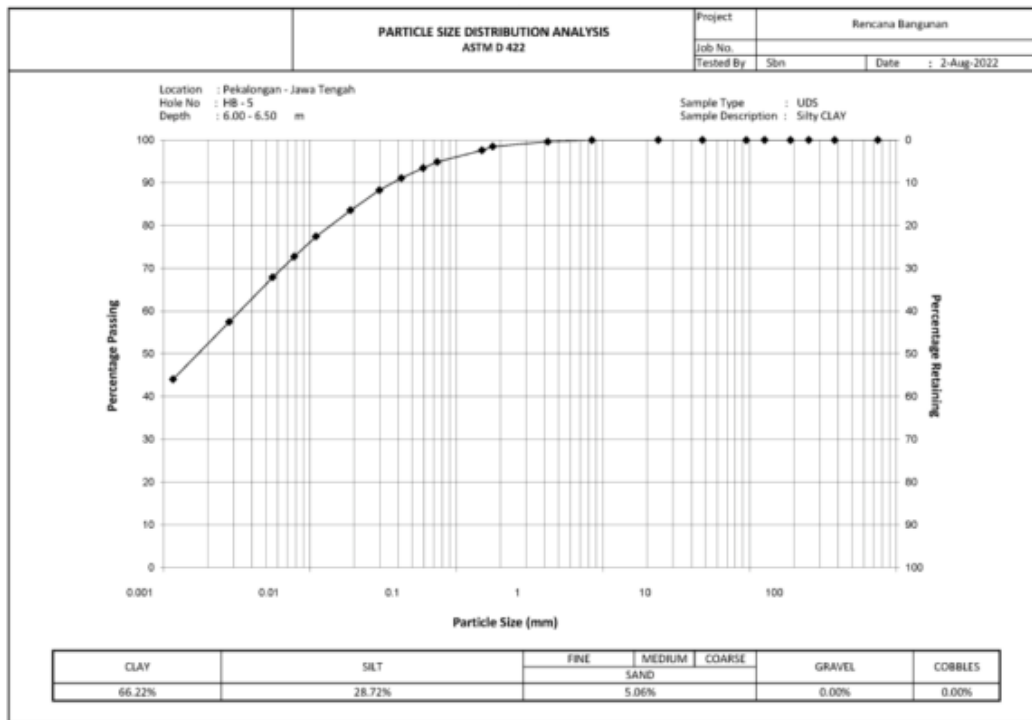


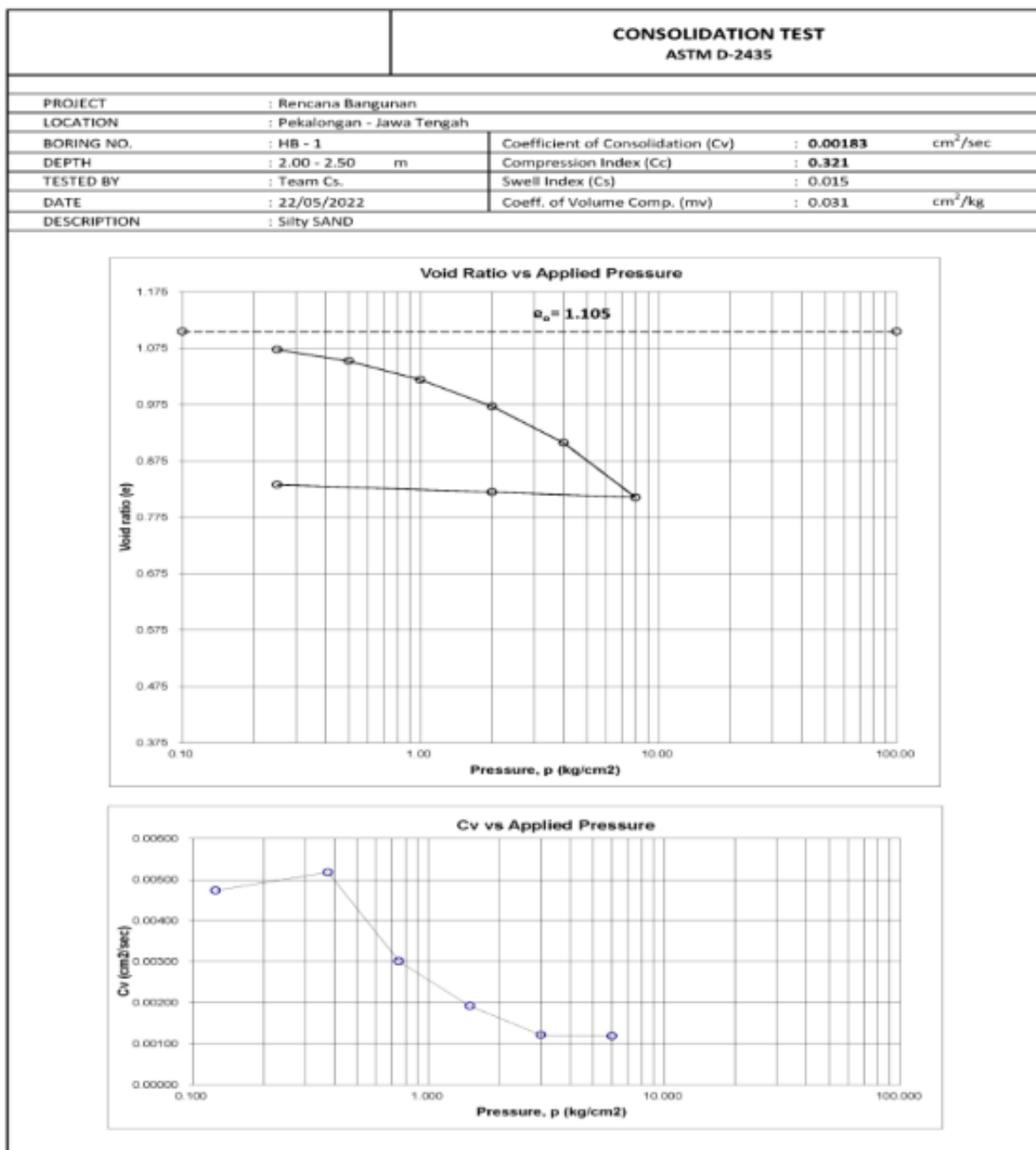
Table 5-15. HB 05 Hydrometry test results



### 5.1.13 Consolidation Test

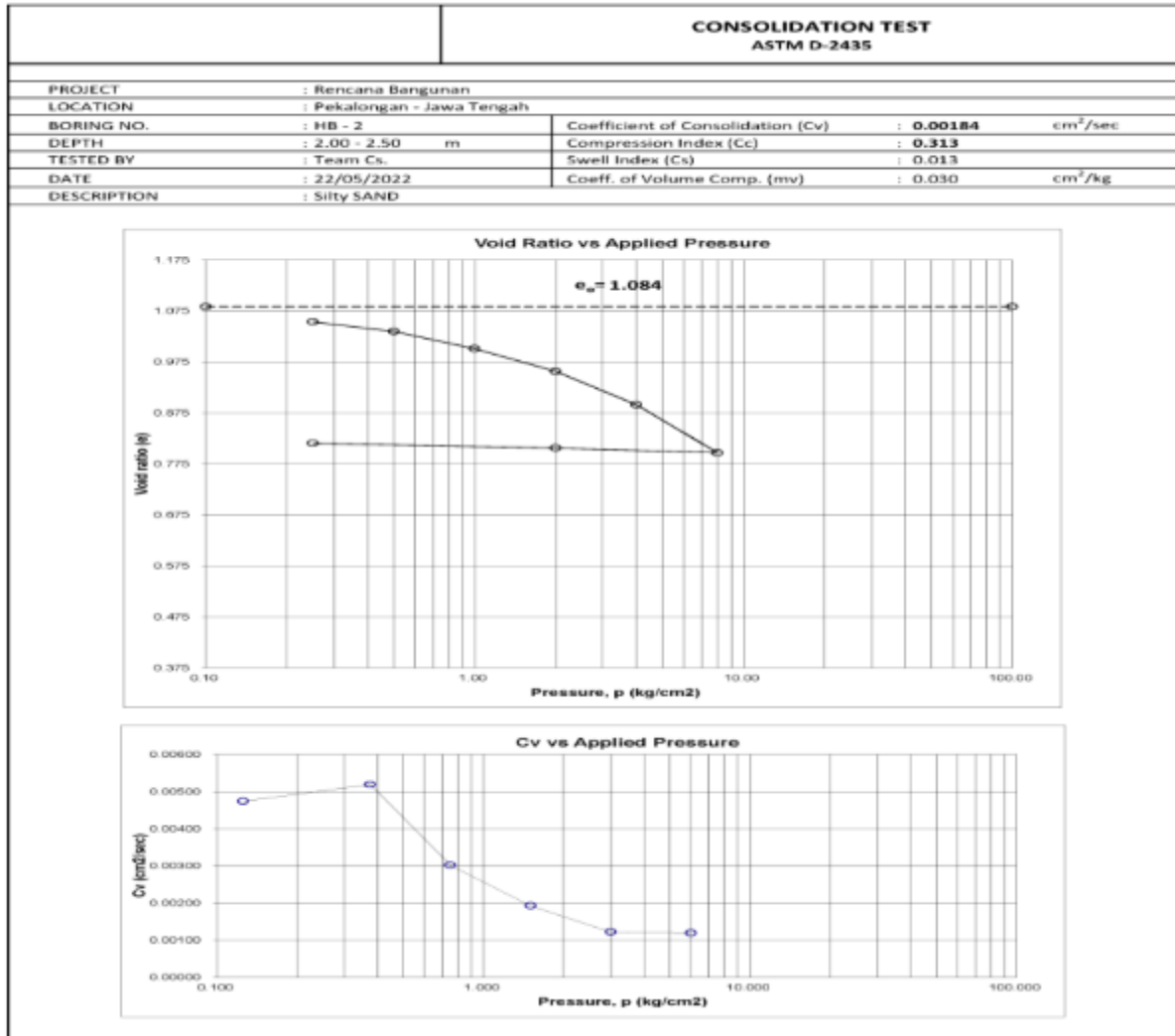
The measurement results of the HB 01 consolidation are presented in the following Table 5-16:

Table 5-16. HB 01 Consolidation Test Results



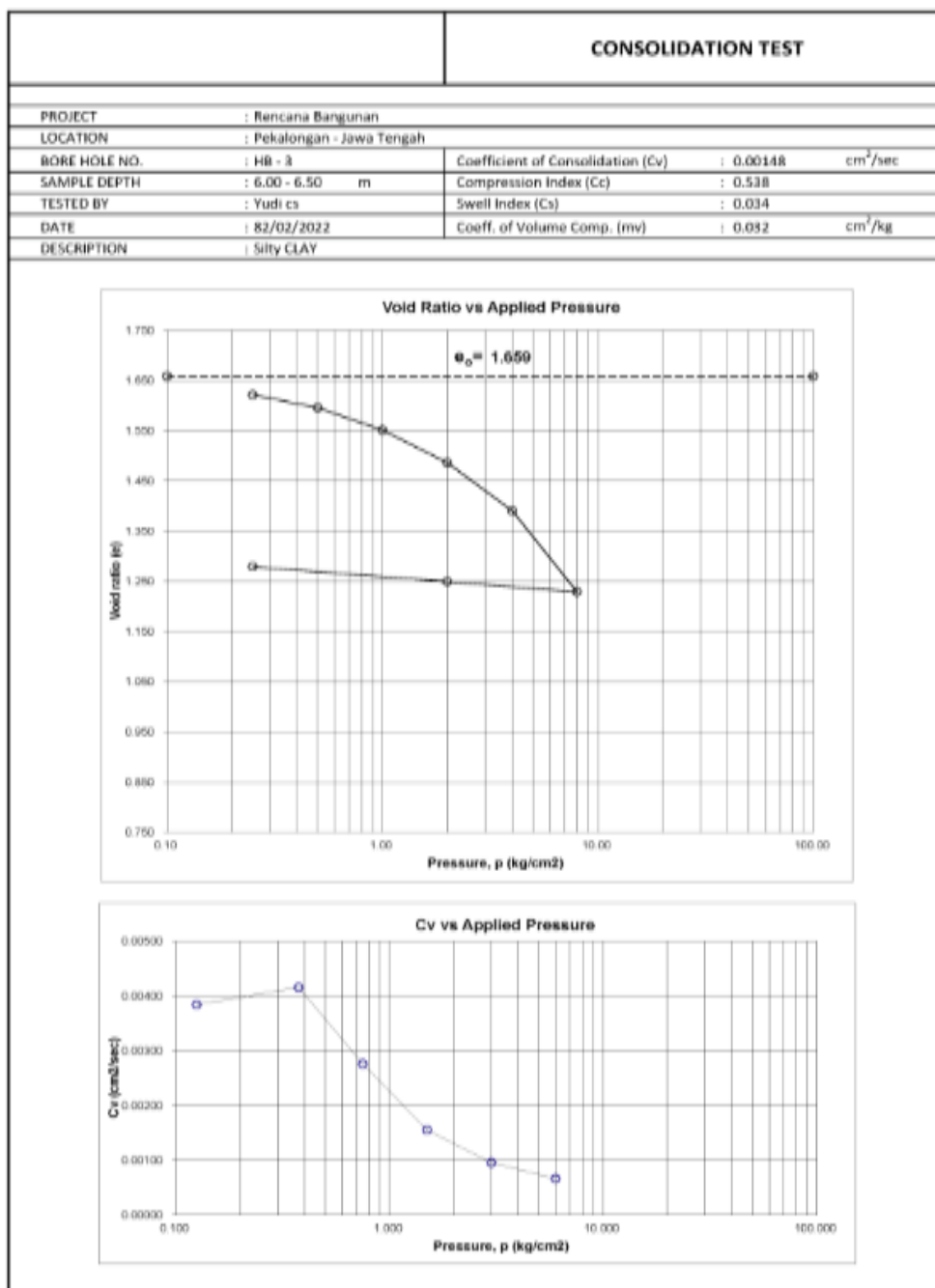
The measurement results of the HB 02 consolidation are presented in the following Table 5-17:

**Table 5-17. HB 02 Consolidation Test Results**



The measurement results of the HB 03 consolidation are presented in the following Table 5-18.

**Table 5-18. HB 03 Consolidation Test Results**

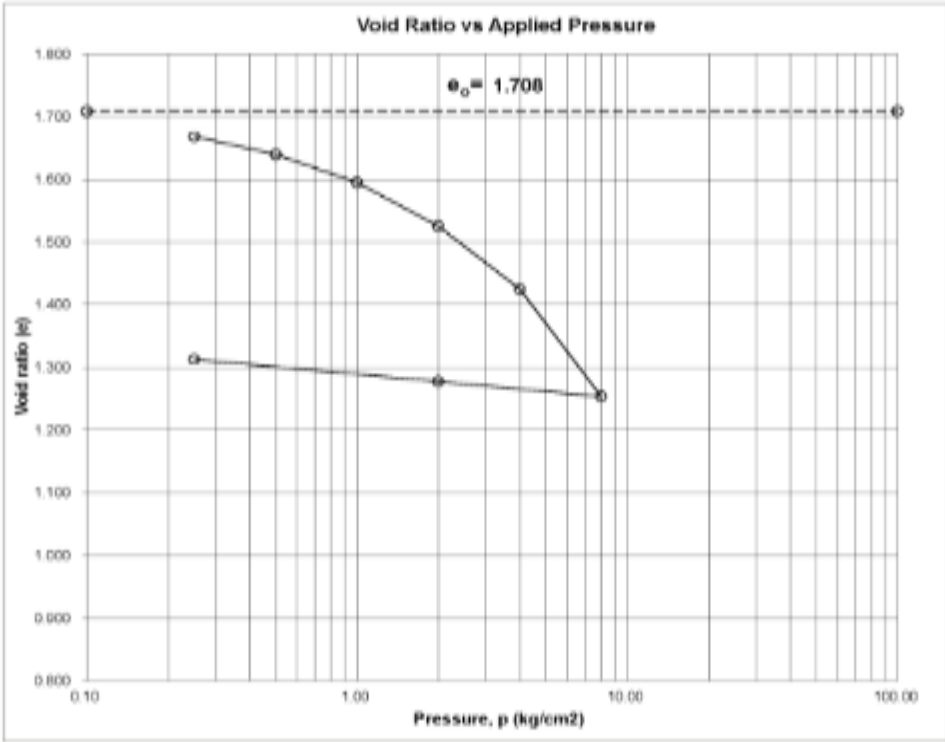


The measurement results of the HB 04 consolidation are presented in the following Table 5-19:

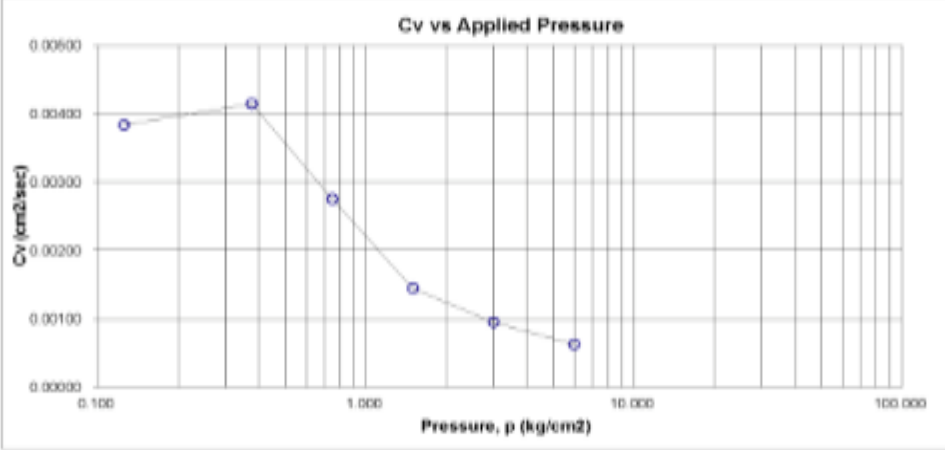
**Table 5-19. HB 04 Consolidation Test Results**

		<b>CONSOLIDATION TEST</b>	
PROJECT	: Rencana Bangunan		
LOCATION	: Pekalongan - Jawa Tengah		
BORE HOLE NO.	: HB - 4	Coefficient of Consolidation (Cv)	: 0.00144 cm <sup>2</sup> /sec
SAMPLE DEPTH	: 6.00 - 6.50 m	Compression Index (Cc)	: 0.569
TESTED BY	: Yudi cs	Swell Index (Cs)	: 0.039
DATE	: 02/02/2022	Coeff. of Volume Comp. (mv)	: 0.033 cm <sup>3</sup> /kg
DESCRIPTION	: Silty CLAY		



**Void Ratio vs Applied Pressure**



**Cv vs Applied Pressure**

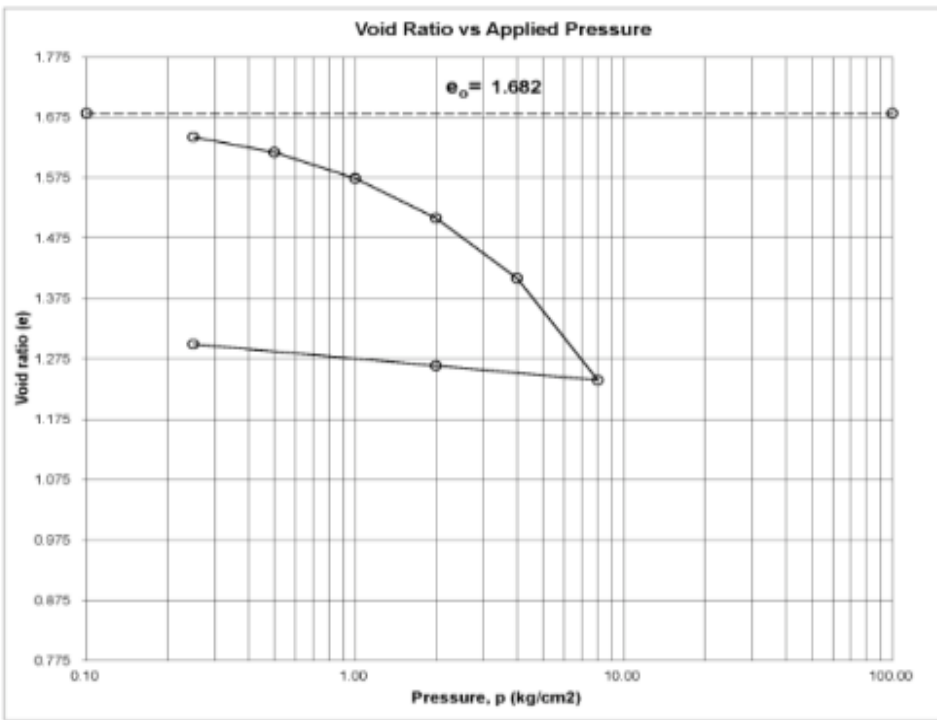
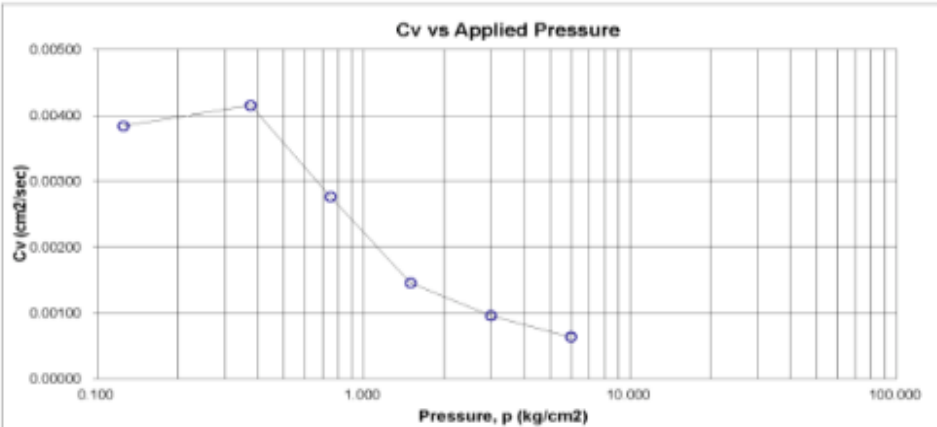


The measurement results of the HB 05 consolidation are presented in the following Table 5-20:

Table 5-20. HB 05 Consolidation Test Results

		<b>CONSOLIDATION TEST</b>	
PROJECT	: Rencana Bangunan		
LOCATION	: Pekalongan - Jawa Tengah		
BORE HOLE NO.	: HB - 5	Coefficient of Consolidation (Cv)	: 0.00145 cm <sup>2</sup> /sec
SAMPLE DEPTH	: 6.00 - 6.50 m	Compression Index (Cc)	: 0.560
TESTED BY	: Yudi cs	Swell Index (Cs)	: 0.039
DATE	: 82/02/2022	Coeff. of Volume Comp. (mv)	: 0.032 cm <sup>2</sup> /kg
DESCRIPTION	: Silty CLAY		

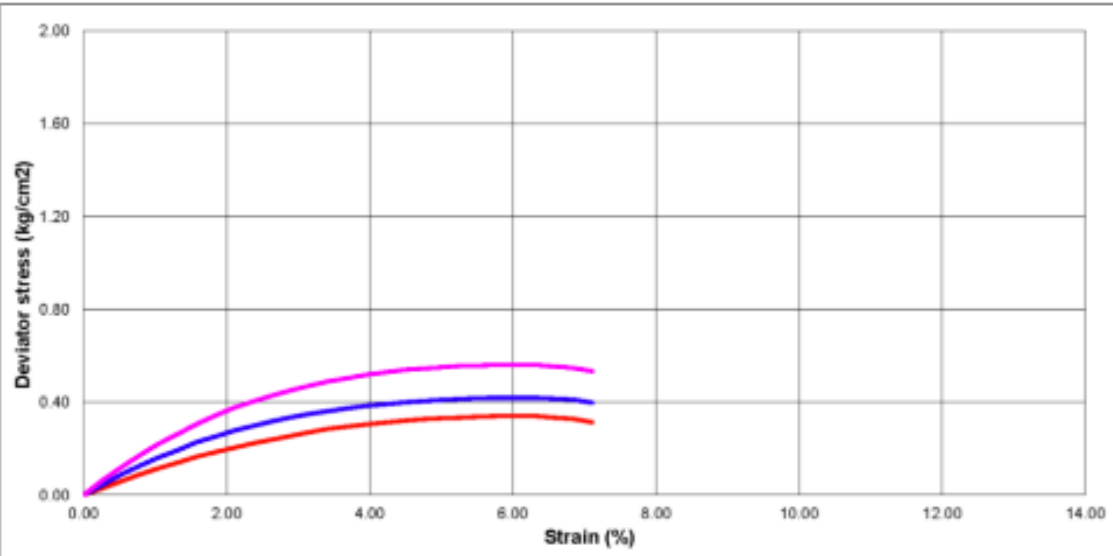
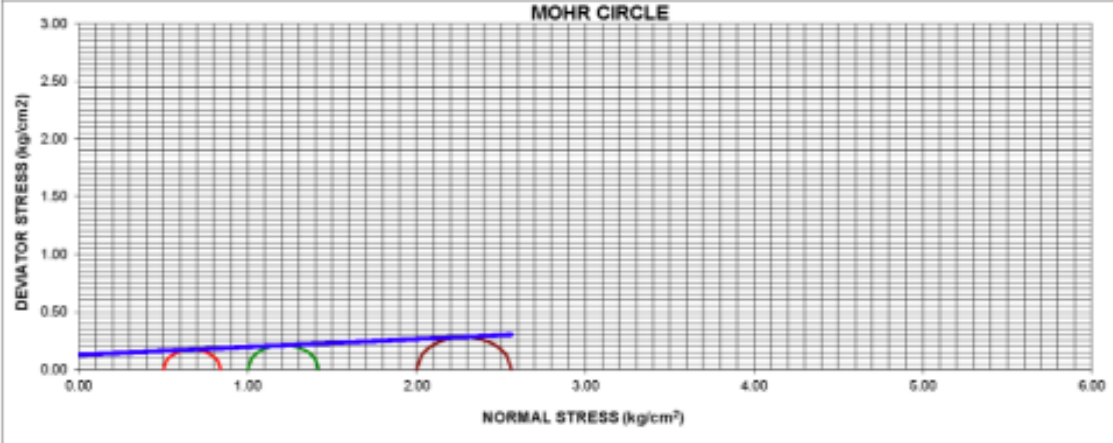
### 5.1.14 Triaxial Test

The HB 03 triaxial test results are presented in the following table.

Table 5-21 HB 03 Triaxial Test Results

				TRIAXIAL COMPRESSION TEST (UU)		
Rencana Bangunan						
Location	Pekalongan - Jawa Tengah			Date Of Test	5-Aug-2022	
Bore Hole No	HB - 3			Tested by	Adi	
Sample Type	UDS			Checked by	Whd	
Sample Depth	6.00 - 6.50 m					
SPECIMEN DATA				ANGEL OF INTERNAL FRICTION		
Number Of Specimen		1	2	3	$\phi = 4.111^\circ$	
Specimen Diameter	cm	3.800	3.800	3.800	$\phi' = \quad^\circ$	
Specimen Height	cm	7.600	7.600	7.600		
Specimen Area	cm <sup>2</sup>	11.341	11.341	11.341		
Dial Gauge Subdivision	mm/div	0.001	0.001	0.001		
Load Rate	kg/min	0.760	0.760	0.760		
Load Ring Constant	kg/div	0.130	0.130	0.130		
Lateral Pressure	kg/cm <sup>2</sup>	0.500	1.000	2.000		
Maximum Deviator Stress	kg/cm <sup>2</sup>	0.340	0.420	0.561		
Maximum Value Of Vertical Stress	kg/cm <sup>2</sup>	0.840	1.420	2.561		
				COHESION		
				C	= 0.126 kg/cm <sup>2</sup>	
				C'	= kg/cm <sup>2</sup>	

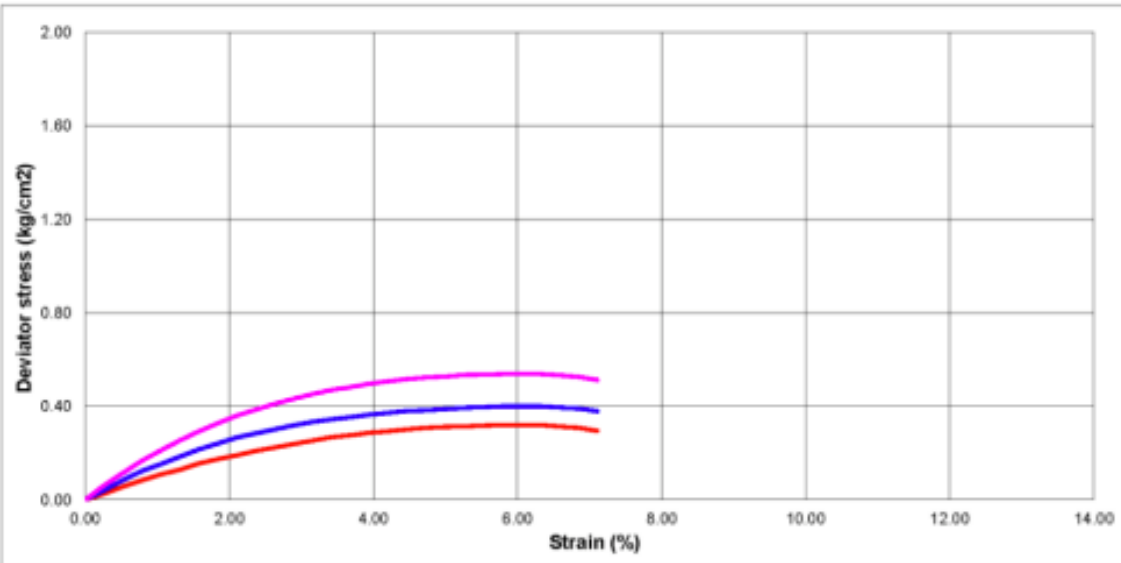



The HB 04 triaxial test results are presented in the following table.

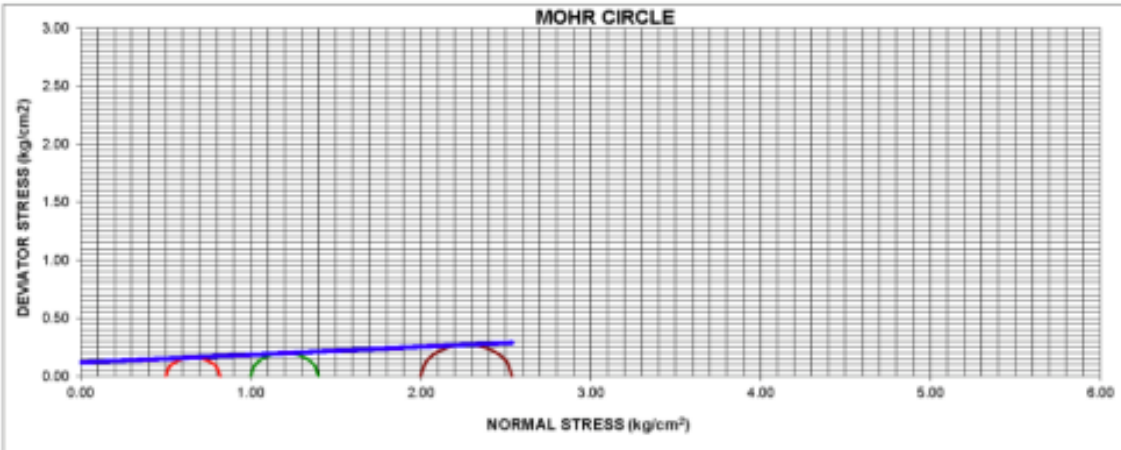
Table 5-22. HB 04 Triaxial Test Results

				TRIAXIAL COMPRESSION TEST (UU)	
Rencana Bangunan					
Location	Pekalongan - Jawa Tengah			Date Of Test	5-Aug-2022
Bore Hole No	HB - 4			Tested by	Adi
Sample Type	UDS			Checked by	Whd
Sample Depth	6.00 - 6.50 m				
SPECIMEN DATA				ANGEL OF INTERNAL FRICTION	
Number Of Specimen		1	2	3	$\phi$ = 4.058 °
Specimen Diameter	cm	3.800	3.800	3.800	$\phi'$ = °
Specimen Height	cm	7.600	7.600	7.600	
Specimen Area	cm <sup>2</sup>	11.341	11.341	11.341	
Dial Gauge Subdivision	mm/div	0.001	0.001	0.001	
Load Rate	kg/min	0.760	0.760	0.760	
Load Ring Constant	kg/div	0.130	0.130	0.130	
Lateral Pressure	kg/cm <sup>2</sup>	0.500	1.000	2.000	
Maximum Deviator Stress	kg/cm <sup>2</sup>	0.320	0.400	0.538	
Maximum Value Of Vertical Stress	kg/cm <sup>2</sup>	0.820	1.400	2.538	
					<b>C</b> = 0.117 kg/cm <sup>2</sup>
					<b>C'</b> = kg/cm <sup>2</sup>

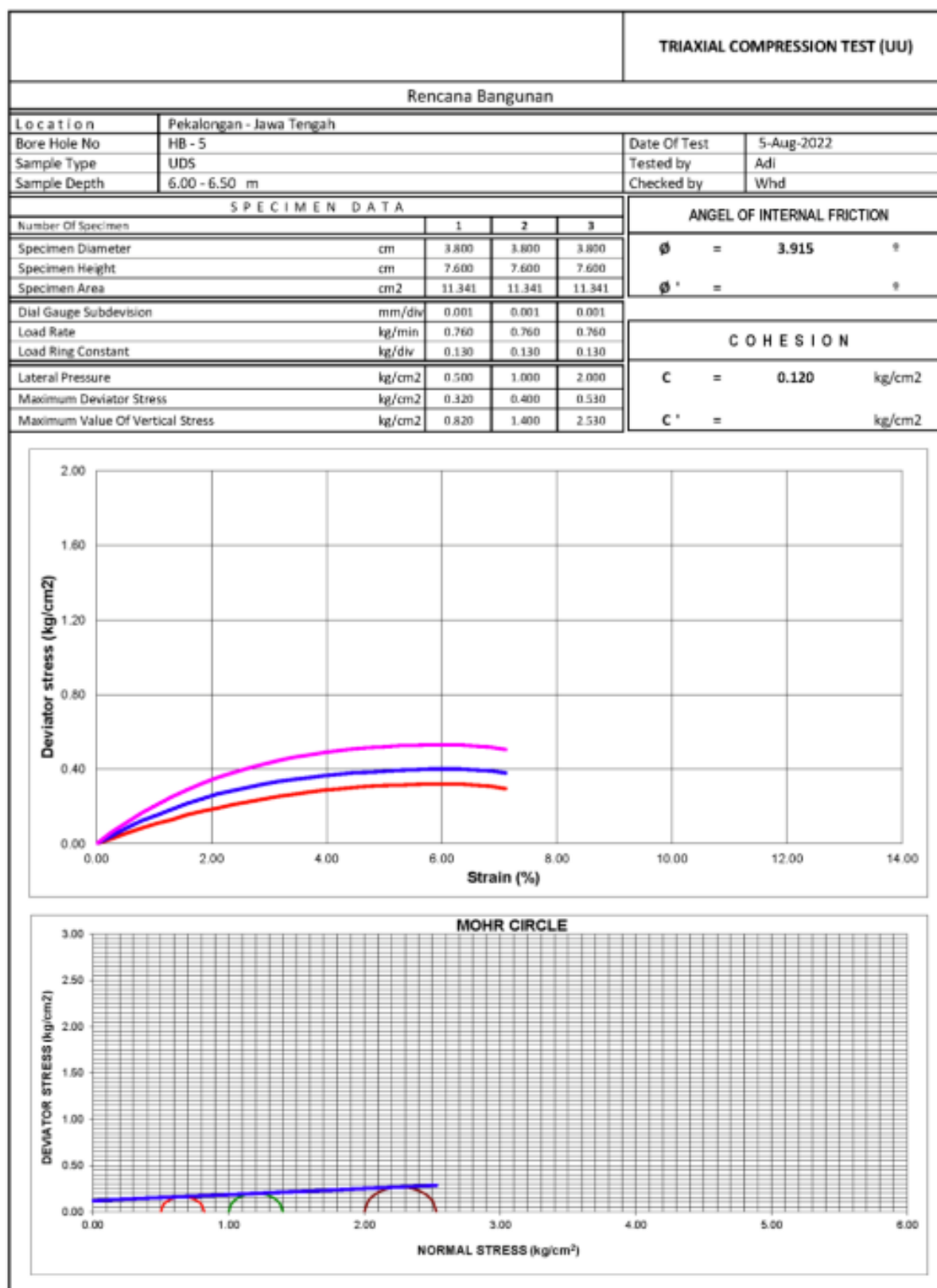


**MOHR CIRCLE**



The HB 05 triaxial test results are presented in the following table.

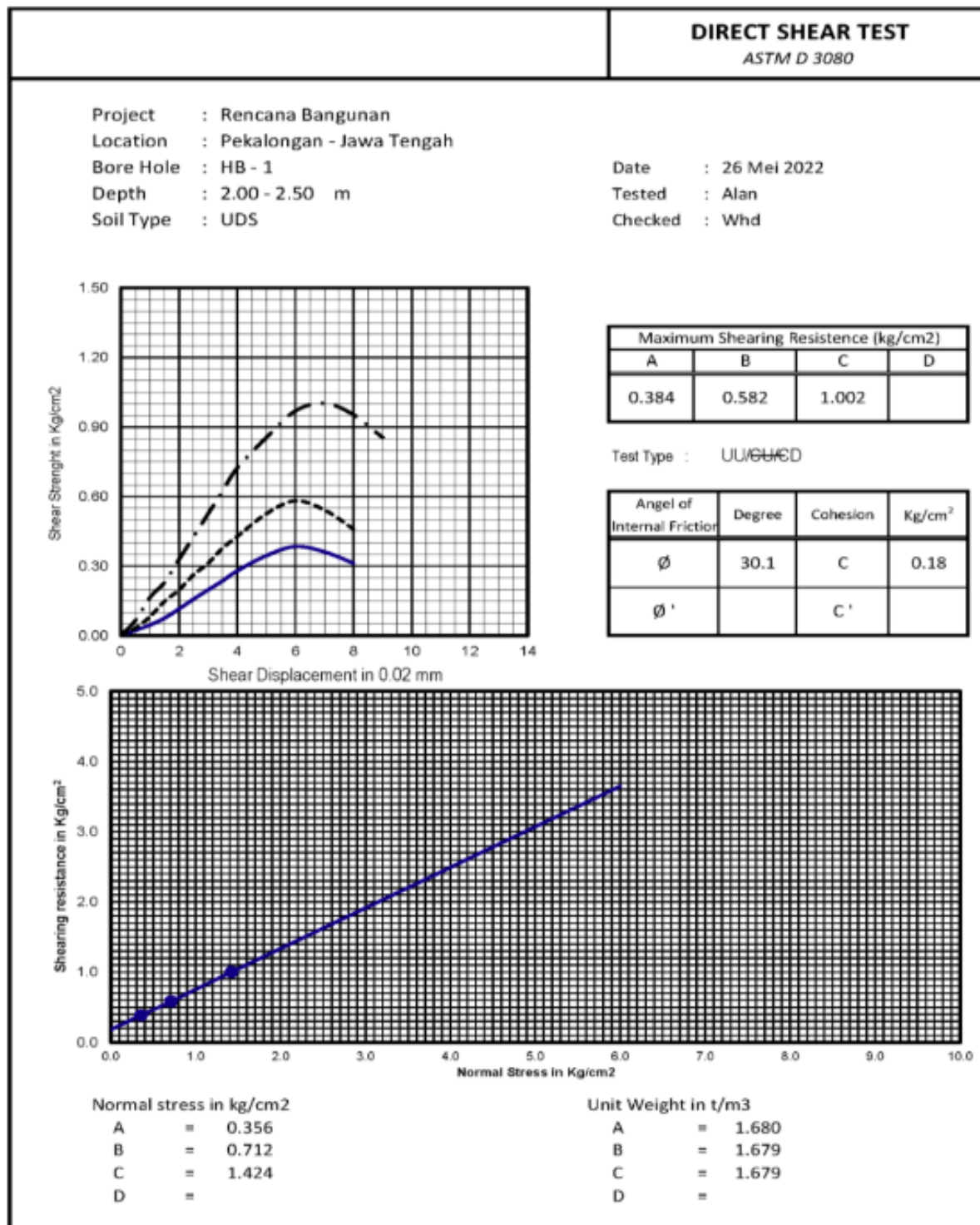
Table 5-23. HB 05 Triaxial Test Results



### 5.1.15 Direct Shears

The direct shears value for HB 01 is presented in the following table.

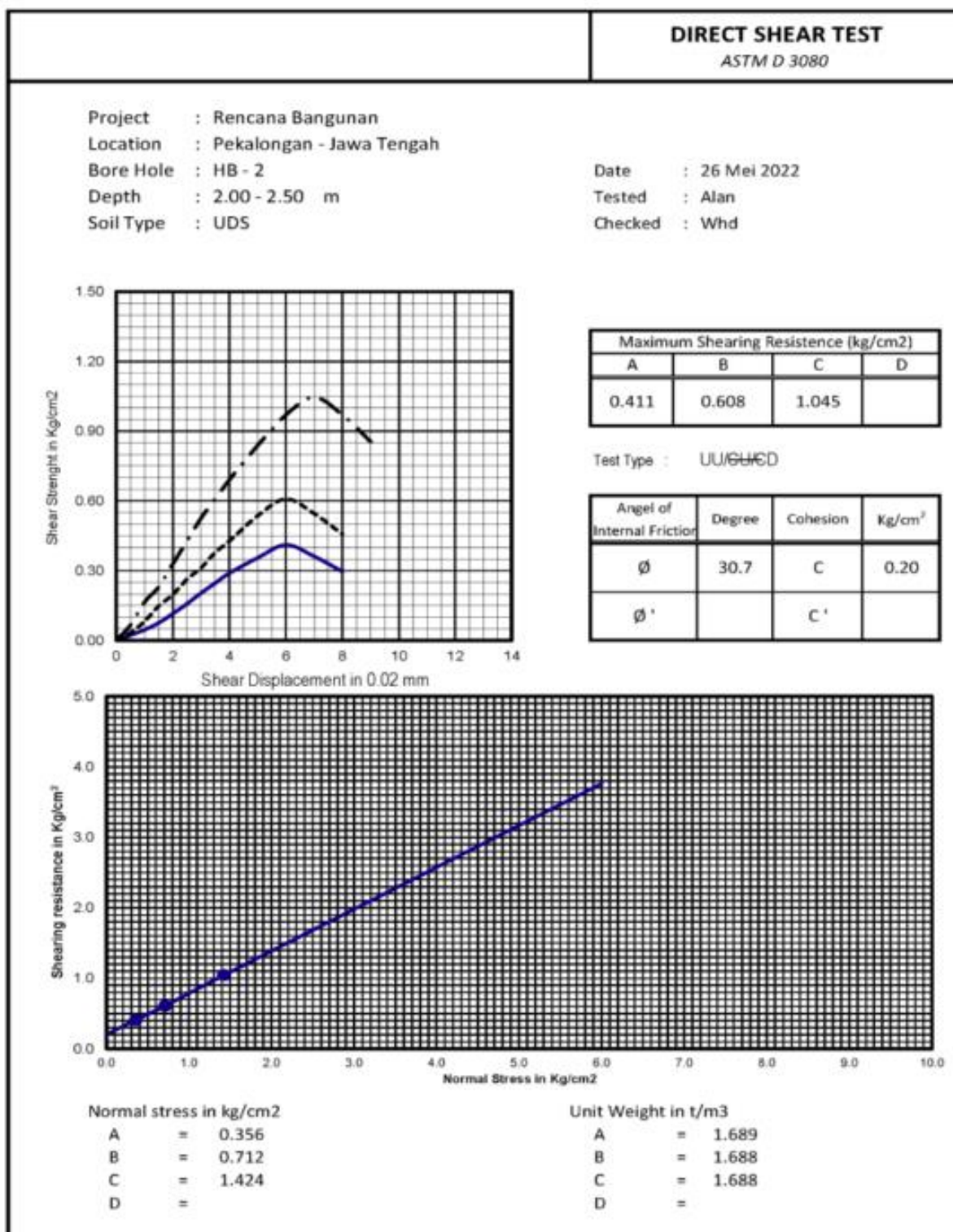
Table 5-24. Direct Shears HB 01 Results





The direct shears value for HB 02 is presented in the following table.

Table 5-25. Direct Shears HB 02 Results





## 5.1.16 Biological Components

### 5.1.16.1 Inventory of Existing Vegetation

Pekalongan, located on the North Coast of Java Island, has mangrove areas like other areas on the north coast of the island. Geographically, mangrove forests are usually found along the coasts of tropical and subtropical countries, between 32° North dan 38° South latitudes. As a result, as a whole Indonesia has a significant share of mangrove forests globally, at the first position, followed by Brazil and others.

Mangrove forests are complex ecosystems consisting of coastal flora and fauna, living simultaneously in land and seawater habitats, in the intertidal zone. Mangrove is also one of the three important ecosystems in coastal areas apart from coral reefs and seagrass beds. Tree groups in mangrove areas can consist of only a certain type of tree or a group of tree communities that can live in salt water.

Natural mangrove forests grow abundantly and widely in delta areas and large rivers with wide estuaries. Mangrove forests have a high tolerance for salt levels and can develop on land with high salinity where ordinary plants cannot grow. The results of the analysis carried out by the MMAF provide an assessment that the mangroves in Pekalongan are at an index of 2.3 or can be said to have high vulnerability.

- 0.1-1.0 : Low.
- 1.1-2.0: Medium.
- 2.1-3.0 : High.

This means that the mangroves in Pekalongan City must be immediately restored.

### 5.1.16.2 Mangrove Plant Reference

References to mangrove plants are presented in Table 5-26 below.

**Table 5-26. Morphological Characteristics of Mangrove Vegetative Organs**

Nama Jenis	Karakteristik Morfologi Organ Tumbuhan mangrove						Visual
	Persebaran Distribusi	Akar	Daun			Ujung Daun	
			Susunan daun	Tata Letak Daun pada Batang	Helian (Daun)		
1. <i>Alicapton acuminata</i> Lam.	padam	meling	tersekat	berhadapan	di atas	Meruncing/tumpul, perulangan berarah atas bawah, selang selang (di-bawah) keci beraturan ke atas	
2. <i>Sonneratia umbrosera</i> (L.) Benth		tersekat	tersekat	berhadapan	di atas	meruncing	
3. <i>Sonneratia alba</i> J. Sm.		tersekat	tersekat	berhadapan	di atas	meruncing	
4. <i>Xylocarpus moluccensis</i> (Lam.) M. Roemer		tersekat	tersekat	berhadapan	di atas	meruncing	
5. <i>Sonneratia alba</i> Blume		tersekat	tersekat	berhadapan	di atas	meruncing	
6. <i>Lumnitzera racemosa</i> Willd		tersekat	tersekat	berhadapan	di atas	meruncing	

Source: Adapted from Maria Teresia Danong, et al (2019)

### 5.1.17 Mangrove Planting Area

As has been mentioned earlier, the area of mangroves measure about 9.5 ha (2012). However, because the continuously critical condition land due to prolonged tidal flooding, field identification results show that the remaining area covered by mangroves is approximately  $\pm 2.3$  ha. The results of aerial observations from drone photos on May 15 2022 are shown in Figures 5-29 and 5-30.



**Figure 5-27. Bird's Eye Identification of Mangroves from the East of the Area**



**Figure 5-28. Aerial Identification of Mangrove Plants**

The PIM (Mangrove Information Center) area is a mangrove forest educational tourism site inaugurated in 2013. This facility complements Pekalongan City, which is rich in marine tourism potential for nature lovers to visit. Apart from being a tourist spot to enjoy the beauty of mangrove plants on the beach - in the early days of PIM's operations, it was very busy with tourists — it is an education facility where tourists can learn about the coastal ecosystem and how to plant mangrove tree seeds, fish and enjoy the beauty of the flora and fauna, particularly birds nesting in the mangrove forest trees, watching fish and crab farming activities while relaxing and enjoying the sunset, fresh and pollution-free mangrove air in the middle of the city. Furthermore, the management is open and provides opportunities for anyone who wants to participate in conservation by planting mangrove trees in Pekalongan. So, the mangrove trees there are not only planted by the local government but also by community members who care about the ecosystem, environment and vulnerability to abrasion in the Pekalongan area.

The tidal conditions that continue to hit the area recently have caused community visits to decrease, and there are almost no tourists now as the location is almost continuously submerged. Figure 1.29 illustrates the severity of the flood conditions at the crematorium location on the beach.



**Figure 5-29. Conditions of Tidal Flooding in Beach Crematorium,  
13 May 2022 and 29 July 2022**

From the results of direct surveys at the Beach Crematorium location on 13-15 May 2022 and 29-30 July 2022, the condition of the plants in the mangrove forest has been inundated by high tide because they are not strong enough to withstand the rapid erosion so they are sinking, as are the right and left sides of the gazebo. Then, the bridge that was built stretching along the ecotourism area for tourists who wanted to walk around, take photos and enjoy the aesthetics of the mangrove forest up close is starting to be submerged by water so it could not function properly. The crematorium building right on the beach is almost flooded by sea water during high tide and the water can enter the place of worship where ashes of the deceased are stored.

A report from the online news site nativeindonesia.com states that "parts of the Pekalongan mangrove park area have been submerged and the coastline is almost no longer visible."

This condition is quite critical and concerning. If ignored continuously, it could result in Pekalongan City experiencing significant land subsidence so that seawater rises and eats away at city buildings. Even though it is as expected and known, the primary function of the

mangrove is to prevent erosion and abrasion so as not to allow sea water to rise to land.

Based on direct observations at the Beach Crematorium location and the Mangrove Information Center as well as information obtained from local residents who participated in planting the trees, approximately 2,500 mangrove trees of the mangrove (*Rhizophora mucronata* Lam) and api-api (*Avicennia alba* Blume) genuses were planted in a planting area of ±2.3 ha in 2006. Meanwhile, data obtained from the Pekalongan City Maritime Affairs and Fisheries Office shows that up to 2012, community planting had been carried out as shown in Table 5-26.

**Table 5-27. Mangrove Planting Data in PIM (2012)**

Source	Number of Plants	Type of Plants
Ministry of Forestry State Budget (KBR- BPDAS Pemali Jratun)	150.000	<i>Rhizophora sp.</i>
Ministry of Forestry State Budget (KBR- BPDAS Pemali Jratun)	25.000	<i>Avicennia sp.</i>
KP3K KKP-RI State Budget	25.000	<i>Rhizophora sp.</i>
IPB Bogor	5.000	<i>Rhizophora sp.</i>
Pekalongan City Regional Budget	5.000	<i>Rhizophora sp.</i>
Bintari NGO	15.000	<i>Rhizophora sp.</i>
CSR FIF	5.000	<i>Rhizophora sp.</i>

The mangrove planting initiative cannot be carried out continuously because of the tidal conditions that continue, in addition to damage to the area due to land subsidence causing planting areas to be lost, washed away by sea water. Meanwhile, efforts to restore the mangrove area cannot immediately overcome the tidal conditions.

Efforts to place coastal protectors, such as geotubes in 2014-2015, have also failed as these structures have been damaged, making them ineffective in protecting the mangrove plants behind them. Practically, since the boom of mangrove planting in 2012, there has been no mangrove planting program at this location. Ario, R., et al (2017) reported the results of a survey conducted by his team up to July 2014, that the mangroves that had been planted grew with a tree height of 30-50 cm, but after August 2014 when the research was carried out it turned out that various types of mangrove plants have disappeared. Mangrove vegetation that did survive were those of *Rhizophora* and *Avicennia* genuses. It is possible that the poor water circulation factor resulted in the mortality of the mangrove vegetation.

Table 5-28. Morphological Characteristics of Plant Vegetative Organs




Nama Jenis	Karakteristik Morfologi Organ Tumbuhan						Foto tumbuhan
	Batang	Akar	Daun				
			Susunan daun	Tata letak daun pada batang	Helaian daun	Ujung daun	
<i>Rhizophora mucronata</i> Lam sp. (bakau)	Pohon	Tunjang	Tunggal	Berhadapan	Elips	Meruncing/tajam, permukaan bawah daun terdapat banyak titik-titik kecil berwarna hitam	
<i>Avicennia alba</i> Blume sp. (api-api)		Napas	Tunggal	Berhadapan	Lanset	Lancip	
<i>Bruguiera gymnorhiza</i> sp. (putut, tumu)		Napas	Tunggal	kelompok di ujung ranting,	Agak tebal seperti jangat	Lancip	



Figure 5-30. *Avicennia alba* Blume



Figure 5-31. *Rhizophora mucronata* Lam



## 5.2 Social, Economic and Cultural Components

### 5.2.1 Demography

#### *Kandang Panjang*

The population of Kandang Panjang Village is quite sizeable at 12,985 people. Of that total population, there is a nearly equal split between men and women, with 6,552 male residents making up just over half at 50.5% and 6,433 female residents comprising the remaining 49.5%. This results in a sex ratio of 101.85 males for every 100 females, indicating a slight skew toward more men than women in the village's demographic makeup.

With 4,321 families residing in Kandang Panjang Subdistrict, the average family size is small at about 3 people per household. This suggests that most families in the area are nuclear families of parents and one or two children. The total population divided across the subdistrict's land area results in a population density of 8,657 people per square kilometer. This is a moderately high density, meaning households are closely situated together throughout the village rather than being sparsely spread out over a large area.

Overall, the demographics of Kandang Panjang Village reveal a sizable but balanced population distributed densely over a compact residential area, with nuclear families of three being the norm. The data indicates a community of families living in close proximity to one another in the village environment.

The age demographics and family economic status in Kandang Panjang Subdistrict provide insight into the makeup and livelihoods of the residents. With regards to age, data shows that the majority of the population, 9,286 people, are of working age between 15-64 years old. This large segment of productive residents forms the backbone of the local economy. Comparatively, there are far fewer residents who are dependents - only 2,877 youth under age 14 and 819 elderly over age 64. The predominance of working-age individuals enables economic development.

In terms of family prosperity, 1,659 households are categorized as prosperous, meaning they have met basic needs and have disposable income. A larger segment, 1,139 families, are moderately prosperous, meeting basic needs but lacking excess income. And 303 families still struggle in poverty, unable to reliably meet basic needs. The goal would be to continue growing the prosperous segment through job creation and skills training.

#### *Bandengan*

Most of the main livelihoods of Bandengan Village residents consist of workers, entrepreneurs/traders, and working in the private sector. The people of this village rely on a diverse range of jobs and businesses to support themselves and their families. Many residents work as laborers, construction workers, drivers, and factory employees, providing manual and skilled labor across various industries. Others run small shops, food stalls, and other enterprises, buying and selling goods and services within the village and to customers from



surrounding areas. Some operate as traders, middlemen who connect regional producers with urban markets. Beyond these conventional roles, a number of tech-savvy residents are employed by private companies in administrative, sales, and technical positions, taking advantage of opportunities created by development and modernization. Though the livelihoods span a spectrum, most of the village relies on hard work, entrepreneurship, and adaptability to thrive in a rapidly changing economy. The industriousness and flexibility of the villagers has allowed them to find diverse ways to earn income by leveraging the village's regional connections, labor force, and increasingly modernized landscape.

## 5.2.2 Education

### Kandang Panjang

The education level of the population of Kandang Panjang Subdistrict is mostly at the level Elementary, Junior and high school. As for the tertiary level, it is available starting from D1 up to S3. This means the education level of the population of Kandang Panjang Subdistrict is various, from lower level to upper level. Education level of the population of Kandang Panjang Subdistrict is shown in Table 5-29.

**Table 5-29. Education level of the population of Kandang Panjang Subdistrict**

Education Level	Amount (people)
Not attending school yet	636
Ages 7 - 45 years, never attended school	123
Attended elementary school but not graduated	154
Elementary school	2.945
Junior high school	2.144
High school	2.154
Diploma-1	76
Diploma-2	83
Diploma-3	139
Bachelor degree	681
Master degree	29
Doctoral	11

*Source: Kandang Panjang Subdistrict Monograph, 2023*

The population of Kandang Panjang Subdistrict displays a wide range of educational attainment, from elementary school all the way through doctoral degrees. As detailed in Table 2, the majority of residents have completed elementary, junior high, or high school. This indicates that basic education is readily available in the area, allowing most people to obtain at least a high school diploma. At the same time, there are also opportunities for higher education, with some residents holding associate, bachelor's, master's, and even doctoral degrees. The presence of tertiary institutions, whether vocational schools, colleges, or

universities, enables citizens to pursue studies past the high school level if they desire and have the means. An education system encompassing all levels from primary to postgraduate reflects a community where academic development is valued and supported. While lower levels like elementary school predominate, the diversity of attainment up to doctorates shows that Kandang Panjang Subdistrict caters to students of all ages and ambitions. The distribution across the spectrum demonstrates an educated populace with knowledge and skills spanning the gamut from basic to highly advanced.

### **Bandengan**

The education level of community in Bandengan subdistrict is mostly at elementary and kindergarten levels. For the university level, some people have the education at diploma level to bachelor degree level. This means the level of education in Bandengan Village is diverse, from the low levels to the higher levels.

The level of education of the community will influence the level of knowledge and Where the higher the level of community education will of course have an influence on level of knowledge of a problem.

**Table 5-30. Education level of the population of Bandengan Subdistrict**

Education Level	Amount (people)
Not attending school yet	636
Ages 7 - 45 years, never attended school	123
Attended elementary school but not graduated	154
Elementary school	2.945
Junior high school	2.144
High school	2.154
Diploma-1	76
Diploma-2	83
Diploma-3	139
Bachelor degree	681
Master degree	29
Doctoral	11

The education level of the community in Bandengan subdistrict is quite diverse, spanning from the basic elementary and kindergarten levels to more advanced diplomas and bachelor's degrees. This indicates a mix of educational backgrounds among the villagers. While a sizeable portion of the population has only completed primary or secondary schooling, focusing more on fundamental literacy and numeracy skills, there are also those who have embarked on higher education at local colleges or universities. These more educated individuals have delved deeper into academic disciplines and acquired specialized

knowledge in certain fields, whether that be engineering, teaching, business, or healthcare. Their advanced studies nurture critical thinking and problem-solving aptitudes beyond the basics learned in grade school.

The variability in education levels directly impacts the distribution of knowledge within Bandengan. Those with only an elementary background often grasp everyday concepts and practical skills for routine tasks, but they generally lack exposure to abstract ideas or theories. Their knowledge is confined to tangible, observable matters in their immediate surroundings. Meanwhile, the university graduates have a wider grasp of complex systems, critical analysis, and even specialization in a certain subject. Their knowledge extends beyond the concrete and literal into conceptual relationships. This education-based knowledge gap has implications for how informed and involved the community is regarding more complex social, economic, and political issues affecting their village. The higher the level of education among citizens, the more likely they will comprehend the nuances of problems and contribute solutions.

### 5.2.3 Health situation

#### Kandang Panjang

Kandang Panjang is a village in North Pekalongan subdistrict in Pekalongan Regency, Central Java, Indonesia that faces challenges in providing adequate healthcare access to its population. With only one Puskesmas, or community health center, available to serve the nearly 50,000 residents, preventative care and basic medical services are limited. The sole Puskesmas struggles to meet demand across its large coverage area that spans two districts, Kandang Panjang and Bandengan. This solitary clinic is responsible for providing immunizations, maternal and child health services, basic dental care, and minor emergency treatment. Any cases needing more advanced care must be referred out to hospitals in other towns, creating difficulties for patients without reliable transportation.

Posyandu or integrated service posts, scattered throughout Kandang Panjang, community-run clinics focus on maintaining the health of mothers and children under five by providing growth monitoring, nutrition education, immunizations, and basic healthcare. While beneficial, their limited hours of operation and reliance on volunteers prevent Posyandu from fully meeting community needs. The lack of clinics, doctors, and preventative care resources in Kandang Panjang leaves many residents struggling to access the healthcare services they require. Establishing additional Puskesmas, expanding Posyandu capabilities, and improving transportation access could help strengthen this subdistrict's overburdened healthcare system. With more infrastructure and staffing support, the foundations laid by the existing Puskesmas for comprehensive preventative care and community medicine could be built upon to better serve Kandang Panjang's people.

#### Bandengan

Bandengan, with its modest population of around 5,000 people, is served by only one Puskemas (community health clinic) and six Posyandu (integrated health service posts) for all of its healthcare needs. This extremely limited number of healthcare facilities poses significant challenges for the residents of this village. With just one health clinic and a handful of health

posts for thousands of people spread across an expansive area, many in Bandengan struggle to access even basic medical services. The lone Puskesmas, while staffed by a dedicated team, is overwhelmed by the demand and often has long wait times for appointments. Those needing urgent care have no choice but to make the hours-long journey to the nearest hospital in the city. The Posyandu, meanwhile, can only provide very basic care and preventative services on the one day per month they are open. Transportation is another major barrier, as those without private vehicles have no public transit options to reach the clinic or health posts. Many residents simply forgo preventative screenings and routine checkups due to the difficulty of getting to their limited healthcare options. With an aging population and rising rates of chronic illness, Bandengan is in critical need of expanded healthcare access. More clinics, health posts, and visiting community health workers could help bridge the gaps. Creative solutions like mobile clinics and telehealth offerings may also help bring services to the people when transportation is a challenge. Until greater investments are made in healthcare infrastructure and accessibility, the residents of Bandengan will continue to struggle to get the medical services they need and deserve.

#### **5.2.4 Religion**

In 2022, adherents of all six officially recognized religions in Indonesia could be found in Pekalongan City. The majority of the population adhere to Islam, with 306,299 adherents. The other religions were Protestant Christianity (5,582), Catholic (3,637), Hindu (47), Buddhism (1,289) and Confucianism (73).

## 6. PUBLIC CONSULTATION AND PARTICIPATION

### 6.1. Stakeholder Analysis

KEMITRAAN has conducted extensive stakeholder consultations regarding the proposed Rubble Mound breakwater infrastructure along the north coast of Pekalongan. These consultations have engaged a diverse range of community members and groups, including local residents, business owners, fishermen, local government officials, and civil society organizations. The goal has been to provide information about the proposed project, gather input on its potential impacts and benefits, and build broad-based support.

So far, the consultations have indicated strong community backing for the breakwater. Local residents and business owners recognize the need to protect the coastline from worsening erosion and flooding. The breakwater is seen as a way to stabilize the shoreline, prevent further loss of homes and livelihoods, and support tourism development. Fishermen believe the breakwater may enhance certain habitats and fish stocks. Government officials and civil society groups appreciate the potential economic benefits, especially for poorer communities.

More consultations are planned as the project moves forward, to update stakeholders on progress and gather ongoing feedback. There appears to be an emerging consensus that the breakwater will provide much-needed coastal protection. While specific concerns exist regarding design, access, and monitoring potential impacts, the consultations overall demonstrate extensive goodwill and broad community support for the infrastructure project. KEMITRAAN is committed to continuing transparent, inclusive outreach efforts to ensure all major stakeholders have a voice.

### 6.2. Stakeholder Engagement and Public Participation

#### Stakeholder identification

The key stakeholders for this project include project area groups such as local businesses, schools, and other entities within the physical footprint of the project. Groups affected by construction like nearby residents are key stakeholders that will experience noise, traffic, and other disruptions. Vulnerable groups in the community including children, the elderly, and the economically disadvantaged must have their needs addressed. The construction unit itself is a stakeholder, as timely completion and safety are priorities. Community neighborhood committees and village committees in the project area can provide valuable grassroots input. They have in-depth knowledge of local needs. Other government agencies have a stake in the project from permitting and regulatory standpoints. Identifying and engaging key stakeholders early and often is vital for project success. Their diverse needs and perspectives must be balanced. Effective stakeholder management ensures their voices are heard, and the project is completed with community support.

#### Key Stakeholders

Key stakeholders are vital groups and individuals that have an interest in or are impacted by a project. They play a crucial role throughout the project life cycle and their perspectives must be considered. Identifying and engaging key stakeholders early and often is vital for project success. Their diverse needs and perspectives must be balanced. Effective stakeholder management ensures their voices are heard, and the project is completed with community support. The identified key stakeholders consist of:

- 1) Project area groups: the key stakeholders for this project include project area groups such as local businesses, schools, and other entities within the physical footprint of the project.
- 2) Groups affected by construction like nearby residents are key stakeholders that will experience noise, traffic, and other disruptions.
- 3) Vulnerable groups in the community including children, the elderly, and the economically disadvantaged must have their needs addressed.
- 4) The construction unit itself is a stakeholder, as timely completion and safety are priorities.
- 5) Community neighborhood committees and village committees in the project area can provide valuable grassroots input. They have in-depth knowledge of local needs.
- 6) Other government agencies have a stake in the project from permitting and regulatory standpoints.

### 6.3. Public Participation Process

In order to understand the attitudes and views of local residents towards the project, the SIA consultant conducted Focus Group Discussions (FGDs) and key informant interviews in the communities of Kandang Panjang and Bandengan as well as the local government at the provincial and regency levels. The purpose of these qualitative research methods was to gain insights into how aware residents were of the proposed project and what their perceptions were regarding its potential impacts.

Specifically, the FGDs gathered together small groups of 8-10 community members to discuss open-ended questions related to their knowledge, support, and expected benefits and drawbacks of the project. This format enabled residents to share their thoughts and perspectives in a comfortable setting that encouraged back-and-forth conversation. The key informant interviews were conducted one-on-one with identified stakeholders, such as community leaders, business owners, teachers, etc. to elicit their unique views on the project's cognition, feasibility, and social, economic, and environmental consequences for the communities.

By directly engaging residents through these qualitative techniques, the SIA consultant aimed to develop a nuanced understanding of the predominant community attitudes, levels of endorsement, and hopes and concerns related to the proposed development's effects locally. The findings would inform later communications and engagement strategies to address any misconceptions, issues, or opportunities highlighted by Kandang Panjang and Bandengan inhabitants regarding the project. Overall, the FGDs and interviews sought to give voice to



those most impacted by the potential changes and empower them to share their knowledge, expectations, and recommendations.

**Table 6-1. Attitudes and needs of key stakeholders' groups on the project**

Key stakeholder groups	Attitude to the project	Demand
Project area groups	Support	<ul style="list-style-type: none"> <li>• Hope that the project will be implemented as soon as possible</li> <li>• Hope to improve people's lives and create more employees' opportunities</li> </ul>
Groups affected by construction	Support	<ul style="list-style-type: none"> <li>• Hope that the project implementer makes a construction plan to reduce the inconvenience caused to people during the construction period</li> <li>• Hope to take appropriate measures to minimize the impact of construction noise and dust on the normal life of surrounding residents</li> </ul>
Vulnerable groups	Support	<ul style="list-style-type: none"> <li>• Women hope to get equal access to employment opportunities and benefits</li> <li>• Poor families hope that the construction work increases employment opportunities</li> </ul>
Construction unit	Support	<ul style="list-style-type: none"> <li>• Hope the project construction goes smoothly</li> </ul>
Community neighborhood committees and villages committees in the project area	Support	<ul style="list-style-type: none"> <li>• Hope that the project will start as soon as possible.</li> <li>• Recommend that project owner and construction unit communicate with the affected residents frequently to avoid conflicts.</li> </ul>
Government offices	Support	<ul style="list-style-type: none"> <li>• Hope that the project owner will always maintain a good communication and coordination with them.</li> <li>• Hope that the project construction process will be smooth</li> </ul>

The prospect of this project commencing in the near future is an exciting one that should be welcomed with open arms. However, it is crucial that as things get underway, all key stakeholders maintain open lines of communication and operate with the utmost transparency. Most notably, the project owner and construction company have an obligation to engage with residents who will be impacted by the work. They should schedule regular meetings to keep locals informed of timelines, logistics, and any potential inconveniences. Sending email updates and holding community forums would provide additional opportunities to connect. This frequent outreach will help avoid misunderstandings and preemptively address concerns before they escalate. If residents feel disrespected or ignored, it could quickly lead to conflicts that jeopardize the entire project. But by making inclusivity

and active listening a priority from day one, the chances of completing this endeavor smoothly and on schedule will be vastly improved. The benefits of enhanced infrastructure and economic activity will only be fully realized if they are balanced with compassion for those whose lives will be disrupted in the short term. Open communication channels can help achieve that delicate balance. With cooperation and goodwill on all sides, there is much reason for optimism that this project will transform the community for the better.

#### 6.4. Main Findings of Public Participation

In order to understand the attitudes and views of local residents towards the project, the consultant conducted an in-depth qualitative research process involving focus group discussions (FGDs) as well as key informant interviews in Kandang Panjang and Bandengan attended by representatives of Kelurahan and community members. The FGDs brought together groups of 8-12 participants from diverse backgrounds within each village, including elders, religious leaders, teachers, farmers, fishermen, and small business owners. The consultant carefully facilitated these discussions, providing opportunities for all to share their thoughts, feelings, hopes and concerns regarding the proposed project.

Key informant interviews were also conducted with individuals identified as having extensive knowledge of the community as well as influence over public opinion. In addition to the grassroots perspectives gathered through this field research, the consultant also interviewed government officials at both the provincial and regency levels, as well as government at village level. These officials were able to provide insights into the project from the perspective of regional economic development, infrastructure improvement, gender and social inclusion (GESI), job creation and environmental regulation. Taken together, the qualitative data gathered through these community discussions and expert interviews provided the consultant with a nuanced understanding of how local residents and leaders view the costs, benefits, opportunities and risks associated with the project across social, economic and environmental realms. This in-depth comprehension of community attitudes and perspectives will allow the project to move forward in a manner responsive to local needs and priorities.

##### 6.4.1. Result of FGD and Key Informant Interviews

Two separate focus group discussions (FGDs) were conducted to gather insights on a particular issue, with each FGD having a distinct set of participants. The first FGD brought together government officials working at the provincial and regency levels. These officials likely provided perspective on the issue from an administrative and policy standpoint, given their positions in regional governance. Their expertise would lend an important top-down view.

The second FGD convened representatives of the local community in the villages of Kandang Panjang and Bandengan. As residents directly affected by the issue under discussion, these community members could share crucial on-the-ground experience and firsthand knowledge. Their input would complement the big-picture view of the officials with detailed examples and stories from daily life. Dividing the FGDs this way ensured that both high-level policy

viewpoints and granular community-level perspectives were represented in the discussion. The two groups offered different but equally valuable angles that, taken together, provided a comprehensive understanding of the issue and how it impacts governance and people across multiple levels. Thoughtfully separating the FGDs into these distinct participant sets enabled collection of richer, more multilayered qualitative data through the research.

#### **6.4.2. Result of FGD with government officials**

The aim of this focused group discussion is to collect information from the government side related to the proposed coast protection facility in Kandang Panjang and Bandengan. The main idea is to gather their perception including their participation after the breakwater has been set, as part of monitoring the coastal protection facility. Specifically, the discussion hopes to gain insight into the government's views on the breakwater project, its potential benefits, and any concerns they may have.

During the discussion, participants representing various government agencies and departments will be asked open-ended questions to understand their opinions on the goals of the project, its proposed location, the materials and methods to be used, and the timeline for completion. Facilitators will encourage participants to share thoughts on how the breakwater could impact coastal communities, recreation, fishing, and ecosystems along the shore.

Additionally, they will inquire about what role different government entities expect to play in overseeing the project and monitoring its effects after construction. The facilitators will listen closely to any apprehensions voiced by officials and ideas they propose for ensuring the breakwater achieves its aims of protecting the coastline while minimizing adverse impacts. The rich qualitative data gathered from this focused group discussion with government stakeholders will allow project leaders to take community considerations into account in their plans and work cooperatively with local authorities to implement an effective coastal protection facility.

The consultant's discussion with government officials revealed hesitancy around developing coastal protection infrastructure like Rubble Mound breakwaters. While provincial and regency leaders recognized the need to safeguard coastal communities from rising seas and intensifying storms, they had concerns about securing permits for breakwater construction. Specifically, utilizing marine space to site breakwaters requires approval from the Ministry of Marine Affairs and Fisheries (MMAF). Without this green light from MMAF, provincial and regency governments worried that initiating work on coastal defenses could stall out, leaving half-finished projects and communities still vulnerable. Seeking an MMAF permit introduces uncertainties around timeline and feasibility that give provincial and regency officials pause. Though eager to protect their coastal constituencies, they are wary of moving forward without assurances that MMAF will sanction the marine footprint needed for breakwaters. Until provincial and regency leaders feel confident that MMAF approval is attainable, their enthusiasm for coastal protection initiatives will remain restrained. The consultant learned through discussion that MMAF permitting represents a critical gating factor delaying provincial and regency action on adapting coastal safeguards to the threats of climate change. Overcoming this barrier will require proactive engagement between local, provincial and

national agencies to align priorities and streamline permitting for essential coastal resilience projects.

#### **6.4.3. Result of FGD with community representatives**

##### **Result of FGD with community representatives**

Despite ongoing plans to build breakwaters along the coast as a means of protection from storm surges and erosion, some community members feel they have been left out of the process and lack comprehensive details. While infrastructure projects like these are vital for defending shorelines, citizens argue the local population should actively participate in bringing the vision to fruition rather than relying heavily on outside contractors. Beyond requesting transparency around blueprints and timelines, residents have advocated for recruiting laborers from within the community itself. This would nurture a sense of ownership over the breakwaters and invest locals in seeing the endeavor through. It would also provide employment and skills training for those hired to construct the structures. Proponents say that by engaging the community in this hands-on manner, the physical development along their shores will translate to economic and professional development within their neighborhoods as well. With the proper training and opportunity, locals could assist in building the very walls meant to protect their homes, schools, businesses, and livelihoods. This has the potential to uplift and empower entire families. Though vital, infrastructure projects like breakwaters should not be imposed on a community without their input or involvement. Bringing residents to the table and equipping them to participate in the building process can transform a defense strategy into a collective labor of care and resilience.

The community's overall consensus is supportive of the proposed breakwater construction location. However, they have requested greater involvement and more open communication regarding all partnership initiatives moving forward. Specifically, the community feels strongly that they should participate in each stage of planning and implementation for any activities or developments. Their viewpoint is that by being actively engaged and kept well-informed through regular updates, they will be empowered to provide meaningful input, voice any concerns, and help shape final decisions. This will ensure the outcomes align with community needs and values. Additionally, through this collaborative process, the community will be poised to receive maximum benefits from the partnerships' endeavors, whether it be new economic opportunities, access to resources, or other advantages. Essentially, the community is granting its approval for the breakwater location, contingent upon establishing robust mechanisms for consultation and information sharing between the parties as a foundation for an inclusive, cooperative, and mutually beneficial relationship. Adopting this stance promises to strengthen trust and goodwill on all sides.

When implementing coastal protection infrastructure projects such as breakwaters, there are often communities directly in the path of development that experience losses. This may include the loss of homes, businesses, community centers, sacred sites, or access to traditional fishing areas. The project developers have an ethical and legal responsibility to provide fair compensation and replacement for any losses experienced by these impacted communities. This compensation should be equivalent to the value of property seized or income lost.

The residents of the coastal villages of Kandang Panjang and Bandengan were overjoyed when they heard news of an upcoming initiative to develop coastal protection facilities for their communities. For years, they had faced the constant threat of storm surges, flooding, and erosion eating away at their shores, so this project represented a chance to finally gain security and stability. The prospect of new employment opportunities during the construction phase also brought great excitement, as most families in these fishing villages struggled with limited incomes. The men saw potential for good-paying jobs building the breakwaters and other structures, while the women looked forward to the influx of hungry workers to buy their homemade snacks, meals, and produce. Though some of the male villagers made their living as fishermen, they did not feel the breakwaters would hinder their ability to catch fish in the nearby coastal waters. Overall, the residents viewed the coastal protection project as a huge benefit for their communities that would bring both environmental and economic gains. They eagerly awaited the start of construction and the promise of protection for their vulnerable shores as well as a boost to their household incomes. The project gave them hope for a safer, more prosperous future.

## 6.5. Community Perceptions and Expectations

The effective management of community expectations, perceptions, and understanding regarding the project will be critical to its timely and successful implementation. This means that it will be vital to proactively communicate with the public to shape how they view the project and what they can realistically expect from it.

The project managers should develop a comprehensive community outreach strategy that utilizes multiple channels to provide clear, consistent messaging about the project's objectives, timeline, potential impacts, and benefits. This messaging should be tailored to address the specific hopes, concerns, and information needs of diverse community stakeholders. For example, directly affected neighborhoods may need more granular details about construction timelines, while the broader community may just need high-level awareness of the project's purpose.

Two-way communication channels should be established to monitor community perceptions in real-time and address any misconceptions or rumors before they spread. This allows for messaging to be dynamically adjusted as needed. Relationship building with community leaders, partners, and influencers will also be key to having credible validators to reinforce communications. If done effectively, managing community expectations and understanding will result in greater public buy-in and smoother implementation of this important project. Some of the key perceived risks and response measures identified include the following:

- The budget and spending for a coastal protection project can vary greatly depending on the technology and approach adopted. Hard engineered options like seawalls, bulkheads, and revetments require intensive upfront investment into design, materials, and construction. The budget must account for purchasing vast quantities of these construction materials as well as hiring contractors and engineers to properly design and oversee the project. In contrast, soft engineering options like beach

nourishment or dune replenishment call for recurring expenditures into importing and moving large amounts of sand to widen beaches, create dunes, and enhance natural buffers. While less costly per linear foot than a seawall, beach nourishment requires regularly repeating the nourishment, sometimes as often as every few years, to maintain the added sand volume. The budget must have funds set aside not just for the initial beach expansion but for ongoing periodic renourishment. When comparing coastal protection plans and technologies, decision-makers must weigh the high upfront costs of hard structures versus the recurring costs of soft engineering and nourishment over the project lifespan. The optimal technology and budget allocation depends on the unique geographical setting and community resources.

- The environmental and social impact assessment (ESIA) process is a crucial part of development projects, especially in developing countries. It aims to evaluate and predict the potential environmental and social impacts of a proposed project before major decisions and commitments are made. However, there is a concern that the ESIA process could become donor-driven, rather than led by the host country.

The ESIA is important because it provides a framework to identify, avoid, minimize, and mitigate adverse impacts of development projects. It brings together key stakeholders to discuss concerns, analyze alternatives, and develop management plans. Without a rigorous ESIA, projects can end up causing unintended harm. This is especially risky in developing nations which may lack environmental regulations. Conducting an ESIA signals a commitment to sustainable, responsible development.

However, the ESIA process relies heavily on the funders and sponsors of projects. Major donors like the World Bank require an ESIA for funding eligibility. Consequently, consultants may tailor ESIA's to satisfy donor requirements rather than respond to local contexts. There are cases where the ESIA seems more an exercise to access funding than a process to protect people and environments. This donor-driven approach can undermine the ESIA's purpose.

The host government should take leadership in conducting ESIA's. Local experts should shape the process to address on-the-ground realities. An ESIA led by locals is more likely to identify public concerns, engage communities, and result in mitigation that fits the local context. With training and capacity building, developing nations can own the ESIA process rather than have it imposed externally. This will lead to better social and environmental outcomes from development projects.

- The implementation process and outcomes of the Rubble Mound breakwater infrastructure highlighted key limitations and lessons that warrant further examination. Constructing extensive breakwaters along coastlines poses numerous engineering and environmental challenges. The scale of such projects requires immense coordination across government agencies, contractors, and local communities. Strict permitting and impact studies are necessary to analyze how introducing artificial structures may disrupt natural wave patterns, sediment flows, habitats, and aesthetics. Even with careful planning, unintended consequences often emerge post-construction. For example, some breakwaters have triggered beach



erosion in adjacent areas by blocking littoral drift. There are also maintenance issues, as storm damage and material deterioration can compromise the integrity of breakwaters over time. Weighing costs and benefits is complex, as protection of real estate and infrastructure must be balanced with ecological impacts. Overall, implementing major coastal defenses demands comprehensive foresight, flexible adaptation as effects unfold, and long-term stewardship. The process provides sobering lessons on humanity's limitations in exerting control over dynamic marine systems. But with prudent precautions and monitoring, breakwaters may play a role in protecting certain vulnerable areas if intelligently integrated into more holistic coastal management strategies.

- There is hope that the project might be able to provide a dredging machine and have locals trained on how to use it for future beach nourishment and maintenance. This would be a huge benefit for the community's beaches going forward. A dredging machine is a piece of specialized equipment that can suck up sediment from the seafloor or nearby waterways and pump it onto beaches to replenish sand that has eroded away over time. Having one of these machines locally could allow for ongoing, regular beach nourishment efforts, helping to combat erosion and maintain wide, sandy beaches that both residents and tourists can enjoy. The project organizers aim not just to provide the equipment, but also to train local workers on proper operation and maintenance of the dredge. With a team of knowledgeable locals trained and ready to operate the equipment, the community would have full control over beach nourishment whenever needed, rather than relying on outside contractors. This local expertise could save substantial time and money over the long-term. The prospect of having a dedicated dredging program with locally trained operators gives real hope that the community's beaches can be sustained and kept healthy for generations to come through continual replenishment. It's an investment that could pay dividends for coastal protection, the local economy, and quality of life.

While the 3S Project team members effectively responded to community questions with evidence-based reasoning, the nature of questions suggests the need to facilitate a deeper engagement with the community. A comprehensive stakeholder analysis to better identify how different groups in society might be impacted will provide the community with better reasoning for project decisions, approaches, and activities. The use of culturally appropriate media such as church and culture-based events as well as audio, audiovisual, and written communication products could prove effective. The importance of participatory planning, decision-making, and implementation processes to facilitating community ownership and cooperation towards the project may also facilitate trust in its process.

The feedback from the community indicates that although the project team provided satisfactory answers, more work needs to be done to fully address people's concerns. A detailed stakeholder analysis mapping out all individuals and groups affected by the project will illuminate the diverse perspectives that must be considered. This will enable the team to tailor communication and engagement efforts to each audience. For instance, hosting interactive forums at community centers and places of worship could allow two-way dialogue in a familiar setting. Sharing information via radio ads, videos, pamphlets, and posters in commonly spoken languages would further distribute knowledge. Most crucially,

consistently involving community members in planning, making key decisions, and enacting project components will build mutual understanding and shared purpose. When people feel their voices are genuinely heard and valued, they are more likely to support the overall goals and trust in the validity of the process. Taking these measures to promote inclusive participation will foster greater cooperation and ownership in the community.

## 1) Employment

The coastal protection initiative will provide much-needed income generating opportunities for community members across multiple phases of the project. During the design process, there will be openings for locals to contribute their expertise and traditional ecological knowledge to help shape plans in a culturally appropriate and environmentally sustainable way. The construction phase will be a boon for employment, with labor sourced mainly from within the island communities. This injection of money into the local economy through fair wages will empower families to cover basic needs and improve their quality of life. However, care must be taken to ensure the workload and remuneration are divided equitably between different islands and demographics. For instance, women are often excluded from manual jobs, so measures should be enacted to actively include women alongside men in construction crews. The same ethos of equality should carry through to the operational phase, where maintenance and monitoring of the coastal structures could provide ongoing employment. If approached strategically, the project can uplift and unify communities across socioeconomic divides. By embracing inclusive hiring practices and compensating labor justly, the initiative's economic ripple effects will spread prosperity instead of concentrating gains in the hands of a few. With conscientious policies and oversight, the coastal protection project can reinforce social cohesion while literally building the foundation for a more resilient future.

### Protective Measures

To ensure that opportunities to incorporate men and women's views and interests are purposefully created and enabled in stakeholder engagement throughout a project, it is critical that an inclusive approach is taken. The project team must proactively seek input from all genders during planning, design, implementation and monitoring stages. This may require specifically reaching out to women's groups, minorities or marginalized populations that may not have a voice at community meetings. Facilitators of stakeholder sessions should encourage participation from both men and women by asking directed questions and watching for imbalances in who is speaking up. The project team should analyze feedback by gender to identify any differences in priorities, concerns or ideas. These diverse perspectives should inform project decisions, such as site selection, construction methods, compensation mechanisms, and monitoring plans. By deliberately creating space for men and women to share their views at each step, the project is more likely to reflect the interests of the whole community and lead to equitable outcomes.

The construction project will provide a welcome boost to the local economy and job opportunities for the local community. In keeping with the cultural practice of sharing employment fairly, the work will be rotated amongst the residents. This communal approach ensures everyone benefits from the income generated by the development. To operationalize the job rotation smoothly, the contractor shall provide training at the outset for all nominated

workers. Equipping the workforce with the requisite skills from day one will maximize efficiency and prevent potential slowdowns later when new workers rotate in. The inclusive employment model empowers the community to collectively share in the economic gains. The temporary jobs during construction are a chance for local residents to earn wages, gain valuable skills, and play an active role in building a project that will better their home.

## **7. POTENTIAL ENVIRONMENTAL AND SOCIAL IMPACT MITIGATION MEASURES**

## 7.1. Potential Environmental Impact and Risk Management

Each stage of activity in the planning and operation of the BCPCC has the potential to cause environmental impacts at the pre-construction, construction and the operation and post-operation stages. The potential environmental impacts that might occur at each stage based on the type of activity are described in the following table.

**Table 7-1. Potential Environmental Impacts**

<b>Activity Component</b>	<b>Cause of Impact</b>	<b>Type of Impact</b>	<b>Extent of Impact</b>
<b>A. Pre-Construction Stage</b>			
Permits	Permit Obtaining Activities	Community Attitudes and Perceptions	Responses and complaints, and positive and negative responses from the community towards/with the BCPCC plan
Socialization and Permits	BCPCC plan socialization and permit obtaining process	<ul style="list-style-type: none"> <li>• Positive (+) in the form of positive perceptions of residents' hopes for the construction of the BCPCC.</li> <li>• Negative (-) in the form of changes in negative attitudes and perceptions of the community towards the development plan after following and knowing the information on the BCPCC development plan.</li> </ul>	<ul style="list-style-type: none"> <li>• Complaints/protests and input from the community regarding the BCPCC plan</li> <li>• Completeness of administration and permit documents</li> </ul>
<b>B. Construction Stage</b>			

Recruitment of Construction Workers	Construction Workforce Recruitment Activities	Opening of Job Opportunities	Recruitment of 50% - 70% of the workforce is from local residents
	Construction Workforce Recruitment Activities	Increasing Community Income	Measured by the number of workers of 57 people during the construction phase and the amount of wages workers received during the construction stage.
	Construction Workforce Recruitment Activities	Community Attitudes and Perceptions	Measured by the number of local workers, according to the skills required, absorption reaches more than 50% -70% of the total workforce of 57 people
Basecamp Construction and Operations	Basecamp Construction and Operation Activities	Decrease in Surface Water Quality	Measured by the amount of waste water produced during basecamp operations, of 2.736 m <sup>3</sup> /day
	Basecamp Construction and Operation Activities	Increased Waste Generation	Waste generation during the construction phase was 46.5 L/day or 6.2 kg/day
Mobilization of Equipment and Materials	Equipment and Material Mobilization Activities	Decreased Ambient Air Quality	Measured by the percentage increase in SO <sub>2</sub> , NO <sub>2</sub> and dust levels that do not exceed ambient air quality standards according to Central Java Governor Decree No. 8 of 2001 concerning Ambient Air Quality Standards for Central Java Province

	Equipment and Material Mobilization Activities	Increased Noise	Measured from the noise level that does not exceed the quality standard of Decree of the Minister of Environment of the Republic of Indonesia Number 48/MenLH/11/1996 concerning Noise Level Standards, namely 55 dBA.
	Equipment and Material Mobilization Activities	Traffic Generation	The generation and withdrawal of material and equipment transport fleets, the number of vehicle rotations for equipment and material mobilization activities is 5-6 cycles per day.
Site Preparation	Site Preparation Activities	Decreased Ambient Air Quality	Measured by the percentage increase in SO <sub>2</sub> , NO <sub>2</sub> and dust levels that do not exceed ambient air quality standards according to Central Java Governor Decree No. 8 of 2001 concerning Ambient Air Quality Standards for Central Java Province
	Site Preparation Activities	Increased Noise	Measured from the noise level that does not exceed the quality standard of Decree of the Minister of Environment of the Republic of Indonesia Number 48/MenLH/11/1996 concerning Noise Level Standards, namely 55 dBA.



	Site Preparation Activities	Waste Generation	Measured by the amount of waste generated during land preparation.
	Site Preparation Activities	Loss of Flora and Fauna	The number of flora and fauna is decreasing
Construction of BCPCC Facilities (basic facilities, environmental protection facilities and support facilities)	BCPCC Facilities Construction Activities	Decreased Ambient Air Quality	Measured by the percentage increase in SO <sub>2</sub> , NO <sub>2</sub> and dust levels that do not exceed ambient air quality standards according to Central Java Governor Decree No. 8 of 2001 concerning Ambient Air Quality Standards for Central Java Province
	BCPCC Facilities Construction Activities	Increased Noise	Measured from the noise level that does not exceed the quality standard of Decree of the Minister of Environment of the Republic of Indonesia Number 48/MenLH/11/1996 concerning Noise Level Standards, namely 70 dBA.
	BCPCC Facilities Construction Activities	Decrease in Surface Water Quality	Measured by the amount of material spilled during construction
	BCPCC Facilities Construction Activities	Waste Generation	Measured by the amount of waste generated from leftover materials from physical construction activities, namely cement waste every day.

	BCPCC Facilities Construction Activities	Community Attitudes and Perceptions	As measured by the community's negative response to the BCPCC facility construction activities, 11.04% of the community did not agree with the BCPCC Plan
	BCPCC Facilities Construction Activities	Construction Occupational Health and Safety (K3) Issues	Measured by the number of 1-2 incidents experienced by workers out of 57 workers who experienced occupational health and safety (K3) issues
<b>C. Operational Stage</b>			
Recruitment of Operational Workers	Operational workforce recruitment activities	Open job opportunities	Measured by the number of workers involved in maintenance activities
	Operational workforce recruitment activities	Community attitudes and perceptions	Measured by the percentage of positive responses from the community towards operational workforce recruitment activities"
BCPCC Operations	BCPCC operational activities	Decreased Groundwater Quality	
	BCPCC operational activities	Increasing Community Income	Measured by the number of operational workers, reaching 50-70% of the 57 workers needed
	BCPCC operational activities	Community Attitudes and Perceptions	Measured by the community's positive and negative responses to BCPCC activities

	BCPCC operational activities	Occupational Health and Safety (K3)	Measured from the number of operational workers of 57 people
Supporting Facility Maintenance	Supporting facility maintenance activities	Environmental sanitation and aesthetic disturbances	Domestic wastewater generation is 2.736 m <sup>3</sup> /day
<b>D. Post-Operations</b>			
	BCPCC Operations	Wear/Erosion/landslide	Erosion and landslides in several parts of the breakwater
	Breakwater Maintenance	Wear/Erosion/landslide	Erosion and landslides in several parts of the breakwater
	Regular and periodic inspections	Wear/Erosion/landslide	Erosion and landslides in several parts of the breakwater
	Rehabilitation of coastal areas	Revegetation/planting of Cover Vegetation in order to increase biodiversity and ecosystem/environmental services	Improvement of microclimate and increase in land cover as well as the potential for carbon environmental services from the rehabilitation of Pekalongan City Coast

## 7.2. Potential Social Impact and Risk Management

After the completion of this project, it will promote the ecological environment of human settlements, improve the coastal condition, increase the level of resource utilization, create employment opportunities, and ecological environmental protection, which has significant ecological and social economic benefits. The project aims to develop the coastal region in an environmentally sustainable way by implementing green infrastructure and restoring natural habitats. This will enhance the area's biodiversity, provide natural flood and erosion control, filter pollutants, and absorb carbon emissions. At the same time, it will generate new jobs related to construction, maintenance, tourism, recreation, research and monitoring. The restored wetlands, mangroves, seagrass beds and coral reefs will become nursery grounds for fish, shellfish and other marine life, leading to healthier fisheries and increased food production. The project will also develop ecotourism activities like kayaking, bird watching

and snorkeling, providing alternative livelihoods. Overall, the project takes a holistic approach that balances ecological conservation, climate change resilience and community development. It will transform degraded coastlines into vibrant, productive and climate-resilient landscapes that support both people and nature. The significant ecological benefits include habitat restoration, biodiversity conservation, natural coastal protection, and carbon sequestration. The social and economic benefits include job creation, sustainable fisheries, ecotourism opportunities, recreation, research and community engagement. This project serves as a model for integrating environmental sustainability, climate adaptation and community wellbeing.

### **7.2.1. Positive Impacts of the Project**

#### **1) Improve environmental condition in coastal area**

Breakwaters are vital structures that provide coastal protection and prevent beach erosion. These massive barriers, typically constructed from rock, concrete, or even sunken ships, are built perpendicular to the shoreline and extend out into the ocean. Their purpose is to absorb the energy of incoming waves before they reach the beach. As waves approach a breakwater, they are forced to break and dissipate their energy against the sturdy structure. This disruption of the waves causes sand that is held in suspension by wave action to settle out and accumulate behind the breakwater, allowing the beach to expand and widen over time.

Without breakwaters, beaches can face severe erosion as waves continually batter the shore, pulling sand back out to sea. The constant wave action grinds rocks into smaller sediments, wearing the shoreline away. Breakwaters act as a shield, calming wave action and creating a sheltered area of water between the structure and the shore where sand can settle. Not only do they prevent further erosion, but breakwaters also encourage accretion, which is the gradual build up and expansion of the beach. This is why breakwaters are often installed in areas with receding shorelines. Their presence ensures the preservation and growth of the beach for years to come by harnessing the natural forces of waves and longshore currents for beneficial gain. Breakwaters are an important engineering solution that allows us to reshape coastlines and provide storm protection for coastal communities.

#### **2) Impact on coastal tourism and recreation**

Breakwaters can also be utilized for tourism and recreational purposes. There seems to be unanimous agreement that emerged breakwaters can sustain the tourism industry within a coastal community while still offering adequate beach protection. Coastal areas with emerged breakwaters can be attractive tourism destinations, since beach aesthetics are not interrupted. Along a coastline with beautiful sandy beaches, breakwaters that remain visible above the water's surface can provide recreational opportunities while preserving the natural beauty that draws tourists. The rock structures provide a place for people to fish, swim, or simply enjoy being near the ocean without disrupting the sweeping views.

Emerged breakwaters allow waves to continue flowing to shore, maintaining the picturesque sandy beaches that are iconic tourism destinations. Compared to submerged breakwaters which are hidden below the water, emerged breakwaters enable people to still access and enjoy the water and shoreline. Their presence above the surface adds architectural interest

and a sense of interaction with the ocean. By dampening destructive wave action, emerged breakwaters protect the beach from excessive erosion, preserving the coastal scenery and amenities that coastal towns depend on for tourism revenue. The breakwaters offer protection without marring the landscape with unsightly seawalls or jetties. Emerged breakwaters strike an ideal balance between functionality and aesthetics, serving the dual purposes of preserving beaches and enhancing recreation. Their addition to a coastline provides natural infrastructure to support tourism while maintaining the beautiful vistas that draw people year after year.

### ***3) Create job opportunities***

During the construction of this project, a diverse workforce will come together, providing employment opportunities and economic benefits for the local community. For a period of six months, the site will be abuzz with activity as managers coordinate and oversee the efforts of permanent workers and seasonal temporary laborers. At its peak, the project could employ over a hundred people, with construction crews working to transform raw materials into infrastructure. Local residents will be hired to fill many of these temporary roles, giving their families a steady income during the project timeline. The influx of workers will also create business opportunities, especially for women seeking to provide food services. Women can earn additional income while still having time to care for their children at home. When the final beam is erected and the equipment is put away, the community will be left with more than just a completed project—many residents will have new skills, work experience, and a little more money in their pockets. The temporary employment will provide stability and opportunity for months to come.

## **7.2.2. Social Risk Analysis and Negative Impact of the Project**

### ***1) Impact on ecology***

Impact can devastate fauna, flora and benthic habitats over vast expanses, as well as pelagic species in the surrounding area, annihilating environments that are crucial for the nourishment, reproduction and maturation of juveniles. The razing of seabed ecosystems tears apart intricate webs of life that dwell on the ocean floor. Lush seagrass meadows, towering kelp forests and colorful coral reefs that once teemed with fish, crustaceans, mollusks and other marine creatures are obliterated in an instant. The sediment plumes and debris fields generated by impact smother bottom-dwelling organisms accustomed to clear waters, cutting off their food supplies and ability to breathe. Even the tiniest disturbance to these fragile benthic communities can have far-reaching consequences, as so many species depend on them for food, shelter and nursery grounds.

Furthermore, the shock waves and particulate clouds produced by impact can be lethal to fish, marine mammals and other pelagic species in the vicinity. Physical trauma, blocked gills and internal injuries inflicted on these animals lead to mass die-offs. The loss of so many breeding adults and juveniles in one fell swoop can cripple populations already struggling against other human-caused pressures like overfishing, pollution and climate change. By destroying critical habitats like seagrass beds and coral reefs which act as nurseries for the young, impact obliterates the next generation and prevents recovery. The effects cascade through the food chain, toppling entire marine ecosystems that once thrived in the area. Clearly, impact poses

a severe threat not just to individual species, but to the health and resilience of ocean life as a whole.

## 2) *Impact of project construction on road traffic and normal life of residents*

The engineering construction project encompassing roads, civil works, gardens, and revetments will significantly impact the local residents living within the project boundaries. Multiple aspects of daily life will be disrupted by the upcoming construction. For instance, road excavation and muck pile removal necessary for installing underground utilities and drainage will severely obstruct normal traffic flow.

Although trucks transporting materials for constructing breakwaters will pass through the main route in Kandang Panjang, this will not cause traffic congestion, as the unloading of materials will occur far from residential areas. Apart from that, the construction process is temporary and expected to last approximately 6 months, resulting in minimal noise and air pollution that will not adversely impact the health of nearby residents.

These impacts are typical for a sub-urban construction project, but still need to be properly managed to minimize disruption. The project managers have prepared an Environmental and Social Management Plan that outlines mitigation steps like limiting noisy work to daytime hours, wetting down dirt roads to reduce dust, and having flaggers to direct traffic. As long as these measures are conscientiously followed, the negative impacts of the construction can be avoided or reduced to an acceptable level. Though there will still be some unavoidable effects, if care is taken to protect the community, the overall social risk rating can remain minor. With proactive management and community involvement, the project can proceed on schedule while keeping disturbances to a minimum.

## 3) *Social risks of labors influx*

During the construction phase, it is estimated 100 laborers outside Kandang Panjang and Bandengan will come to the project to meet the project requirements. The influx of labors may potentially lead to some social risks, such as envy on the use of outside labors for certain works, usually with certain skills. Compared to residents living in both areas, the migration labor is small amount and the social risk is minor.

Throughout the project's construction, there will be an increasing requirement for labor. To meet this demand, the contractor will hire temporary workers from the local community. Additionally, to compensate for the lack of skilled labor, the contractor will also bring in workers from other regions outside of Kandang Panjang and Bandengan. The number of incoming migrant workers is relatively very small compared to the overall population living in Kandang Panjang and Bandengan.

The key to mitigating any potential conflicts will be to maintain open and transparent communication with the leaders and local residents of both villages. By clearly articulating the necessity of bringing in outside workers with specific skills required for the project, it can help alleviate any concerns or misunderstandings that may arise. This approach can help foster a sense of understanding and collaboration between all parties involved in the project.



### 7.2.3. Proposed Mitigation Measures on Impacts Management

#### 1) Safe Construction to Minimize the Impact on People

A breakwater is an important coastal structure used to protect harbors, marinas, and shorelines from waves and currents. Breakwaters are typically made of large, heavy rocks such as granite, weighing up to 15 tons each. The rocks are carefully placed to form an artificial barrier that dissipates the energy of incoming waves. There are two main types of breakwaters - detached breakwaters that are located offshore and parallel breakwaters that run along the shore. The breakwaters to be constructed in Kandang Panjang and Bandengan is detached breakwater. Detached breakwaters are useful for protecting larger areas since waves break on them before reaching the shore. Parallel breakwaters are attached to the coast and directly protect harbors or beaches.

The design of a breakwater depends on factors like wave height, direction, and angle of approach. Breakwaters can be built straight out from shore or at an angle depending on shoreline needs. The rock used is precisely graded with the largest boulders, up to 15 tons, on the seaward side to withstand wave impacts. The rock size decreases towards shore. Concrete armor units are also sometimes used instead of just rock. The core of the breakwater is made of smaller rock or rubble. The key is using heavy materials like rock and concrete to reflect, dissipate and absorb wave energy.

During the construction phase of breakwaters project in Kandang Panjang and Bandengan, the contractor will need to transport huge sized rocks into the work area. This poses potential safety risks that must be mitigated. As these heavy materials are moved on trucks and other vehicles, extra precautions should be implemented to avoid incidents with local residents. The contractor should place large, highly visible warning signs on the roads leading to the construction area alerting drivers and pedestrians that oversized loads will be entering. These signs should be written in the local language so they are clearly understood. Along the transportation route, the contractor should also station workers to wave flags and direct traffic when the heavy trucks are moving, ensuring other vehicles give them a wide berth. When the rock materials arrive onsite, the contractor needs safety barriers setup to prevent anyone from accidentally wandering too close to the unloading area. By clearly communicating the risks and controlling the surroundings, the contractor can transport these massive construction materials while avoiding any potential accidents with neighborhood residents, keeping everyone safe. With proper precautions and planning, the contractor can smoothly bring in the vital resources needed to complete the project on schedule.

#### 2) Implement Effectively Information Disclosure and Public Participation

It is important to conduct extensive publicity throughout the duration of major infrastructure projects in order to foster open communication, build public understanding, and facilitate constructive feedback. Bulletin boards, brochures and other traditional media should be leveraged to broadly share information on project timelines, milestones, impacts and other developments. Village halls and public hearings with diverse stakeholders must be held regularly so that concerns can be voiced, questions can be answered, and solutions to

emerging issues can be debated. Organizers should take care to ensure traditionally marginalized groups like the poor, women, and minorities have ample opportunity to participate in these discussions, as their perspectives are critical to fully understanding community needs. Multiple channels should be made available for public comments and complaints, which should be carefully documented, considered and incorporated into planning and problem-solving processes. By maintaining transparency, providing education, enabling diverse participation and establishing open dialogue throughout all stages of project implementation, trust can be built, interests can be balanced, and conflicts can be minimized or avoided altogether. Proactive communication and meaningful public engagement are key to delivering projects that align with community values and priorities.

### 3) *Ensure Labor Management*

The project of constructing breakwaters in Kandang Panjang and Bandengan is expected to create a significant number of new jobs for the local community. According to estimates, the project will attract additional laborers to the area, with 40% of the new jobs going to residents in the surrounding communities. This influx of employment opportunities will provide a boost to the local economy and livelihoods. However, proper management and protection of these workers is essential.

The labor practices for the project will adhere strictly to Indonesia's national labor laws and regulations, including the Labor Law, Labor Contract Law, and Labor Protection Law. The provincial government of Central Java has also issued specific regulations to implement these national laws locally. They have passed legislation on implementing the labor contract law and labor protection regulations. Meanwhile, the local Pekalongan government will take responsibility for addressing any key issues or difficulties that come up related to the workers on this project. Their role is to guarantee the legitimate rights and interests of the laborers are protected. They will monitor the recruitment practices of employers and regulate them to ensure proper standardized procedures are followed in the management of the workers. A specific requirement is that employers must sign official labor contracts with each employee. Oversight mechanisms will also be established for monitoring labor conditions and providing an appeal process for workers' grievances.

Full details on the labor policies, regulations, and protections will be regularly disclosed through multiple information channels. This will include posting on the Pekalongan government's website, information centers, public message boards, community meetings, social media groups, and other avenues. This comprehensive approach will ensure proper treatment and transparency around the influx of new jobs and workers created by the breakwaters project in Kandang Panjang and Bandengan.

### 4) *Monitoring and Evaluation of Social Action Plan*

It is recommended to develop practical social action plans. Creating detailed, achievable plans for addressing social issues provides a roadmap for driving meaningful change. The process of developing social action plans encourages stakeholders to clearly define the problem, set measurable objectives, and outline concrete steps for implementation. Well-conceived plans consider resources needed, timelines, division of responsibilities, potential challenges, and

how impact will be tracked. They combine evidence, theory, and community input to formulate realistic solutions.

Once plans have been created, the hard work begins with implementation. It is critical that established monitoring and evaluation processes are faithfully executed. The effectiveness of the social action must be regularly assessed, with results feeding back into plan adjustments and improvements. Monitoring looks at progress made toward objectives, while evaluation analyzes how successful activities have been in producing desired changes. By continually tracking outputs and outcomes, implementers can identify what's working well and what needs modification. This allows social action plans to evolve and adapt as new information emerges, creating an iterative cycle of learning. Rigorous monitoring and evaluation enable data-driven decision making, ensuring resources are used efficiently and stakeholders remain engaged. It transforms well-intentioned plans into catalyzers of meaningful social progress.

#### 7.2.4. Poverty Impact Analysis

##### *Poverty Situation*

According to the socio-demographic data of Kandang Panjang and Bandengan, people living in and under poverty line in both villages of Kandang Panjang and Bandengan is shown in table 7-1.

**Table 7-2. Number of families living in and under poverty line**

Village Name	Number of family categorized as	
	Pre-prosperous*	Moderately prosperous**
<b>Kandang Panjang</b>	853	1.139
<b>Bandengan</b>	176	885

\* Pre-prosperous means that people are unable to meet their basic needs.

\*\* Moderately prosperous means that people have already able to meet their basic need but lacking excess income.

These numbers show that poverty in both villages is still high in terms of number. Therefore, the implementation of construction project could contribute to alleviate poor families through employment opportunities for local residents.

In an effort to alleviate poverty and improve the welfare of disadvantaged families, the government of Indonesia established the PKH (*Program Keluarga Harapan*), or Family Hope Program, under the administration of the Ministry of Social Affairs. This conditional cash transfer program provides direct financial assistance to extremely poor households, with the goal of breaking the cycle of intergenerational poverty. To receive the bimonthly cash payments, beneficiaries must fulfill certain obligations, such as ensuring children attend school regularly and receive proper healthcare and immunizations. Mothers are also required to attend prenatal checkups and nutritional counseling sessions. By tying the aid to these human capital investments, the objective is to not only provide immediate relief, but to also

empower families to lift themselves out of poverty in the long run. Rigorous impact evaluations have shown the program to be successful in boosting consumption and food security, keeping children in school for longer, and improving healthcare utilization and outcomes. While more work remains to be done, the PKH represents an important step for Indonesia in establishing a social safety net and using conditional cash transfers to alleviate hardship for its most vulnerable citizens. With continued commitment and refinement of the program's design and implementation, the PKH can have lasting impacts on reducing intergenerational transmission of poverty.

The prosperity of the family impacts the situation of educational level, access to health service, and employment. When a family is financially stable, it can provide better opportunities for its members to pursue higher education, leading to a more knowledgeable and skilled workforce. Additionally, having access to quality healthcare becomes easier, ensuring the well-being of the family members. Moreover, financial stability enables individuals to secure stable employment, leading to a more secure future for the family as a whole.

### *The Effect of Poverty Alleviation*

The result of FGD conducted in both villages showed that local residents are fully supporting the project construction and believe that the implementation of this project is conducive to improving the ecological environment and promoting economic development. After completion of this project, the following benefits will be generated for the poor in the project area.

- Promote the poor people to enjoy dividends. Through the establishment of interest linkage mechanisms with poor households, it provides employment for the poor, such as cleaning and security.
- Improve the quality of the living environment of the poor. Through the construction of Rubble Mound breakwaters, we can give full play to the ecological benefits, help to reduce flood, maintain soil and water, be beneficial to human health, and effectively reduce the number of people who are poor due to illness.

### **7.2.5. Gender and Social Inclusion Analysis**

Women are the main beneficiaries of this project, and their opinions are indispensable for the smooth implementation of the project and the maximization of social benefits. Women's right to participation should be guaranteed to promote equal opportunities for men and women to benefit from the project.

Women are one of main beneficiaries of this project, and their opinions are indispensable for the smooth implementation of the project and the maximization of social benefits. Ensuring women have an active voice and role is crucial, as they are the ones who stand to gain the most from the project's success. Their input as stakeholders provides critical insight into how the project can best meet their needs and empower them. By consulting women and incorporating their feedback into the project's design and execution, implementers can gain key information directly from the ground about the realities women face, the challenges they

encounter, and their goals and aspirations. With women at the table providing their perspectives, the project can be tailored to effectively target and alleviate the specific barriers holding women back, like lack of access to resources, education, and opportunities. Their participation lends legitimacy and buy-in that will aid adoption and sustainability.

Furthermore, guaranteeing women's right to participation promotes equal opportunities for men and women to benefit. When women are given an equal chance to shape initiatives intended to help them, it signals that their voices and experiences matter just as much as men's. They are treated as valued partners whose contributions are vital, not passive recipients of aid. By actively engaging women, the playing field is leveled so women can gain new skills, connections, and confidence to create positive change in their lives and communities. Structural gender inequalities are challenged instead of reinforced. With equal participation rights, women are empowered to take ownership of their development and growth. The project gains responsiveness and relevance to women's needs. Overall, ensuring women's full participation rights creates a more just, equitable environment for women to thrive alongside men.

### *Women's rights and status*

Women's rights and interests have long been marginalized in many societies, but Indonesia has made significant strides in recent decades to promote gender equality through progressive laws and policies. The issuance of Presidential Instruction No 9 in the year 2000 marked a major milestone in the country's commitment to upholding women's rights. This landmark directive mandates that women must have equal standing as men across all aspects of Indonesian society - whether in politics, economics, culture, social norms, family life, property ownership, or individual freedoms.

The comprehensive scope of Presidential Instruction No 9 seeks to dismantle gender bias and discrimination that have historically disadvantaged Indonesian women. It asserts that women must have the same opportunities as men to participate in decision-making, access education, pursue careers, own and inherit property, get paid fair wages, receive healthcare, and more. The policy is designed to empower women economically, socially, and politically. It also affirms women's reproductive rights and their equal roles within marriage and childrearing. Adherence to the principles of gender equality outlined in Presidential Instruction No 9 is required of all government bodies and officials. This obligation indicates that women's equality is not merely an ideal, but a legal right to be actively upheld nationwide.

While full equality has not yet been achieved, Presidential Instruction No 9 provided a crucial legal framework to propel and safeguard the advancement of Indonesian women. It reflects the nation's growing recognition that gender equity strengthens families, communities, and the country as a whole. The policy's comprehensive approach aims to systematically dismantle barriers and open doors for women in every sphere. Two decades after its issuance, Presidential Instruction No 9 continues to guide Indonesia's efforts to fulfill its constitutional promise of justice for all citizens regardless of gender.

### *Field Findings on Gender Analysis*

The discussion revealed that women's participation in public affairs across the project area is unfortunately lagging behind that of men. While some progress has been made in recent years towards gender equality, women remain underrepresented in leadership roles and decision-making processes at both local and regional levels. Several complex and interrelated factors contribute to limiting women's public participation. Traditional gender norms that associate leadership and authority with masculinity persist. This translates into fewer opportunities for women to take on visible community positions. Patriarchal attitudes also lead to women having less access to education and resources needed to meaningfully engage in civic life. Additionally, women's domestic responsibilities like childcare and housework constrain their time and mobility. Without support systems in place enabling women's participation, they face barriers to attending community meetings, voicing opinions, holding offices, and shaping policies. The discussion underscores the need for targeted measures to empower women, challenge structural inequities, and create a more inclusive environment. Achieving gender balance in public affairs will require changes to deep-rooted social biases as well as institutional reforms. With coordinated efforts on multiple fronts, women's participation can be expanded to tap into their immense potential for contributing to society. But the discussion makes clear there are still major obstacles to overcome before reaching gender parity in the public sphere.

### *The Project Impact on Women*

#### *1) Provide employment opportunities for women*

The focus group discussions revealed that there is an appetite for employment opportunities among women in the community. Many women expressed a positive attitude toward working, with some even voicing a desire to participate directly in the breakwater construction activities. These women are eager to receive the relevant technical training that would enable them to actively contribute their labor and develop valuable construction skills during the project. Beyond just being beneficiaries, the women see themselves as a capable workforce ready and willing to learn.

The project planners aim to be inclusive of women and vulnerable groups in the jobs created throughout the construction and operational phases. An estimated hundred positions will be designated for female workers specifically, largely consisting of support roles like cleaners and food vendors that require no prior technical knowledge. While not directly participating in the engineering and building work, this influx of service jobs in the community will provide income-generating opportunities for women that previously did not exist.

For many local women, this project represents a chance to gain financial independence, support their families, and prove their competency in non-traditional work. The construction of the breakwaters will not just bring physical structures to the area, but has the potential to instill confidence and transform mindsets around women in the workforce. With access to training and employment, this untapped labor pool of motivated women can make tangible contributions to the project's success.



## 2) *Encourage women to participate and promote women's development*

The Adaptation Fund (AF) has made significant strides in empowering and uplifting women through its climate finance projects. As stated, the fund has always placed a strong emphasis on encouraging women's participation and safeguarding their rights and interests. This commitment is evident in the fund's efforts to actively engage women in surveys, focus groups, and other forms of stakeholder consultation. For any given project survey, the AF aims for at least 30 percent female participation. This quota ensures that women's voices are heard and their perspectives are accounted for when designing climate adaptation initiatives. By directly consulting women and incorporating their feedback, the fund creates projects that are more responsive to female needs and priorities. The involvement of women also enables the identification of gender-specific climate impacts, allowing interventions to be tailored accordingly. Beyond surveys, the AF strives to provide women with access to climate finance and training opportunities. The fund mandates that women receive equitable access to any jobs, skills training, leadership roles, and other benefits generated by its projects. These measures empower women socioeconomically and close gender gaps exacerbated by climate change impacts. Overall, the Adaptation Fund's commitment to including women has enabled more inclusive, women-friendly adaptation solutions. With women directly shaping projects and gaining opportunities, the AF is creating development pathways that uplift and protect females against the threats of climate change. The fund's progressive gender policies provide a model for how climate finance mechanisms can promote equity and social justice.

## 3) *Increase income for women*

Women are the beating heart of many families, tirelessly working to keep their loved ones afloat financially while also tending to the endless duties of the household. For female-headed households, the pressures can feel crushing as women heroically shoulder the full burden of providing for and protecting their families. The implementation of this project offers a glimmer of hope, a chance for women to finally take a full breath. With training and employment opportunities made possible by the initiative, women can increase their disposable income and inch closer to economic stability and self-sufficiency. The project's completion ushers in a new chapter, transforming the rural environment into one ripe for tourism and the jobs it spawns. From hotels to restaurants, cleaning services to tour guides, women can access a range of roles to supplement their income. Financial freedom liberates women, allowing them to live fuller, more empowered lives and gain a stronger foothold in their local economies. The project lifts heavy clouds that once darkened women's days, letting the warm sun finally shine down on them as they stand tall, equal partners providing for their families.

## 4) *Improve women's ability to participate in public affairs*

Women's participation in decision-making in public affairs is the most direct and fundamental reflection of women's social status. During the construction of this project, women participated in various trainings, received various interviews, and communicated with government, business and other departments so they can gain a variety of information and knowledge, understand the relevant current policies and regulations and express their

opinions. This experience will increase women's awareness of public affairs participation and help women improve their ability to participate in public affairs.

The involvement of women in making important choices that affect the public sphere is a clear indicator of the position women hold in society. Throughout the development of this initiative, women were actively engaged through numerous educational sessions and discussions where they could acquire extensive knowledge on current laws and guidelines. Women connected with governmental, commercial, and other entities to collect diverse insights and viewpoints. They had opportunities to voice their perspectives through interviews and exchanges with officials and leaders. Gaining exposure to the policymaking process in this way enlightens women about participating in civic matters and strengthens their capacity to have input on public decisions and discourse. As women gain more experience collaborating with influential stakeholders and wielding their influence in the public realm, it validates their standing and ability to shape society. Expanding participation takes dedicated effort but is essential for actualizing gender equality.

During the implementation of the project, the PMU and the implementing agency need to pay careful attention to the positive impact the project can have on local women in the area and carry out thoughtful actions to support and empower them. Specifically, they should coordinate with contractors to prioritize hiring female laborers, both for project construction and ongoing operations. The PMU can recommend qualified women workers by partnering with the local women's federation to source candidates. Throughout the project, from start to finish, the PMU should closely monitor metrics related to female participation, including the number of women employed for construction and operations, the number of women in nearby villages working in agriculture who stand to benefit, the number of women who utilize technical training opportunities, and trends in income for women in households impacted by the project. Additionally, the PMU should make special efforts to organize women's consultation groups and focus groups related to project implementation and employment, to ensure women have a voice in the process. Taking these steps to promote employment, skills training, and engagement of women will allow the project to have a positive impact on gender equality and women's empowerment in the local area. The actions described should be formalized as part of a comprehensive social development action plan.

## **8. ENVIRONMENTAL AND SOCIAL ACTION AND IMPLEMENTATION PLAN (ESMP)**

## 8.1. Basic Principles

As a part of the ESIA, an Environmental and Social Management Plan (ESMP) is a safeguards instrument that is typically used in many projects and which consists of information on and guidance for the process of mitigating and managing adverse environmental impacts throughout project implementation. Typically, an ESMP comprises a list of typical mitigation measures to be carried out by contractors, an environmental monitoring program, organization arrangements, and an estimated monitoring cost.

There is a comprehensive regulatory framework in Indonesia related to ESIA preparation, environmental standards, protection and management of forest and cultural property, and other aspects related to construction and operation of facilities and infrastructures in Indonesia. This ESMP is consistent with these regulations.

To facilitate effective implementation of the ESMP, the PMU will: (a) Establish an Environment and Social Unit (ESU) responsible for ensuring timely implementation of the ESMP, including monitoring, reporting, and capacity building related to safeguards; (b) Assign the Construction Supervision Consultant (CSC) to also be responsible for supervision of the contractor's safeguard performance as part of the construction contract and this requirement will be included in the CSC's terms of reference; and (c) Hire qualified national consultants as the Independent Environmental Monitoring Consultant (IEMC) to assist the ESU in performing its task.

In terms of laying out the mitigation measures of the ESMP, there are two fundamental parts to this ESMP. Firstly, the Pekalongan Local Government, specifically the Office of Public Works and Resettlement has developed and will use Urban Construction Environmental Codes of Practice (ECOPs). These ECOPs outline typical generic low-level impacts that can be expected to occur in a wide range of construction activities of the project. They include mitigation measures for these impacts and a process for including them in the construction contracts of contractors. During the detailed design of technical specifications for each contract, the technical design consultant will incorporate into the contract the parts of the ECOPs specific to that contract, as well as the specific measures identified in the ESMP.

## 8.2. Key Mitigation Measures

Below are the mitigation measures themselves. Types of impacts covered in this document are:

- Dust generation
- Air pollution
- Impacts from noise and vibration
- Water pollution
- Drainage and sedimentation control
- Management of stockpiles, quarries, and borrow pits
- Solid waste
- Management of dredged materials
- Disruption of vegetative covers and ecological resources
- Traffic management

- Interruption of utility services
- Restoration of affected areas
- Worker and public safety
- Communication with local communities
- Chance findings

### 8.3. Environmental Monitoring Program

#### 8.3.1. Objectives and Approach

The main objective of the Environment Monitoring program is to ensure that (a) the potential negative impacts of the project are minimized; (b) the ESMP is effectively implemented; and (c) the ESMP is adequate to mitigate the potential negative impacts. Given that monitoring the implementation of the Breakwater RP will be conducted separately, the environmental monitoring program will comprise (a) monitoring the safeguard performance of the contractor during site clearance and construction, (b) environmental quality monitoring, (c) monitoring effectiveness of the ESMP.

#### 8.3.2. Monitoring of Contractor's Safeguard Performance

Three levels of safeguard monitoring will be implemented: routine monitoring, periodic monitoring, and community monitoring as follows:

- Routine monitoring: The routine monitoring will be made by the Construction Supervision Consultant (CSC) as assigned by PMU. The CSC will include the monitoring results in the project progress reports.
- Periodic monitoring (every six months): As part of the overall monitoring of the ESMP, the ESU assisted by the Independent Environmental Monitoring Consultant (IEMC) will also monitor the contractor performance every 6 months and the results will be reported to the PMU and the WB.
- Community monitoring: Monitoring by local communities will be conducted following the Government practices with the technical and management support from the PMU.

#### 8.3.3. Environmental Quality Monitoring

To ensure an acceptable level of environmental quality, monitoring of dust, noise, vibration, air quality, and water quality will be made at project specific locations that are likely to be significantly affected by the construction activities, or requested by local authorities and communities for specific purposes. ESU/IEMC will be responsible for the monitoring of the program.

The potential environmental impacts, environmental management standards and environmental monitoring standard is shown in Table 8-1.

**Table 8-1. Potential Environmental Impacts, Environmental Management Standards  
And Environmental Monitoring Standards**

No	ENVIRONMENTAL IMPACT			ENVIRONMENTAL MANAGEMENT STANDARDS			ENVIRONMENTAL MONITORING STANDARDS			Environmental Management and Monitoring Institution	Notes
	Source of Impact	Type of Impact	Magnitude of Impact	Management	Location	Period	Monitoring	Location	Period		
1	PRE-CONSTRUCTION STAGE										

a.	Management of permits/approvals/ commitments of persons responsible for shares and/or activities	Protection of coastal areas in Pekalongan City	<ul style="list-style-type: none"> <li>All permits required for Breakwater Construction can be completed quickly and precisely.</li> <li>The time frame for carrying out construction work is in accordance with the schedule and there is no delay in the auction process;</li> </ul>	In the process of processing this permit will be carried out Complete administrative equipment prepared in accordance with the requirements required for approval/recommendation and feasibility of the BCPCC plan. Submission of Cover Letter for Application for Approval according to the scope of approval requirements requested.	<ul style="list-style-type: none"> <li>Government Agencies at the Pekalongan City level</li> <li>Central Java Government</li> <li>Relevant vertical agencies that have authority in recommendations and technical approval of the feasibility of the BCPCC development plan</li> </ul>	All initial permits are completed before construction takes place	<p><u>Monitored indicators:</u> Initial approval has been approved by the competent government agency in stages</p> <p><u>Data collection method:</u> Ensure that all files and letters have been approved by the competent government.</p> <p><u>Data analysis method:</u> Data is analyzed descriptively to ensure all required permits have been approved</p>	<ul style="list-style-type: none"> <li>Government agencies at the Pekalongan City level, Central Java Government</li> <li>The relevant vertical agency has the authority to provide recommendations and technical approval for the feasibility of the BCPCC development plan</li> </ul>	Once during construction period	<p><b>a. Executor:</b> Pekalongan City Tourism, Culture, Youth and Sports Department</p> <p><b>b. Supervisor:</b></p> <ul style="list-style-type: none"> <li>Marine and Fisheries Ministry</li> <li>Central Java Province Environment and Forestry Service</li> <li>BBWS Pemali Juana</li> <li>Central Java Province Water Resources and Spatial Planning (PUSDATARU) Service</li> <li>Central Java Province Maritime and Fisheries Service</li> <li>Pekalongan City Environmental Service</li> <li>Pekalongan City Public Works Department</li> </ul> <p><b>c. Reporting:</b></p> <ul style="list-style-type: none"> <li>Central Java Province Environment and Forestry Service</li> </ul>	-
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										<ul style="list-style-type: none"><li>• Pekalongan City Environmental Service</li></ul>	
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b.	Socialization of BCPCC plans	The emergence of public perception and attitudes and concerns regarding the BCPCC development plan	<ul style="list-style-type: none"> <li>Community complaints and concerns regarding development plans</li> <li>Protests and actions that cause obstacles to BCPCC</li> </ul>	<ul style="list-style-type: none"> <li>Coordinate with related stakeholder elements and prepare an agenda for the socialization of the Breakwater Development plan</li> <li>Convey plans and stages of breakwater development clearly and completely, including the potential environmental impacts that could be caused to the community;</li> <li>Announce plans and stages of breakwater construction clearly and completely, including potential</li> </ul>	<ul style="list-style-type: none"> <li>Kandang Panjang Urban Village</li> <li>Communities adjacent to the Breakwater Construction site location, such as communities in Panjang Baru, Kandang Panjang urban village, North Pekalongan subdistrict, Pekalongan City</li> </ul>	Carried out two (2) times during the pre-construction process	<p><u>Monitored indicators:</u></p> <ul style="list-style-type: none"> <li>Schedule of outreach activities</li> <li>implementation of the function of the complaint forum for suggestions and public responses</li> <li>Complaints/protests/public perception of the company's planned activities</li> </ul> <p><u>Data collection method:</u></p> <ul style="list-style-type: none"> <li>Conduct interviews regarding community perceptions of BCPCC activities</li> <li>Make news of socialization events, recapitulate the implementation of the complaint forum for suggestions and responses from the public,</li> </ul>	Communities adjacent to the Breakwater Construction site location, such as communities in Panjang Baru, Kandang Panjang urban village, North Pekalongan subdistrict, Pekalongan City	Carried out once during the Pre-Construction period	<p><b>a. Executor:</b> Pekalongan City Tourism, Culture, Youth and Sports Department</p> <p><b>b. Supervisor:</b></p> <ul style="list-style-type: none"> <li>Central Java Province Environment and Forestry Service</li> <li>BBWS Pemali Juana</li> <li>Central Java Province PUSDATARU Service</li> <li>Central Java Province Maritime and Fisheries Service</li> <li>Pekalongan City Environmental Service</li> <li>Pekalongan City Public Works Department</li> </ul> <p><b>c. Reporting:</b></p> <ul style="list-style-type: none"> <li>Environment and Forestry Service</li> <li>province of Central Java</li> <li>BBWS Pemali Juana</li> <li>Central Java Province</li> </ul>	-
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				<p>environmental impacts that may arise, through notice boards or invitations at the village head and sub-district offices</p> <ul style="list-style-type: none"> <li>• Convince the local community of the impact of development</li> <li>• BCPCC will be managed well according to the stages of implementation of development activities that will be carried out. BCPCC will have many positive impacts on the community, namely controlling</li> </ul>			<p><u>Data analysis method:</u></p> <ul style="list-style-type: none"> <li>• The data obtained was analyzed using simple tabulation and descriptive analysis. The results of the analysis are compared with the initial environmental baseline conditions to determine the condition of public perception</li> </ul>			<p>PUSDATARU Service</p> <ul style="list-style-type: none"> <li>• Central Java Province Maritime and Fisheries Service</li> <li>• Pekalongan City Environmental Service</li> <li>• Pekalongan City Public Works Department.</li> </ul>	
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				<p>coastal damage.</p> <ul style="list-style-type: none"><li>• Providing a means for community complaints and suggestions</li></ul>								
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c.	Determination of Land Delineation	The emergence of social conflict	<ul style="list-style-type: none"> <li>A number of people around the location are worried about land takeover</li> </ul>	<ul style="list-style-type: none"> <li>Empowering communities who work the land is a top priority within the BCPCC Pekalongan to act as a workforce or business partner for BCPCC Development Plan activities</li> <li>Negotiating to create agreements and conflict solutions</li> <li>Cooperate and/or coordinate with relevant stakeholders (sub-district, subdistrict government, etc.) to reduce conflict</li> </ul>	Communities adjacent to the Breakwater Construction site location, such as communities in Panjang Baru, Kandang Panjang urban village, North Pekalongan subdistrict, Pekalongan City	Adapted to times of community unrest	<p><u>Monitored indicators:</u> Reports on conflict-causing incidents and conflict handling reports</p> <p><u>Data collection method:</u> Carrying out field observations/observations regarding community concerns/concerns regarding planned activities, especially activities for settling cultivated land. Conduct interviews with the community regarding land settlement agreements.</p> <p><u>Data analysis method:</u> The data is analyzed descriptively to see the number of cases of conflict and the implementation of conflict resolution."</p>	Communities adjacent to the Breakwater Construction site location, such as communities in Panjang Baru, Kandang Panjang urban village, North Pekalongan subdistrict, Pekalongan City	Once during the pre-construction stage	<p><b>a. Executor:</b> Pekalongan City Tourism, Culture, Youth and Sports Department</p> <p><b>b. Supervisor:</b></p> <ul style="list-style-type: none"> <li>Marine and Fisheries Ministry</li> <li>Central Java Province Environment and Forestry Service</li> <li>Central Java Province PUSDATARU Service</li> <li>Central Java Province Maritime and Fisheries Service</li> <li>Pekalongan City Environmental Service</li> <li>Pekalongan City Public Works Department.</li> </ul> <p><b>c. Reporting:</b></p> <ul style="list-style-type: none"> <li>Ministry of Marine and Fisheries</li> <li>Central Java Province Environment and Forestry Service</li> <li>Central Java Province</li> </ul>
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										PUSDATARU Service <ul style="list-style-type: none"> <li>• Central Java Province Maritime and Fisheries Service</li> <li>• Pekalongan City Environmental Service</li> <li>• Pekalongan City Public Works Department.</li> </ul>	
<b>2 CONSTRUCTION STAGE</b>											
a.	Work Area Boundaries and Arrangement										



	Work Area Boundaries and Arrangement	Emergency of conflict	The length of the outer boundary of the area requested for BCPCC is 2 X 150 m	<ul style="list-style-type: none"> <li>• Create boundaries in the field by involving elements of the local community/fishermen and relevant policy makers (KSOP, Maritime Affairs and Fisheries Service) who understand the boundaries and coastal areas.</li> <li>• Make boundaries in the field properly and correctly in accordance with guidelines for coastal area boundaries in Pekalongan City in accordance with Central Java</li> </ul>	The area of the coastal area requested for the BCPCC development plan	Carried out at the beginning of the construction period	<p><u>Monitored indicators:</u> The number of community conflicts that occurred and the solutions provided to handle the conflicts</p> <p><u>Data collection method:</u> Conduct direct interviews with the community regarding plans for demarcating and arranging the boundaries of the Pekalongan City Coastal Breakwater area Conduct interviews with the community regarding location points the existence of sacred areas. Observe and monitor in the field regarding the length of the boundaries that have been set.</p> <p><u>Data analysis method:</u> - The data is analyzed descriptively by</p>	The area of the coastal area requested for the BCPCC plan.	This is done once before construction is carried out	<p><b>a. Executor:</b> Pekalongan City Tourism, Culture, Youth and Sports Department</p> <p><b>b. Supervisor:</b></p> <ul style="list-style-type: none"> <li>• Marine and Fisheries Ministry</li> <li>• Central Java Province Environment and Forestry Service</li> <li>• Central Java Province PUSDATARU Service</li> <li>• Central Java Province Maritime and Fisheries Service</li> <li>• Pekalongan City Environmental Service</li> <li>• Pekalongan City Public Works Department.</li> </ul> <p><b>c. Reporting:</b></p> <ul style="list-style-type: none"> <li>• Ministry of Marine and Fisheries</li> <li>• Central Java Province Environment and Forestry Service</li> <li>• Central Java Province</li> </ul>	
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				Province Regional Regulation (PERDA) Number 13 of 2018 <ul style="list-style-type: none"> <li>• Zoning Plan              for Coastal              Areas and              Small              Islands              Central Java              Province              2018-2038</li> </ul>			taking into account aspects of the authority to provide recommendations/a pproval for coastal use.			PUSDATARU Service <ul style="list-style-type: none"> <li>• Central Java              Province              Maritime and              Fisheries Service</li> <li>• Pekalongan City              Environmental              Service</li> <li>• Pekalongan City              Public Works              Department.</li> </ul>	
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b.	Labor Recruitment
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1	Recruitment of construction workers	Community Perceptions and Attitudes, Jealousy of migrant workers	<ul style="list-style-type: none"> <li>• Jealousy of the people in the area of the Breakwater Development site plan towards migrant workers</li> <li>• Potential for social conflict, local residents and even protests over dissatisfaction with the recruitment process,</li> </ul>	<ul style="list-style-type: none"> <li>• Prioritize project workforce from local residents.</li> <li>• Carry out a social approach to the community in the Kandang Panjang sub-district, North Pekalongan sub-district, Pekalongan City and surrounding areas to accommodate the aspirations and opinions accommodated by representatives of the affected communities</li> </ul>	Kandang Panjang urban village, North Pekalongan subdistrict, Pekalongan City	During the construction period, every 6 months	<p><u>Monitored indicators:</u> Community concerns regarding migrant workers</p> <p><u>Data collection method:</u> Conduct direct field visits and continue with interviews with affected communities to find out about local workforce recruitment.</p> <p><u>Data analysis method:</u> Monitoring data is analyzed to determine trends in changes in workforce acceptance.</p>	Kandang Panjang urban village, North Pekalongan subdistrict, Pekalongan City	During the construction period, every 6 months	<p><b>a. Executor:</b></p> <ul style="list-style-type: none"> <li>• Pekalongan City Tourism, Culture, Youth and Sports Office</li> <li>• Construction Service Providers</li> </ul> <p><b>b. Supervisor:</b></p> <ul style="list-style-type: none"> <li>• Central Java Province Environment and Forestry Service</li> <li>• PUSDATARU Service, Central Java Province</li> <li>• Pekalongan City Environmental Service</li> <li>• Pekalongan City Public Works Department.</li> </ul> <p><b>c. Reporting:</b></p> <ul style="list-style-type: none"> <li>• Central Java Province Environment and Forestry Service</li> <li>• Provincial PUSDATARU Service. Central Java</li> <li>• Pekalongan City Environmental Service</li> <li>• Pekalongan City Public Works Department</li> </ul>	-
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			<p>The number of people accepted for work is 75 people with a local community percentage of 70%-80% needed for construction implementation</p>	<ul style="list-style-type: none"> <li>• Install announcement boards in sub-district offices and company offices regarding the need for hiring workers by stating the number and qualifications</li> <li>• Prioritize local workers in recruiting workers for the construction phase.</li> </ul>	<p>Communities adjacent to the Breakwater Construction site location, such as communities in Panjang Baru, Kandang Panjang urban village, North Pekalongan subdistrict, Pekalongan City</p>	<p>During the construction period</p>	<p><u>Monitored indicators:</u></p> <ul style="list-style-type: none"> <li>• The process of recruiting workers for the construction phase</li> <li>• Employment contract</li> <li>• Implementation of employee recruitment announcements</li> </ul> <p><u>Data collection method:</u> Conduct direct monitoring and interviews of the number of workers who have registered and ensure that the workers who register meet the required qualifications</p> <p><u>Data analysis method:</u> Job opportunity presentations are analyzed by counting the numbers labor force participation</p>	<p>Communities adjacent to the Breakwater Construction site location, such as communities in Panjang Baru, Kandang Panjang urban village, North Pekalongan subdistrict, Pekalongan City</p>	<p>During the construction period it takes place every 6 months</p>	<p><b>Executor:</b></p> <ul style="list-style-type: none"> <li>• Pekalongan City Tourism, Culture, Youth and Sports Department</li> </ul> <p><b>Supervisor:</b></p> <ul style="list-style-type: none"> <li>• Marine and Fisheries Ministry</li> <li>• Central Java Province Environment and Forestry Service</li> <li>• Central Java Provincial PUSDATARU Service</li> <li>• Pekalongan City Environmental Service</li> <li>• Pekalongan City Public Works Department.</li> <li>• North Pekalongan Subdistrict Government</li> </ul> <p><b>Reporting:</b></p> <ul style="list-style-type: none"> <li>• Central Java Province Environment and Forestry Service</li> <li>• Pekalongan City Environmental Service</li> </ul>
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		Increased Community Income	Community income increased after the recruitment of 10 construction workers	<ul style="list-style-type: none"> <li>• Enter into work agreements with workers</li> <li>• Pay labor wages in accordance with the agreement stated in the employment agreement.</li> <li>• Follow the rules related to employment law.</li> </ul>	Communities adjacent to the Breakwater Construction site location, such as communities in Panjang Baru, Kandang Panjang urban village, North Pekalongan subdistrict, Pekalongan City	During the construction period, every 6 months	<p><u>Monitored indicators:</u></p> <ul style="list-style-type: none"> <li>• The amount of wages paid to workers</li> <li>• Ensure to follow the rules regarding employment laws</li> <li>• Increase in community income</li> </ul> <p><u>Data collection method:</u></p> <ul style="list-style-type: none"> <li>• Conduct direct interviews with the community regarding increasing community income.</li> <li>• Secondary data collection is in the form of minutes of coordination with relevant stakeholders</li> </ul> <p><u>Data analysis method:</u> Data are analyzed using simple tabulation and descriptive analysis to determine</p>	Communities adjacent to the Breakwater Construction site location, such as communities in Panjang Baru, Kandang Panjang urban village, North Pekalongan subdistrict, Pekalongan City	During the construction period, every 6 months	<p><b>Executor:</b> Pekalongan City Tourism, Culture, Youth and Sports Department &amp; Construction service provider</p> <p><b>Supervisor:</b></p> <ul style="list-style-type: none"> <li>• Marine and Fisheries Ministry</li> <li>• Central Java Province Environment and Forestry Service</li> <li>• Central Java Provincial PUSDATARU Service</li> <li>• Pekalongan City Environmental Service</li> </ul> <p>Pekalongan City Public Works Department.</p> <p><b>Reporting:</b></p> <ul style="list-style-type: none"> <li>• Central Java Province Environment and Forestry Service</li> <li>• Central Java Provincial PUSDATARU Service</li> <li>• Pekalongan City Environmental Service</li> </ul>	-
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							people's income levels				
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c.	Mobilization of Equipment and Materials	Decreased Ambient Air Quality and increased dust (dust generation /TSP)	Increased levels of SO <sub>x</sub> , NO <sub>x</sub> , CO, CO <sub>x</sub> , and Pb Emissions and dust particles	<ul style="list-style-type: none"> <li>Regularly sprinkling equipment and/or material transportation routes with water, especially during the dry season around residential areas people passing through,</li> <li>Using a vehicle fit for operation;</li> <li>Cover the vehicle bed with a tarpaulin to cover cargo that is at risk of falling when transporting equipment and/or materials.</li> <li>Not transport equipment and/or materials exceeding the dimensional</li> </ul>	Jl. Sari Beach, Jl Kunti Utara and Jl. Samudera Residential Settlements of Kandang Panjang and Panjang Wetan Urban Villages, North Pekalongan Subdistrict.	Carried out at least once a month during the construction period	<p>Monitored indicators: Road conditions, condition of vehicle tires when leaving the site, use of tarpaulin, operational vehicles used, vehicle speed, and vehicle rotation</p> <p>Data collection method: Carry out routine monitoring of the vehicles used to ensure that each car component functions properly so that it does not cause excessive emissions. Observe the routine/schedule of incoming and outgoing vehicles.</p> <p>Data analysis method: Observation data and activity reports are analyzed descriptively.</p>	Location of air monitoring point on Jl. Sari Beach and Jl. Samudera, 6° 51'33.52"S; 109°41' 14.14"89) Jl Kunti Utara, 6° 51'26.84"S; 109°40' 36.31"S), Kandang Panjang 6° 51'41.72"S; 109°40'40.32"S ) Panjang Wetan 6° 51'32.30"S; 109°41' 07.71"S)	Carried out every 6 months during the construction phase.	<p>Executor: Pekalongan City Tourism, Culture, Youth and Sports Department</p> <p>Supervisor: Central Java Province Environment and Forestry Service Central Java Provincial Transportation Department, Central Java PUSDATARU Service Pekalongan City Environmental Service Pekalongan City Transportation Department. Pekalongan City PUPR Department.</p> <p>Reporting: Central Java Province Environment and Forestry Service Central Java PUSDATARU Service Pekalongan City Environmental Service</p>	-
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		<p>Monitored indicators: Road conditions , condition of vehicle tires when leaving the site, use of tarpaulin, operational vehicles used, vehicle speed, and vehicle rotation</p> <p>Data collection method: Carry out routine monitoring of the vehicles used to ensure that each car component functions properly so that it does not</p>		<p>capacity specified according to the type of vehicle (not ODOL)</p> <ul style="list-style-type: none"> <li>• Carry out maintenance and replace components on the vehicle regularly.</li> <li>• Limiting the speed of transport vehicles when passing through residential areas and dirt roads that have the potential to generate dust.</li> <li>• Installation of operational vehicle stickers for transporting construction materials for the Pekalongan City</li> </ul>								<p>Pekalongan City Public Works Department.</p>
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		<p>cause excessive emissions. Observe the routine/schedule of incoming and outgoing vehicles.</p> <p>Data analysis method: - Observati on data and reports activities are analyzed descriptiv ely. Location of air monitoring point on Jl. Sari Beach and Jl. Ocean, 6° 51'33.52" S; 109°41' 14.14"89)</p>		<p>Breakwater Construction</p>							
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		<p>JI Kunti Utara, 6° 51'26.84" S; 109°40' 36.31"S) Kandang Panjang Residentia I Settlemen t 6° 51'41.72" S; 109°40'40 .32"S)</p> <p>Long Residentia I Settlemen t Wetan 6° 51'32.30" S; 109°41' 07.71"S)</p> <p>Carried out every 6 months during the constructi on phase.</p> <p>Executor: Pekalonga n City</p>								
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		<p>Tourism, Culture, Youth and Sports Departme nt</p> <p>Superviso r: Central Java Province Environm ent and Forestry Service Central Java Provincial Transport ation Departme nt, Central Java Provincial PUSDATA RU Service Pekalonga n City Environm ental Service Pekalonga n City Transport ation</p>									
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		<p>Departme nt. Pekalonga n City PUPR Departme nt.</p> <p>Reporting: Central Java Province Environm ent and Forestry Service Provincial PUSDATA RU Service. Central Java Pekalonga n City Environm ental Service Pekalonga n City Public Works Departme nt.</p>									
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		Increased noise	Increased effects of noise exposure from vehicles transporting equipment & materials > 55 dBA	<ul style="list-style-type: none"> <li>The maximum vehicle speed limit is 40 km/hour.</li> <li>Do not sound the vehicle horn when entering residential areas at residents</li> <li>Carry out maintenance and replace components on the vehicle regularly.</li> <li>Limiting the speed of transport vehicles when traveling on dirt roads that have the potential to generate dust.</li> <li>Do not carry out equipment and material mobilization activities during peak</li> </ul>	Jl Kunti Utara and Jl.Samudera Planned location of BCPCC construction	Carried out at least once a month during the construction period	<p>Monitored indicators: Send the vehicle according to the operating period and complete vehicle documents; Road conditions, condition of vehicle tires when leaving the site, use of tarpaulin, operational vehicles used, vehicle speed, and vehicle rotation</p> <p>Data collection method: Carry out routine monitoring of the vehicles used to ensure that each car component functions properly so that it does not cause excessive emissions. Observe the routine/schedule of incoming and outgoing vehicles.</p> <p>Data analysis method: Observation data and activity reports</p>	<p>Location of noise monitoring points on Jl. Sari Beach and Jl. Ocean, 6° 51'33.52"S; 109°41' 14.14"89) Jl Kunti Utara, 6° 51'26.84"S; 109°40' 36.31"S) Long Cage 6° 51'41.72"S; 109°40'40.32"S ) Long Wetan 6° 51'32.30"S; 109°41' 07.71"S)</p>	Carried out every 6 months during the construction phase.	<p>Executor: Pekalongan City Tourism, Culture, Youth and Sports Department</p> <p>Supervisor: Central Java Province Environment and Forestry Service Central Java Provincial PUSDATARU Service Central Java Province Maritime and Fisheries Service Pekalongan City Environmental Service Pekalongan City PUPR Department.</p> <p>Reporting: Central Java Province Environment and Forestry Service Central Java Provincial PUSDATARU Service Pekalongan City Environmental Service Pekalongan City PUPR Department.</p>	
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				hours of population activity.			are analyzed descriptively.				
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d.	Breakwater Construction Activities	Opening of Business Opportunities	Ten people are accepted for work, 70% of them from the local community	Installing announcement at the District office regarding the need for recruiting workers who have expertise in the field of breakwater structure construction  Prioritize local workers as construction workers	Communities adjacent to the Breakwater Construction site location, such as communities in Panjang Baru, Kandang Panjang urban village, North Pekalongan subdistrict, Pekalongan City	Carried out during the construction phase	Monitored indicators: Number of local people recruited to become workers.  Data Collection Method: Ensure that workers who register and are accepted meet the required qualifications. Ensure that the community around the BCPCC Project site is aware of the opening for construction workers for the construction of facilities and infrastructure.  Data analysis method: The presentation of job opportunities is analyzed by calculating the number of labor force participation	Communities adjacent to the Breakwater Construction site location, such as communities in Panjang Baru, Kandang Panjang urban village, North Pekalongan subdistrict, Pekalongan City	Carried out every 6 months during the construction phase.	<p>Executor: Pekalongan City Tourism, Culture, Youth and Sports Department &amp; Construction Service Provider</p> <p>Supervisor: Marine and Fisheries Ministry Central Java Province Environment and Forestry Service Central Java Provincial PUSDATARU Service Central Java Province Maritime and Fisheries Service Pekalongan City Environmental Service Pekalongan City Public Works Department.</p> <p>Reporting: Central Java Province Environment and Forestry Service Pekalongan City Environmental Service</p>
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		Increased Waste Generation	Increased Waste Generation Solid waste generation in small/medium cities is estimated at 0.3 -0.4 kg/person/day. Thus, the generation of solid waste during breakwater construction activities is 4 kg/day  Benchmark: SNI 19-3964-1995	Providing a place to dispose of waste materials and waste equipment so that waste does not scatter and endanger workers Manage the waste produced up to the TPS and sort organic and inorganic waste. Do not burn rubbish/solid waste in the project/activity area. Transporting waste to the landfill is carried out once a month or if the collection site is full	Location of waste disposal location and temporary waste storage during construction of facilities and infrastructure	Performed daily during the construction phase	Monitored indicators: Availability of temporary waste storage places. Waste transportation schedule Data collection method: Ensure that waste is disposed of in the place provided and ensure that waste is managed based on its type at the temporary storage. Monitor the cleanliness of the project site. Data analysis method: The results of direct observations are compared with the plans that have been made and analyzed descriptively	Location of TPS at the Project site (6° 51' 26.39 S; 109°40' 33.73 E)	Carried out once every 1 (one) month during the construction phase.	Executor: Pekalongan City Tourism, Culture, Youth and Sports Department Supervisor: Central Java Province Environment and Forestry Service Pekalongan City Environmental Service Reporting: Central Java Province Environment and Forestry Service Pekalongan City Environmental Service	Waste management in the area is adjusted to Law no. 18 of 2008 concerning Waste Management Pekalongan City Regional Regulation (PERDA) Number 7 of 2020 Amendments to Pekalongan City Regional Regulation Number 16 of the Year 2012 concerning Waste Management
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		Decreased Air Quality (construction dust)	Increased levels of SO <sub>x</sub> , NO <sub>x</sub> , CO, CO <sub>x</sub> , and Pb Emissions and dust particles originating from loading & unloading rock material activities at rock material stockpile locations using heavy equipment (excavators)	The stockpile location is as close as possible to the loading to the construction site location Land cleaning uses equipment that meets low emission standards. Providing regulations and agreements regarding working hours for construction activities	Location of stockpile 1 and stockpile 2 (material loading & unloading points) BCPCC construction	Carried out once during the construction phase	Monitored indicators: Ambient air quality and dust at the project site location.  Data collection method: Conduct ambient air and dust quality testing  Data analysis method: Comparing the test results with air quality standards Appendix VII Ambient Air Quality Standards to Government Regulation Number 22 of 2021 concerning the Implementation of Environmental Protection and Management	Location of Breakwater Construction monitoring point at Stockpile 1, 6° 51'24.49"S; 109°40' 29.32"E) Stockpile 2 6° 51'20.73"S; 109°40' 11.77"S)	Carried out every 6 months during the construction phase.	Executor: Pekalongan City Tourism, Culture, Youth and Sports Department  Supervisor: Central Java Province Environment and Forestry Service Central Java Provincial PUSDATARU Service Central Java Province Maritime and Fisheries Service Pekalongan City Environmental Service  Reporting: Central Java Province Environment and Forestry Service Central Java Province Maritime and Fisheries Service Pekalongan City Environmental Service	Appendix VII Ambient Air Quality Standards Government Regulation of the Republic of Indonesia Number 22 of 2021 concerning Implementation of Environmental Protection and Management
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		Increased Noise Intensity	<p>The noise level for the Green Open Space designation is based on Minister of Environment Decree No. KEP-48/MENLH/11/1996 concerning Noise Level Standards does not exceed 55dBA</p>	<p>Equipment and material mobilization vehicles do not use units that produce high noise.</p> <p>The location plan uses land that is already available so there is not much land clearing.</p> <p>Land cleaning does not use units that produce high noise.</p> <p>Organize and supervise workers so as not to create noise with limited working hours from 08.00 to 16.00.</p> <p>Benchmark: Minister of Environment Decree No. 48 1996 concerning Standard Levels Noise.</p>	<p>Location of stockpile 1 and stockpile 2 (points of loading &amp; unloading materials) for construction of breakwater</p>	<p>Performed once during the construction phase</p>	<p>Monitored indicators:</p> <p>The noise level that occurs around the activity</p> <p>Data collection method:</p> <p>Conduct sampling for noise levels in accordance with the Noise Level Quality Standards contained in KepMenLH No. KEP-48/MENLH/11/1996.</p> <p>Ensure that the workers' working hours are in accordance with the agreement, namely 08.00 to 16.00.</p> <p>Data analysis method:</p> <p>The noise sampling results are compared with the applicable noise quality standards</p>	<p>Location of Breakwater Construction monitoring point at Stockpile 1, 6°124.49"S; 109°40' 29.32"E) Stockpile 2 6° 51'20.73"S; 109°40' 11.77"S)</p>	<p>Carried out every 6 months during the construction phase.</p>	<p>Executor:</p> <p>Pekalongan City Tourism, Culture, Youth and Sports Department Supervisor: Marine and Fisheries Ministry Central Java Province Environment and Forestry Service Central Java Provincial PUSDATARU Service Central Java Province Maritime and Fisheries Service Pekalongan City Environmental Service Pekalongan City Public Works Department.</p> <p>Reporting: Marine and Fisheries Ministry Central Java Province Environment and Forestry Service Central Java Provincial PUSDATARU Service</p>	<p>The quality standards for noise levels in Green Open Space (RTH) are contained in KepMenLH No. KEP-48/MENLH/11/1996.</p>
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				Quality Standard is 55 dBA						Central Java Province Maritime and Fisheries Service Pekalongan City Environmental Service Pekalongan City Public Works Department.	
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		Increased Rates of Erosion and Sedimentation	Coastline erosion and sedimentation as well as turbidity of coastal waters	Preparing the work area by excavating the soil includes digging and removing all types of weathering products. This material can be moved with heavy equipment without raking and then leveled and tidied up. Prepare the work area with strong and durable materials ability to support the load of heavy equipment and rock materials. Reinforcing the topsoil structure to provide support ergonomics of heavy equipment work and material piles equipped with adequate drainage arrangements (Addition of drainage channels	At the location where the construction of the breakwater takes place, namely at the location of loading & unloading of Breakwater construction materials in Work Area 1, (6° 51'24.49"S; 109°40' 29.32"E) Work Plane 2 (6° 51'20.73"S; 109°40' 11.77"S)	Carried out once at the construction stage	Monitored indicators: Soil erosion Erosion barrier structure erosion characteristics and sediment load  Data collection methods: Ensure that work area preparation does not interfere with coastal damage. Monitor for symptoms of coastal channel erosion and sedimentation of coastal waters  Data analysis method: Observation data and activity reports analyzed descriptively.	Location of monitoring point for loading & unloading of Breakwater construction materials at Stockpile 1, (6°51'24.49"S; 109°40' 29.32"E) Stockpile 2 (96°51'20.73"S; 109°40'11.77"S )	Done every 6 months	a. Executor: Pekalongan City Tourism, Culture, Youth and Sports Department  b. Supervisor: Central Java Province Environment and Forestry Service Central Java Provincial PUSDATARU Service Central Java Province Maritime and Fisheries Service Pekalongan City Environmental Service Pekalongan City PUPR Department.  c. Reporting: Central Java Province Environment and Forestry Service Central Java Provincial PUSDATARU Service Pekalongan City Environmental Service Pekalongan City PUPR Department
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				<p>/Waterways) on the edge of the coast. Timing of activities by reducing the intensity of activities during the rainy season.</p>								
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		Generation of waste water (black water) from domestic workers and base camp activities	Wastewater generation is equal to	Providing portable toilets at the basecamp location Maintaining the cleanliness of the basecamp environment Suctioning black water waste in collaboration with a third party	BCPCC basecamp	Every day during construction activities	Monitored indicators: Maintaining the sanitary quality of the work environment; groundwater is not contaminated Data collection method: Ensure all waste water is transported by third parties and The quality of the basecamp environment remains clean and does not become a vector for disease  Data analysis method: Observation data and activity reports were analyzed descriptively.	BCPCC basecamp	Once every 1 month / or every time the toilet capacity is full	a. Executor: Pekalongan City Tourism, Culture, Youth and Sports Department  b. Supervisor: Central Java Province Environment and Forestry Service Pekalongan City Environmental Service  c. Reporting: Central Java Province Environment and Forestry Service Pekalongan City Environmental Service	
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		Generation of hazardous waste	Generation of hazardous waste from the remaining domestic activities/field office of construction providers and basecamp maintenance activities amounting to 1-2 kg/month.	Providing adequate and safe containers for hazardous waste; Deposit hazardous waste to third party/vendor for disposal	Temporary waste disposal site	Every day during construction activities	<p>Monitored indicators: The amount and type of hazardous waste produced</p> <p>Data collection method: Ensure that all types and amounts of hazardous waste produced are well managed and not left behind at the activity site The quality of the basecamp environment remains clean</p> <p>Data analysis method: Observation data and activity reports were analyzed descriptively.</p>	Hazardous waste temporary disposal	Once every 1 month during construction activities	<p>a. Executor: Pekalongan City Tourism, Culture, Youth and Sports Department</p> <p>b. Supervisor: Central Java Province Environment and Forestry Service Pekalongan City Environmental Service</p> <p>c. Reporting: Central Java Province Environment and Forestry Service Pekalongan City Environmental Service</p>	
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g.	Construction Activities	Work Health and Safety Disturbances	There are 1-2 work accidents occurring during construction activities	<p>Provide OSH SOP          Construction complies with OSH standards          Provide complete and adequate PPE to serve all workers and guests who have an interest in construction activities          Applying induction to every element with an interest in construction activities          Limit the work area with a safety/divider fence during construction activities</p>	BCPCC construction site location	Every day during construction activities	<p>Monitored indicators:          Workers understand the scope of the employment contract and the rights and obligations at the end of the employment period.</p> <p>Data collection method:          a. Gathering recruited local workers          b. Ensure that all workers have received their rights appropriately in accordance with the provisions at the beginning of hiring workers with the applicable regulations</p> <p>Data analysis method:          Data are analyzed using tabulation and descriptive analysis. The percentage of employment opportunities is analyzed by calculating the</p>	BCPCC construction site location	Once every month during construction activities	<p>Executor:          Pekalongan City Tourism, Culture, Youth and Sports Department</p> <p>Supervisor:          Central Java Province Environment and Forestry Service          Pekalongan City Industry and Manpower Department          Pekalongan City Environmental Service</p> <p>c. Reporting:          Service Environment and Forestry of Central Java Province          Pekalongan City Industry and Labor Department          Pekalongan City Environmental Service</p>
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							number of labor force participation. Labor force participation is seen by trends over time				
<b>3 OPERATION STAGE</b>											

a.	Termination of Labor Relations	Loss of Employment Opportunities and Increased Income	Approximately 70% -80% or around 75 people of the total workforce, namely 60-65 people, are local workers.	Communicating the rights and obligations of service providers and workers in accordance with applicable statutory provisions. Communicating the end of the worker's contract period after the completion of the entire series of breakwater construction activities	Communities adjacent to the Breakwater Construction site location, such as communities in Panjang Baru, Kandang Panjang urban village, North Pekalongan subdistrict, Pekalongan City	Once after the construction phase ends	<p>Monitored indicators: Workers understand the scope of the employment contract and the rights and obligations at the end of the employment period.</p> <p>Data collection method: a. Gathering recruited local workers b. Ensure that all workers have received their rights appropriately in accordance with the provisions at the beginning of hiring workers with applicable regulations</p> <p>Data analysis method: - Data are analyzed using tabulation and descriptive analysis. - The percentage of employment opportunities is analyzed by</p>	Communities adjacent to the Breakwater Construction site location, such as communities in Panjang Baru, Kandang Panjang urban village, North Pekalongan subdistrict, Pekalongan City	Once at the end of the construction stage	<p>Executor: Pekalongan City Tourism, Culture, Youth and Sports Department</p> <p>Supervisor: Central Java Province Environment and Forestry Service Pekalongan City Industry and Labor Department Pekalongan City Environmental Service.</p> <p>Reporting: Central Java Province Environment and Forestry Service Pekalongan City Industry and Labor Department Pekalongan City Environmental Service</p>
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							calculating the number of labor force participation. Trends in labor force participation are seen from time to time				
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		Maintaining the Preservation of Natural Resources and Sustainability and Protection of Pekalongan City Coastal Areas	The lifetime of a BCPCC construction can last a minimum of 20 years	Place a guard post at the entrance to the area via the river. Close some roads that allow access to activities that could disturb forest security. carry out prevention activities against forest disturbances, including theft/illegal logging, forest encroachment, pest and disease control and protection of protected species of natural animals and plants and their habitats.	Priority is given to the location of the BCPCC construction site	Performed during the Operation phase	<p>Monitored Indicators: The existence of breakwater structures controls the rate of coastal abrasion/erosion and supports the preservation of mangrove areas Security and Protection of Pekalongan City Coastal Areas</p> <p>Data collection method: Installation of camera traps Ensure that there is guarding and security at the entrance to the area. Carry out regular forest patrols to ensure that there is no disturbance in the BCPCC Plan area</p> <p>Data analysis method: The results of monitoring the presence and diversity of wild animals are</p>	BCPCC construction site	During the operational stage every 6 months	<p>Executor: Pekalongan City Tourism, Culture, Youth and Sports Department</p> <p>Supervisor: Marine and Fisheries Ministry Central Java Province Environment and Forestry Service Central Java Provincial PUSDATARU Service Central Java Province Maritime and Fisheries Service BPDAS Pemali Jratun Pekalongan City Environmental Service Pekalongan City Public Works Department</p> <p>Reporting: Marine and Fisheries Ministry Central Java Province Environment and Forestry Service Central Java Provincial</p>	-
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							compared with the database and previous data (trends of increase and decrease)			PUSDATARU Service Central Java Province Maritime and Fisheries Service Pekalongan City Environmental Service Pekalongan City Public Works Department	
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c.	Protection and Security of Coastal Areas	Prevent disturbances and threats of damage to coastal areas	The rate of abrasion and erosion in the Pekalongan City coastal area is controlled	Maintenance of breakwater structure from wave erosion Inventory of the level of damage to breakwater structures. Create warning boards and area boundaries and maintain work area boundaries. Conducting outreach to communities around the coastline	Pekalongan City coast	During operations, the BCPCC functions effectively and optimally every 6 months	<p>Monitored Indicators: Number and type of forest disturbance that occurs</p> <p>Data collection method: Direct observation in the field of forest encroachment incidents. Interviews with stakeholders regarding the results of the outreach.</p> <p>Data analysis method: The results of direct observations are compared with the plans that have been made and analyzed descriptively The observation results are also compared with the initial baseline</p>	Pekalongan City Coast	During operations, the BCPCC construction functions effectively and optimally every 6 months	<p>Executor: Pekalongan City Tourism, Culture, Youth and Sports Department</p> <p>Supervisor: Central Java Province Environment and Forestry Service Central Java Provincial PUSDATARU Service Central Java Province Maritime and Fisheries Service BPDAS Pemali Jratun Pekalongan City Environmental Service Pekalongan City Public Works Department</p> <p>Reporting: Central Java Province Environment and Forestry Service Central Java Provincial PUSDATARU Service</p>	Procedures for Protection and Security of Coastal Areas are contained in the Regulation of the Minister of Environment and Forestry of the Republic of Indonesia No. 8 of 2021 concerning Forest Governance and Preparation of Forest Management Plans, as well as Forest Utilization in Protected Forests and Production Forests
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d.	Breakwater Structure Maintenance	Recovery of Coastal Ecosystems and Mangrove Forests	The lifespan of BCPCC structure lasts up to 20 years	Maintaining the amount planted and encouraging the growth of mangrove vegetation Improving the physical properties of the soil by hydrating or loosening the soil. Replant dead plants and replace them with similar plants	Location of Breakwater Construction Site and Pekalongan City Coastal Area	For the protected area, starting from 2025 - 2027 until completion in 2033. Meanwhile, for the cultivation area, starting from 2025 - 2027 to 2045.	Monitored Indicators: Vegetation density Diversity of mangrove vegetation.  Data collection method: Direct observation in the area regarding the number and quality of plants growing. Regular checks regarding the physical and chemical quality of the soil.  Data analysis method: The results of monitoring wildlife habitat (vegetation density) compared with the database and previous data (trend of increase and decrease)	Location of Breakwater Construction Site and Pekalongan City Coastal Area	During the operational stage every 6 months	<p>Executor: Pekalongan City Tourism, Culture, Youth and Sports Department</p> <p>Supervisor: Central Java Province Environment and Forestry Service Central Java Provincial PUSDATARU Service Central Java Province Maritime and Fisheries Service BPDAS Pemali Jratun Pekalongan City Environmental Service Pekalongan City Public Works Department</p> <p>Reporting: Central Java Province Environment and Forestry Service Central Java Provincial PUSDATARU Service</p>	
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e.	Utilization of Carbon Absorption and/or Storage Services	Climate Change Mitigation	Restoration activities in coastal areas and mangrove forests in the Pekalongan City Coastal Area are able to increase carbon stocks	<p>Baseline survey of carbon storage and sequestration potential</p> <p>Preparation of project information notes (PIN) and project design documents (PDD) using the VCS or CCBA method.</p> <p>Document validation and verification. Carbon stock calculations use various valid and reliable references.</p>	Mangrove rehabilitation/restoration area on Pekalongan City Coast	<p>Selama tahap operasional dengan periode setiap 6 bulan sekali during the operational stage every 6 months</p>	<p>Monitored Indicators:</p> <p>Total mitigation uptake (tons of CO<sub>2</sub>).</p> <p>Forest capacity to absorb and store carbon</p> <p>Data collection method:</p> <p>Pay attention to the condition of land cover in the Pekalongan City mangrove area</p> <p>Conduct observations and involve the community in sustainable carbon absorption and/or storage activities.</p> <p>Data analysis method:</p> <p>The results of carbon uptake calculations are compared with the database and previous data (trend increase and decrease)</p>	Mangrove rehabilitation/restoration area on Pekalongan City Coast	During the operational stage every 6 months	<p>Executor:</p> <p>Pekalongan City Tourism, Culture, Youth and Sports Department</p> <p>Supervisor:</p> <p>Central Java Province Environment and Forestry Service Central Java Provincial PUSDATARU Service Central Java Province Maritime and Fisheries Service BPDAS Pemali Jratun Pekalongan City Environmental Service Pekalongan City Public Works Department.</p> <p>Reporting:</p> <p>Department of Environment and Forestry, Central Java Province Central Java Provincial PUSDATARU Service</p>	Reference Carbon Calculation: 1. NFI (1996- 2013), 2014 2. Research and Development, 2014 3. PEP RAD GRK Technical Guidelines, 2013
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		Opening Business Opportunities	Carbon reserves above the surface are 3.88 million tons C with an estimated amount of carbon that can be traded is around 500,000 tons C per year.	<p>a. Forest restoration and conservation to increase forest biomass productivity.</p> <p>b. Preparation of project information notes (PIN) and project design documents (PDD) using the VCS or CCBA method.</p> <p>c. Follow applicable laws and regulations.</p>	BCPCC Construction Location	During the operational stage every 6 months	<p>Monitored Indicators:</p> <p>Number of domestic and foreign business partners</p> <p>Fulfilling the needs of domestic and export carbon markets.</p> <p>Data Collection Method:</p> <p>Ensure that activities for utilizing Carbon Absorption and/or Storage Services comply with applicable regulations</p> <p>Data analysis method:</p> <p>Data are analyzed using simple tabulation</p>	BCPCC Location	During the operational stage every 6 months	<p>Executor:</p> <p>Pekalongan City Tourism, Culture, Youth and Sports Department</p> <p>Supervisor:</p> <p>Marine and Fisheries Ministry Central Java Province Environment and Forestry Service Central Java Provincial PUSDATARU Service Central Java Province Maritime and Fisheries Service Pekalongan City Environmental Service Pekalongan City Public Works Department.</p> <p>Reporting:</p> <p>Marine and Fisheries Ministry Central Java Province Environment and Forestry Service Central Java Provincial PUSDATARU Service</p>	Minister of Environment and Forestry Regulation No. 8 of 2015 concerning Procedures for Business Licensing for the Utilization and/or Storage of Carbon in Production Forests and Protected Forests
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f.	Utilization of Natural Tourism	Increasing the Income of the Surrounding Community	Increased domestic tourist visits to the Pekalongan City Coastal Area	Develop special interest tourism/educational tourism related to mangrove forest ecosystems. Utilizing the ecological richness of the area as a tourist attraction by utilizing coastal ecotourism. Involving tourists in environmental rehabilitation activities.	Pekalongan City Coastal Area	During the operational stage every 6 months	<p>Monitored Indicators: Wages received by workers. Increasing community income.</p> <p>Data collection method: Conduct interviews with the community regarding the income obtained from tourists and natural tourism activities. Making the results of research activities an evaluation of development and improvement.</p> <p>Data analysis method: Data are analyzed using simple tabulation and descriptive analysis.</p>	Pekalongan City Coastal Area location.	During the operational period, once every 6 months	<p>Executor: Pekalongan City Tourism, Culture, Youth and Sports Department</p> <p>Supervisor: Marine and Fisheries Ministry Central Java Province Environment and Forestry Service Central Java Provincial PUSDATARU Service Central Java Province Maritime and Fisheries Service BPDAS Pemali Jratun Pekalongan City Environmental Service Pekalongan City Public Works Department</p> <p>Reporting: Marine and Fisheries Ministry Central Java Province Environment and Forestry Service Central Java Provincial</p>	-
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h.	Research and development	Research results can be used as improvements and role models in coastal ecosystem management	Research will be carried out on mangrove forests in the future and the results of the research will be used as material for evaluating the overall restoration plan for the Pekalongan City Coastal area	<p>Conduct research on growth, ecology, improvement of stand quality and efforts to utilize/process non-timber forest products as well as research related to carbon absorption.</p> <p>Conduct research on socio-economic aspect.</p>	In the Pekalongan City Coastal Area.	During the operational period once every 6 months	<p>Monitored Indicators: - Results of research on growth, ecology, improvement of stand quality in environmental and socio-economic aspects.</p> <p>Data Collection Method: Collaborate with various parties, both international and multinational and local partnership institutions such as universities/government agencies, the private sector or consulting institutions that are deemed capable.</p> <p>Observation of research results on environmental aspects and socio-economic aspects.</p> <p>Data analysis method: The data obtained are analyzed using simple tabulation and descriptive analysis to explain</p>	In the Pekalongan City Coastal Area.	During the operational period once every 6 months	<p>a. Executor: Pekalongan City Tourism, Youth Culture and Sports Department</p> <p>b. Supervisor: Marine and Fisheries Ministry Central Java Province Environment and Forestry Service Central Java Provincial PUSDATARU Service Central Java Province Maritime and Fisheries Service BPDAS Pemali Jratun Pekalongan City Environmental Service Pekalongan City Public Works Department</p> <p>c. Reporting: Marine and Fisheries Ministry Central Java Province Environment and Forestry Service Central Java Provincial</p>	-
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							the results of the research			PUSDATARU Service Central Java Province Maritime and Fisheries Service Pekalongan City Environmental Service Pekalongan City Public Works Department	
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i.	Community Empowerment and Partnership	Revitalizing the role of coastal farmer groups and mangrove conservation in Pekalongan City Coast	Increasing awareness and participation of coastal farming/fishing communities Controlling land conversion and damage to coastal areas	Carrying out socialization and development of the Pekalongan City Coastal Pond Farmers/Community Carry out assistance to farmer groups and coastal communities on the coast of Pekalongan City on an ongoing basis; Institutionalization of mangrove forest conservation and control of damage to coastal areas to maintain sustainability.	Communities adjacent to the Breakwater Construction site location, such as communities in Panjang Baru, Kandang Panjang urban village, North Pekalongan subdistrict, Pekalongan City	During the operational period, once every 6 months	Monitored Indicators: Conflict reports and conflict handling/conflict resolution reports Implementation of capacity building and community development programs  Data Collection Method: Conduct direct field observations and interviews with the community by appointing mediators from the local community.  Data analysis method: - The data obtained was analyzed using simple tabulation and descriptive analysis to see improvements in the role and function of fishing farmer groups.	Communities adjacent to the Breakwater Construction site location, such as communities in Panjang Baru, Kandang Panjang urban village, North Pekalongan subdistrict, Pekalongan City	During the operational period, once every 6 months	<p>Executor: Pekalongan City Tourism, Culture, Youth and Sports Department</p> <p>Supervisor: Marine and Fisheries Ministry Central Java Province Environment and Forestry Service Central Java Provincial PUSDATARU Service Central Java Province Maritime and Fisheries Service BPDAS Pemali Jratun Pekalongan City Environmental Service Pekalongan City Public Works Department</p> <p>c. Reporting: Marine and Fisheries Ministry Central Java Province Environment and Forestry Service Central Java Provincial</p>	-
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		<p>Improving the welfare of local communities</p>	<p>Improving the welfare and purchasing power of Pekalongan City's coastal communities in Kelurahan Panjang Baru, Kelurahan Kandang Panjang, North Pekalongan District, Pekalongan City.</p>	<ul style="list-style-type: none"> <li>• Manpower recruitment is maximized on local manpower</li> <li>• Providing wages to laborers at the minimum standard wage of Pekalongan city</li> <li>- Buying logistical needs from the local community.</li> <li>- Follow the rules related to applicable laws related to employment.</li> </ul>	<p>Communities adjacent to the Breakwater Construction site location, such as communities in kelurahan Panjang Baru, Kelurahan Kandang Panjang, North Pekalongan district, Pekalongan City</p>	<p>During the operational period with a period of every 6 months</p>	<p>Monitored Indicators:</p> <ul style="list-style-type: none"> <li>- Income Levels of communities in the villages assisted and around the BCPCC Plan area.</li> </ul> <p>Data Collection Methods:</p> <ul style="list-style-type: none"> <li>- Direct interviews with communities related to increasing community income</li> <li>- Ensure labor wages <math>\geq</math> minimum wage of East Aceh district.</li> <li>- Ensure the rules are implemented in accordance with the labor law</li> </ul> <p>Data Analysis Method:</p> <ul style="list-style-type: none"> <li>- Data were analyzed by simple tabulation and descriptive analysis</li> </ul>	<p>Communities adjacent to the Breakwater Construction site location, such as communities in Kelurahan Panjang Baru, Kelurahan Kandang Panjang urban village, North Pekalongan district, Pekalongan City</p>	<p>During the operational period with a period of every 6 months</p>	<p>a. <b>Executor:</b> Dinas Pariwisata, Kebudayaan, Kepemudaan dan Olahraga Pekalongan City</p> <p>a. <b>Supervisor:</b></p> <ul style="list-style-type: none"> <li>• Kementerian Kelautan dan Perikanan</li> <li>• Dinas Lingkungan Hidup Dan Kehutanan Provinsi Jawa Tengah</li> <li>• Dinas PUSDATARU Prov Jawa Tengah</li> <li>• Dinas Kelautan dan Perikanan Provinsi Jawa Tengah</li> <li>• Dinas Lingkungan Hidup Pekalongan City</li> <li>• Dinas PU PR Pekalongan City.</li> </ul> <p>c. <b>Reporting:</b></p> <ul style="list-style-type: none"> <li>• Kementerian Kelautan dan Perikanan</li> <li>• Dinas</li> </ul>	-
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							to see the level of community income.			<p>Lingkungan Hidup Dan Kehutanan Provinsi Jawa Tengah</p> <ul style="list-style-type: none"> <li>• Dinas PUSDATARU Prov Jawa Tengah</li> <li>• Dinas Kelautan dan Perikanan Provinsi Jawa Tengah</li> <li>• Dinas Lingkungan Hidup Pekalongan City</li> <li>• Dinas PU PR Pekalongan City.</li> <li>• Dinas Perindustrian Tenaga kerja Pekalongan City</li> </ul>	
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j.	Procurement of Seedlings	Restoring and protecting coastlines and supporting the balance of coastal biodiversity and ecosystems	Recovering the mangrove ecosystem, Controlling the coastline from the threat of abrasion	Planting mangrove tree seedlings and other types as an effort to improve the coastal ecosystem on the Pekalongan City Coast Encourage the involvement of local communities and fishing groups to carry out planting and restoration of coastal ecosystems along the coastline.	At the nursery location determined by the initiator	Carried out one year before planting activities in degraded areas are carried out (Pt-1).	<p>Monitored indicators: Number of seeds to meet plant rehabilitation needs.</p> <p>Data collection method: Ensure that the types of plants developed are semi-tolerant (endemic) and the types of filler plants refer to the Letter of the Director General of Forest Concessions, namely fruit-producing types, sap-producing types and honey bee hives which are local endemic types. Ensure that no chemicals are used in the seeding process.</p> <p>Data analysis method: - Observation data and activity reports are analyzed descriptively</p>	At the nursery location determined by the initiator	Done every 6 months	<p>Executor: Pekalongan City Tourism, Culture, Youth and Sports Department</p> <p>Supervisor: Marine and Fisheries Ministry Central Java Province Environment and Forestry Service Central Java Provincial PUSDATARU Service Central Java Province Maritime and Fisheries Service BPDAS Pemali Jratun Pekalongan City Environmental Service Pekalongan City Public Works Department</p> <p>Reporting: Marine and Fisheries Ministry Central Java Province Environment and Forestry Service Central Java Provincial</p>	Letter from the Director General of Forest Management No. 1682/IV-BPHH/1991
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		Restoration and Increasing the Quality of Coastal Flora and Fauna Habitat The coastline is under control from the threat of abrasion	Habitat and migration for various types of flora and biota/fauna in the Pekalongan City coastal area	Natural succession (Protection and Security of Coastal Areas) in BCPCC	Pekalongan City coastal area	This will be carried out starting from the construction stage, namely in 2024 until the end of activities	Monitored Indicators: Vegetation density and types of plants available Equal distribution of animal food sources  Data Collection Method: Conduct direct observations in the field of restoration activities that have been carried out  Data analysis method: The results of monitoring wild animal habitats (vegetation density and animal food sources) compared with the database and previous data (trends of increase and decrease)	The coastal area of Pekalongan City, especially the mangrove ecosystem	Done every 6 months	<p>Executor: Pekalongan City Tourism, Culture, Youth and Sports Department</p> <p>Supervisor: Central Java Province Environment and Forestry Service Central Java Provincial PUSDATARU Service Central Java Province Maritime and Fisheries Service Pekalongan City Environmental Service Pekalongan City Public Works Department</p> <p>Reporting: Central Java Province Environment and Forestry Service Central Java Provincial PUSDATARU Service Central Java Province Maritime and Fisheries Service</p>	-
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		Maintaining biodiversity preservation and functioning nursery ground for coastal biota species at Pekalongan City coast	Wildlife protection is important in the mangrove ecosystem on the Pekalongan City Coast	Fauna management is carried out and adjusted to the behavior of the fauna concerned. Providing the most ideal habitat for the life of the fauna concerned while also carrying out protection and security activities.	Coastal Area in Pekalongan City	Will start from 2024 until the end of the activity	<p>Monitored Indicators: Habitat for coastal flora and wildlife</p> <p>Data collection method: Ensure to integrate conservation, ecotourism and agroforestry plans with the BCPCC Make direct observations in the field regarding the quality of habitat for flora and fauna.</p> <p>Data analysis method: The results of monitoring wild animal habitats are compared with the database and previous data (trend increase and decrease)</p>	Coastal Area in Pekalongan City	Done every 6 months	<p>Executor: Pekalongan City Tourism, Culture, Youth and Sports Department</p> <p>Supervisor: Central Java Province Environment and Forestry Service Central Java Provincial PUSDATARU Service Central Java Province Maritime and Fisheries Service Pekalongan City Environmental Service Pekalongan City Public Works Department</p> <p>Reporting: Central Java Province Environment and Forestry Service Central Java Provincial PUSDATARU Service Central Java Province Maritime and Fisheries Service</p>	
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		Improving the Welfare of Local Communities	Increasing the income and purchasing power of people in Panjang Baru Village, Kandang Panjang, North Pekalongan District, Pekalongan City	BCPCC activities will be integrated with various conservation and coastal area ecotourism plans Empowerment of local communities and Mangrove Ecosystem Area Managers	Kandang Panjang urban village, North Pekalongan subdistrict, Pekalongan City	Will start from 2024 until the end of the activity	Monitored Indicators: Implementation of cooperative activities with the surrounding community Implementation of community development activities  Data collection method: Conduct direct observations and interviews with the community regarding improving community welfare after habitat restoration.  Data analysis method: Data are analyzed using simple tabulation and descriptive analysis to see people's income levels.	Kandang Panjang urban village, North Pekalongan subdistrict, Pekalongan City	Done every 6 months	<p>Executor: Pekalongan City Tourism, Culture, Youth and Sports Department</p> <p>Supervisor: Ministry of Maritime and Fisheries Central Java Province Environment and Forestry Service Central Java Provincial PUSDATARU Service Central Java Province Maritime and Fisheries Service Pekalongan City Environmental Service Pekalongan City Public Works Department</p> <p>Reporting: Ministry of Maritime and Fisheries Central Java Province Environment and Forestry Service Central Java Provincial PUSDATARU Service</p>
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<b>4 POST-OPERATIONS STAGE</b>											



a.	Termination of Labor Relations	Loss of Income for Workers	A total of 60-65 workers no longer earn income.	Conduct socialization regarding plans for releasing workers between business actors, workers, related agencies and the community. Terminate work in accordance with applicable regulations. The release of workers is carried out after the business actor has provided all the rights that must be received by the workers.	Planned BCPCC construction location	Management is carried out in the post-operative stage periodically every 6 months.	<p>Monitored indicators: Number of workers laid off. Workforce release schedule Implementation of skills training for workers Enforceability of work agreements</p> <p>Data collection method: Conduct field observations regarding the response of the surrounding community. Review the number of employees who have been laid off and also examine the amount of wages and severance pay received.</p> <p>Data analysis method: Descriptive analysis to explain the level of community income when labor release activities have been carried out</p>	Planned BCPCC construction location	Performed during the post-operative stage with a frequency of once every 6 months	<p>Executor: Pekalongan City Tourism, Culture, Youth and Sports Department and Construction Service Provider</p> <p>Supervisor: Ministry of Maritime and Fisheries Central Java Province Environment and Forestry Service Central Java Provincial PUSDATARU Service Central Java Province Maritime and Fisheries Service Pekalongan City Environmental Service Pekalongan City Public Works Department</p> <p>Reporting: Ministry of Maritime and Fisheries Central Java Province Environment and Forestry Service Central Java Provincial</p>	
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		Rise of unemployment	The number of workers who will be laid off is around 60-65 people or 70%-80% of the local workforce recruited during the construction phase	Providing training (skills improvement) according to the skills or talents of each worker. Fulfill workers' rights in accordance with the initial agreement between the worker and the company. The release of workers is carried out after the business actor has provided all the rights that must be received by the workers.	Communities around the BCPCC Site location	Performed during the post-operative stage with a frequency of once every 6 months	Monitored indicators: Fulfillment of workers' rights and obligations. The economic level of the surrounding community and workforce.  Data collection methods: Conduct field observations regarding the response of the surrounding community. Secondary data collection is in the form of employee severance pay slips.  Data analysis method: Descriptive analysis to explain that the rights and obligations have been fulfilled by the manager/person responsible for the business and/or activity	Masyarakat di sekitar lokasi Tapak BCPCC	Communities around the BCPCC Site location	<p>Executor: Pekalongan City Tourism, Culture, Youth and Sports Department and Construction Service Provider</p> <p>Supervisor: Ministry of Maritime and Fisheries Central Java Province Environment and Forestry Service Central Java Provincial PUSDATARU Service Central Java Province Maritime and Fisheries Service Pekalongan City Environmental Service Pekalongan City Public Works Department</p> <p>Reporting: Ministry of Maritime and Fisheries Central Java Province Environment and Forestry Service Central Java Provincial</p>
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b.	BCPCC Care and Maintenance	Restoration of the coastline of the North Coast of Pekalongan City and control of coastal damage	Revegetation of the mangrove ecosystem is going well Restoration of mangrove ecosystem areas Improvement of mangrove types and species in the Pekalongan City coastal area	A party responsible for the business and/or business activities with a high commitment in carrying out the management, care and maintenance of the BCPCC properly, so that the breakwater structure is able to have a construction life of up to 20 years and it is hoped that it will be longer.	Location of BCPCC	Carried out every 6 months	<p>Monitored indicators: Physical Condition of the BCPCC structure Fulfillment of commitments in maintenance and upkeep.</p> <p>Data collection method: Conduct field surveys and physical documentation of breakwater structures. Ensure that the Management has fulfilled all commitments and responsibilities agreed at the beginning.</p> <p>Data analysis method: Conduct an analysis of the functional feasibility and reliability of Breakwater structure construction for the long term in the next 20 years.</p>	BCPCC Site Location	Once during the postoperative period	<p>Executor: Pekalongan City Tourism, Culture, Youth and Sports Department</p> <p>Supervisor:</p> <ul style="list-style-type: none"> <li>• Central Java Province Environment and Forestry Service</li> <li>• Central Java Provincial PUSDATARU Service</li> <li>• Central Java Province Maritime and Fisheries Service</li> <li>• Pekalongan City Environmental Service</li> <li>• Pekalongan City Public Works Department</li> </ul> <p>Reporting:</p> <ul style="list-style-type: none"> <li>• Central Java Province Environment and Forestry Service</li> <li>• Central Java Provincial PUSDATARU Service</li> <li>• Central Java Province</li> </ul>	
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## 8.4. Social Implementation Plan

### 8.4.1. Potential Risks Mitigation Measures

#### 1) Design Optimization to Increase Social Inclusiveness

In order to build a more socially inclusive society, a number of thoughtful measures are being implemented in various projects, such as the recent breakwaters initiative. **The goal is to increase participation and optimize design to benefit people from all walks of life.** For instance, there is a concerted effort to bring more women into the planning process by ensuring at least 30% of workers are females involved at the preliminary design stage. This will help incorporate perspectives that may otherwise go overlooked. Additionally, the final plans will take into account the needs of people with disabilities by including convenient facilities and accessibility features. These considerations, outlined further in Table 7-1, demonstrate a commitment to inclusive design principles. Looking ahead, the team aims to engage the local community more broadly through outreach to schools and residents about the green, ecological aspects of the development. Getting neighborhood stakeholders invested early on can only strengthen public support down the line. Overall, it is uplifting to see such care taken to make sure all voices are heard, all abilities accommodated, and the end result enriched by diversity and community input. This inclusive approach sets a standard for future projects to follow.

#### 2) Information Disclosure and Public Participation

The breakwater construction project in Kandang Panjang and Bandengan will require careful communication and engagement with local residents and stakeholders to ensure widespread understanding and acceptance. The developers recognize that currently there is low public awareness and participation around the project. To remedy this, they plan to implement several outreach strategies. i) leverage social media platforms to share project details, emphasizing the benefits for the community. This modern communication channel will allow broad dissemination of information. ii) hold in-person consultations with community members during the preliminary design phase to gather direct input, identify concerns, and strengthen two-way dialogue. iii) launch public education campaigns focused on environmental awareness to highlight the project's sustainable features. iv) make special efforts to connect with vulnerable groups in the area such as women, the elderly, disabled residents, and the poor. The developers will meet these groups where they are, providing accommodations to facilitate their participation in the planning process. These measures - detailed further in Table 7-2 - will promote inclusive, meaningful stakeholder communication and consultation throughout the project lifecycle. This will lead to higher public awareness and buy-in that will benefit both the developers and the community.

#### 3) Jobs Opportunities Creation and Potential Labor Risks Mitigation

The creation of employment opportunities and reduction of labor influx risks is crucial for sustainable development in the project area. Several key measures can help achieve this goal. i) supporting local government technical training programs or providing direct employment training for migrant workers will build capacity and prepare people for quality jobs. ii) assisting the local government in promoting non-agricultural jobs and establishing "green channels" for returning entrepreneurs can expand the range of opportunities beyond just agriculture. iii) offering free specialized training for managers, companies, and employees will equip people with the skills needed for emerging roles. iv) improving awareness around production safety and green development among workers will lead to safer, more sustainable practices on the job. v) attracting additional workers to the area through construction projects can boost employment, with a target of 40% local hiring to provide opportunities for residents. Strict compliance with national and local labor laws and regulations is essential to ensure workers' rights are protected in terms of contracts, wages, holidays, etc. vi) regular health office inspections of worker dormitories and education on infectious disease prevention and sanitation will maintain strong public health standards. Finally, close attention to on-site food safety by construction units will ensure worker nutrition and wellbeing. By thoughtfully implementing this multifaceted approach, employment opportunities can expand in a responsible and equitable manner while risks are minimized.

#### **4) Promoting Gender Development**

Promoting gender equality and women's empowerment is integral to sustainable development. To that end, the project aims to enhance opportunities and working conditions for women in numerous ways. First, facilities such as nurseries and rest areas will be conveniently provided for women at the mangrove information center, improving comfort and accessibility. Women will also actively participate in consultations during planning and design stages, ensuring their perspectives and needs are incorporated. Additionally, suitable amenities like toilets and washing stations will be established on construction sites to accommodate women workers. Training and employment initiatives will target female participation, including equal access to professional development, as well as a minimum 30% of new horticulture, fisheries, and tourism jobs allocated for women. At least 30% of spaces in special project training activities will also be reserved for women. To further promote gender mainstreaming, the PMU and related management agencies will have at least two female staff members in charge of implementation. By improving inclusion, social safeguards, and economic opportunities for women, the project will empower marginalized groups and pave the way for more equitable development.

#### **5) Poverty Alleviation**

The project management unit (PMU), project implementation agency, and relevant local government offices have agreed to several supportive actions to aid poor families affected by the project. First, they will provide special allowances and reasonable resettlement assistance to poor households impacted by resettlement. This will help

offset the disruption and costs of having to relocate. Second, during construction, at least 30% of job opportunities will be reserved for poor and low-income families. This will provide crucial income and skills training. Third, sub-district offices and affected villages/towns will be encouraged to prioritize hiring poor individuals for non-technical roles during implementation and operations. Contracts can help formalize these arrangements. Fourth, a minimum of 30% of participants in public participation and consultation activities will be from poor and vulnerable groups. This ensures their voices and concerns are heard. Finally, for public hearings, 20% of attendees will be poor people and low-income representatives. This allows them to be informed and have input on decisions impacting their livelihoods. Together, these actions aim to mitigate hardships for the poor while expanding economic opportunities through the project.

**Table. 8-2. Potential Social Impact and Monitoring Standards**

<b>Proposed Activities</b>	<b>Target Group</b>	<b>Responsible and Assist Unit</b>	<b>Monitoring Indicator</b>
<ul style="list-style-type: none"> <li>• Ensure safe construction and provide a good living environmental for local residents</li> <li>• Optimize project design to reduce the negative impact of land expropriation and demolition</li> <li>• Ensure that women participate in the consultation and decision-making process related to the design of vocation activities in eco-tourism areas</li> <li>• Ensure that working conditions on construction sites (any toilets and washing arrangements, etc) are suitable to be used by women.</li> </ul>	<p><b>Target population:</b> local people</p> <p><b>Goal:</b></p> <ul style="list-style-type: none"> <li>• at least 10% of jobs in civil engineering are for women (baseline:0)</li> <li>• at least 20% of the jobs in civil engineering go to poor or low-income families (baseline:0)</li> </ul>	<p><b>Responsible Unit:</b> Project implementation unit</p> <p><b>Assistance Unit:</b> Project facility designers, local governments and local community representatives, contractors, gender experts and education authorities.</p>	<ul style="list-style-type: none"> <li>• Public satisfaction on the ecological environment, social inclusion and business environment.</li> <li>• The number of people employed in the local labor force, including representative of poor households and low-income groups.</li> <li>• Number of houses and people affected</li> <li>• Quantity of work force training (by gender)</li> <li>• Wages paid to the local workforce (broken down by gender)</li> <li>• The number of green development activities held in selected communities and schools</li> </ul>
<ul style="list-style-type: none"> <li>• Provide training for non-agricultural employment to help local workers find jobs in nearby area, ensure that women have timely access to relevant information</li> <li>• Prioritize the use of local building materials and resources, use local products and services (such as housing for labor from outside project area, provision of food and beverages and other supplies)</li> </ul>	<p><b>Target population:</b></p> <ul style="list-style-type: none"> <li>• Local residents, especially those affected and the poor</li> <li>• disadvantaged groups and women.</li> </ul> <p><b>Goal:</b></p> <ul style="list-style-type: none"> <li>• at least 80% of participants are women</li> </ul>	<p><b>Responsible Unit:</b> Project implementation unit</p> <p><b>Assisting Unit:</b> Project Implementation Unit</p>	<ul style="list-style-type: none"> <li>• Organized training and skill upgrading activities.</li> <li>• Frequency, form and attendance of the training.</li> <li>• The frequency of non-agricultural employment information.</li> <li>• The contractor buys local materials.</li> <li>• Other income generated by the project for local residents.</li> <li>• Number of women participating in training and receiving information on labor.</li> </ul>

<p>and ensure at least 40% local materials.</p>	<ul style="list-style-type: none"> <li>100% of labors is trained (trainings are given through activities of 3s Project)</li> </ul>		
<ul style="list-style-type: none"> <li>The project provided full time and temporary jobs during construction and operation.</li> <li>During the operation of the project, permanent jobs were created, of which were women.</li> <li>Ensure that vulnerable groups such as women and the poor are employed, giving priority to non-technical jobs and writing them into contracts.</li> <li>Ecotourism is expected to increase employment demand in horticulture, silvo-fishery and facility maintenance in tourist area, including jobs for women.</li> <li>Establish a service center for entrepreneurship and employment in the Mangrove Ecopark to open up a channel for returning workers to start businesses.</li> </ul>	<p><b>Target population:</b></p> <ul style="list-style-type: none"> <li>Local residents, especially those affected and the poor</li> <li>disadvantaged groups and women.</li> </ul> <p><b>Goal:</b></p> <ul style="list-style-type: none"> <li>30% of non-technical jobs are given priority to local residents.</li> <li>xxx permanent jobs were created, of which xxx were women.</li> <li>Eco-tourism is expected to increase the employment demand in agriculture, silvo-fishery and facilities maintenance in tourist area.</li> </ul>	<p><b>Responsible Unit:</b> Local unit</p> <p><b>Assisting Unit:</b> Project Implementation Unit, village committee.</p>	<ul style="list-style-type: none"> <li>The number of jobs created by the project</li> <li>The number of jobs available to local residents</li> <li>The number of jobs available to women and the poor</li> <li>Wages paid to local residents</li> </ul>

<p><b>1. Public participation and consultation</b></p> <ul style="list-style-type: none"> <li>• Inform and consult local residents, especially those directly affected by the project, about the impact and benefits of the project (Women, poor and vulnerable groups make up no less than 30% of the participants);</li> <li>• The situation and progress of civil works, including interference caused by project construction;</li> <li>• Encouraging and promoting the participation of women in trainings, vocational skills training and homebound entrepreneurship trainings.</li> <li>• For the related meeting of the activity, the target number of participants is 30%.</li> </ul>	<ul style="list-style-type: none"> <li>• Local residents, especially women and the poor (at least 30% of participants are women, poor and vulnerable);</li> <li>• Make records for appeals;</li> <li>• Entrepreneurship training, female participation rate reach 30%;</li> <li>• 40% of female participate in workshop training. (Base line: 0)</li> </ul>	<p><b>Responsible units:</b> project implementing unit agency and local government</p> <p><b>Assisting units:</b> Local government</p>	<ul style="list-style-type: none"> <li>• The number of consultations and the degree of nondiscriminatory participation of the public (women, the poor and the disadvantaged)</li> <li>• Number of complaints received and handling (related records)</li> <li>• Project construction progress report</li> <li>• Number of female participants in workshop training</li> </ul>
<p><b>2. Establish a complaint compensation mechanism</b></p> <ul style="list-style-type: none"> <li>• Establish a complaint compensation mechanism in the project area to deal with the complaints of the affected people, and record the complaints and treatment;</li> <li>• Ensure that the women's complaint mechanism should be in place to receive and handle complaints and complaints from female workers in the industrial park.</li> </ul>			



<ul style="list-style-type: none"> <li>Control dust to prevent pollution; Restrictions on night construction; Strictly follow the noise, dust and vibration control standards;</li> <li>Strengthen construction safety, provide safe roads and canals, set up appropriate safety signs;</li> <li>Avoiding damage to public water, electricity, drainage and irrigation facilities;</li> </ul>	<ul style="list-style-type: none"> <li>The employees signing rate of safety contracts is 100%</li> <li>Employee's participation rate of safety training 100%</li> <li>Employee's participation rate of health training 100%</li> </ul>	<p><b>Responsible units:</b> project executing contractor agency,</p> <p><b>Assisting units:</b> Contractor</p>	<ul style="list-style-type: none"> <li>The number of environmental pollution complaints (including dust and noise) received during the construction phase and the handling status</li> <li>Number of safety signs set, or safety notices issued during construction</li> <li>Times of timely repair of damage to public facilities</li> </ul>
<p>N/A. Since the location of coastal protection facilities take place in coastal area, there is no land acquisition and resettlement of local residents due to the infrastructure development.</p>	<p><b>N/A</b></p>		<p><b>N/A</b></p>
<ul style="list-style-type: none"> <li>Appoint a commissioner for women's rights to implement and report on the gender action plan</li> <li>Training on gender action plans is provided to executing agencies and their stakeholders</li> <li>Create at least two management positions for women in the program office</li> </ul>	<ul style="list-style-type: none"> <li>100% training rate of female in institutions</li> <li>2 female staff members in the project office</li> </ul>	<p><b>Responsible units:</b></p> <ul style="list-style-type: none"> <li>executing agency.</li> <li>implementing unit.</li> <li>local governments</li> </ul> <p><b>Assistance units:</b> project office, gender experts.</p>	<ul style="list-style-type: none"> <li>Number of women working in the project office</li> <li>Number of female staff in project implementing unit participating in training</li> <li>Information and activities of staff responsible for women's rights in the project office.</li> </ul>

### **8.4.2. Social Action Plan**

The aim of this social action plan is to ensure that significant social and poverty concerns are tackled as the project is carried out. Putting the plan into action can boost project advantages and decrease negative effects. Any potential negative impacts of a project should be prevented or minimized as much as feasible. Project benefits include vulnerable groups (such as the poor, women, and ethnic minorities). The social action plan stresses social inclusion and equal opportunity to benefit from new economic progress.

To elaborate, this social action plan aims to tackle critical social and poverty-related problems that may arise during the execution of the project. A comprehensive social plan allows project managers to maximize benefits for disadvantaged populations and minimize any potential adverse effects. The plan advocates for socially inclusive growth that uplifts vulnerable groups rather than leaving them behind. Specifically, it calls for safeguarding and promoting the welfare of the impoverished, women, and ethnic minorities through conscious efforts during project roll-out. This involves actively seeking their input, ensuring they can access any new economic opportunities created, and monitoring project activities to rapidly identify and address any disproportionate impacts they may experience. Overall, the plan promotes equitable development - where prosperity is shared across all segments of society regardless of gender, ethnicity, or socioeconomic status. Thoughtful implementation of the social action plan will help the project lift up the disadvantaged rather than inadvertently entrenching inequality. It will lead to broadly shared economic gains rather than uneven outcomes favoring the already well-off. In short, the plan ensures social consciousness permeates every stage of project execution. The social development and gender action plan is shown in Table 8-1.

### **8.4.3. Public Participation and Consultation Plan**

The development of information disclosure and public participation programs is conducted in a participatory way based on extensive field investigations. These programs aim to engage the public and provide transparency, allowing community members to stay informed and have a voice in local projects or initiatives. The programs are created using a collaborative process, where focus groups, interviews, and other field research methods are used to collect input from a diverse cross-section of stakeholders. This grassroots, bottom-up approach ensures the programs accurately address the needs, concerns and values of the public. With substantial field investigations, program developers can craft outreach and engagement strategies that resonate with the community and facilitate meaningful public involvement. Whether it be forums, workshops, digital platforms or other participation channels, the programs are thoughtfully designed to be accessible, interactive and impactful. By developing information disclosure and public participation initiatives in this participatory, research-driven manner, the programs can empower citizens, build public trust and enable constructive dialogue around community issues. The extensive field investigations provide the foundation to create tailored, responsive programs that truly serve local residents. In summary, these thoughtfully-developed, community-centered participation programs promote transparency, engagement and collaboration through a process firmly rooted in on-the-ground research.

Table. 8-3. Social Development and Gender Action Plan

Proposed Activities	Target Group	Responsible and Assist Unit	Budget	Time	Monitoring Indicator
<b>Measures to enhance the project benefits</b>					
<b>A. Socially Inclusive Design</b>					
<ul style="list-style-type: none"> <li>Ensure safe construction and provide a good living environmental for local residents</li> <li>Optimize project design to reduce the negative impact of land expropriation and demolition</li> <li>Ensure that women participate in the consultation and decision-making process related to the design of vocation activities in eco-tourism areas</li> <li>Ensure that working conditions on construction sites (any toilets and washing arrangements, etc) are suitable to be used by women.</li> </ul>	<p><b>Target population:</b> local people</p> <p><b>Goal:</b></p> <ul style="list-style-type: none"> <li>at least 10% of jobs in civil engineering are for women (baseline:0)</li> <li>at least 20% of the jobs in civil engineering go to poor or low-income families (baseline:0)</li> </ul>	<p><b>Responsible Unit:</b> Project implementation unit</p> <p><b>Assistance Unit:</b> Project facility designers, local governments and local community representatives, contractors, gender experts and education authorities.</p>	Project budget	2024	<ul style="list-style-type: none"> <li>Public satisfaction on the ecological environment, social inclusion and business environment.</li> <li>The number of people employed in the local labor force, including representative of poor households and low-income groups.</li> <li>Number of houses and people affected</li> <li>Quantity of work force training (by gender)</li> <li>Wages paid to the local workforce (broken down by gender)</li> <li>The number of green development activities held in selected communities and schools</li> </ul>
<b>B. Increase Economic Opportunities/ Income</b>					
<ul style="list-style-type: none"> <li>Provide training for non-agricultural employment to help local workers find jobs in nearby area, ensure that women have timely access to relevant information</li> <li>Prioritize the use of local building materials and resources, use local products and services (such as housing</li> </ul>	<p><b>Target population:</b></p> <ul style="list-style-type: none"> <li>Local residents, especially those affected and the poor</li> <li>disadvantaged groups and women.</li> </ul>	<p><b>Responsible Unit:</b> Project implementation unit</p> <p><b>Assisting Unit:</b> Project Implementation Unit</p>	Project Budget	2024 - 2025	<ul style="list-style-type: none"> <li>Organized training and skill upgrading activities.</li> <li>Frequency, form and attendance of the training.</li> <li>The frequency of non-agricultural employment information.</li> <li>The contractor buys local materials.</li> </ul>

<p>for labor from outside project area, provision of food and beverages and other supplies) and ensure at least 40% local materials.</p>	<p><b>Goal:</b></p> <ul style="list-style-type: none"> <li>at least 80% of participants are women</li> <li>100% of labors is trained (trainings are given through activities of 3s Project)</li> </ul>				<ul style="list-style-type: none"> <li>Other income generated by the project for local residents.</li> <li>Number of women participating in training and receiving information on labor.</li> </ul>
<p><b>C. Create Jobs Opportunities</b></p>					
<ul style="list-style-type: none"> <li>The project provided full time and temporary jobs during construction and operation.</li> <li>During the operation of the project, permanent jobs were created, of which were women.</li> <li>Ensure that vulnerable groups such as women and the poor are employed, giving priority to non-technical jobs and writing them into contracts.</li> <li>Ecotourism is expected to increase employment demand in horticulture, silvo-fishery and facility maintenance in tourist area, including jobs for women.</li> <li>Establish a service center for entrepreneurship and employment in the Mangrove Ecopark to open up a channel for returning workers to start businesses.</li> </ul>	<p><b>Target population:</b></p> <ul style="list-style-type: none"> <li>Local residents, especially those affected and the poor</li> <li>disadvantaged groups and women.</li> </ul> <p><b>Goal:</b></p> <ul style="list-style-type: none"> <li>30% of non-technical jobs are given priority to local residents.</li> <li>xxx permanent jobs were created, of which xxx were women.</li> <li>Eco-tourism is expected to increase the employment demand in agriculture, silvo-fishery and facilities</li> </ul>	<p><b>Responsible Unit:</b> Local unit</p> <p><b>Assisting Unit:</b> Project Implementation Unit, village committee.</p>	<p>Project Budget</p>	<p>2024 - 2025</p>	<ul style="list-style-type: none"> <li>The number of jobs created by the project</li> <li>The number of jobs available to local residents</li> <li>The number of jobs available to women and the poor</li> <li>Wages paid to local residents</li> </ul>

	maintenance in tourist area.				
<b>Measures to Reduce Potential Risks</b>					
<b>A. Public Participation and Consultation</b>					
<b>3. Public participation and consultation</b> <ul style="list-style-type: none"> <li>Inform and consult local residents, especially those directly affected by the project, about the impact and benefits of the project (Women, poor and vulnerable groups make up no less than 30% of the participants);</li> <li>The situation and progress of civil works, including interference caused by project construction;</li> <li>Encouraging and promoting the participation of women in trainings, vocational skills training and homebound entrepreneurship trainings.</li> <li>For the related meeting of the activity, the target number of participants is 30%.</li> </ul>	<ul style="list-style-type: none"> <li>Local residents, especially women and the poor (at least 30% of participants are women, poor and vulnerable);</li> <li>Make records for appeals;</li> <li>Entrepreneurship training, female participation rate reach 30%;</li> <li>40% of female participate in workshop training. (Base line: 0)</li> </ul>	<b>Responsible units:</b> project implementing unit agency and local government  <b>Assisting units:</b> Local government	<b>Project budget</b>	2024 - 2025	<ul style="list-style-type: none"> <li>The number of consultations and the degree of nondiscriminatory participation of the public (women, the poor and the disadvantaged)</li> <li>Number of complaints received and handling (related records)</li> <li>Project construction progress report</li> <li>Number of female participants in workshop training</li> </ul>
<b>4. Establish a complaint compensation mechanism</b> <ul style="list-style-type: none"> <li>Establish a complaint compensation mechanism in the project area to deal with the complaints of the affected people, and record the complaints and treatment;</li> <li>Ensure that the women's complaint mechanism should be in place to receive and</li> </ul>					

handle complaints and complaints from female workers in the industrial park.					
<b>B. Measures to reduce construction interference and safe construction</b>					
<ul style="list-style-type: none"> <li>Control dust to prevent pollution; Restrictions on night construction; Strictly follow the noise, dust and vibration control standards;</li> <li>Strengthen construction safety, provide safe roads and canals, set up appropriate safety signs;</li> <li>Avoiding damage to public water, electricity, drainage and irrigation facilities;</li> </ul>	<ul style="list-style-type: none"> <li>The employees signing rate of safety contracts is 100%</li> <li>Employee's participation rate of safety training 100%</li> <li>Employee's participation rate of health training 100%</li> </ul>	<p><b>Responsible units:</b> project executing agency, contractor</p> <p><b>Assisting units:</b> Contractor</p>	Project Budget, Environmental Management Plan	<b>2024 - 2025</b>	<ul style="list-style-type: none"> <li>The number of environmental pollution complaints (including dust and noise) received during the construction phase and the handling status</li> <li>Number of safety signs set, or safety notices issued during construction</li> <li>Times of timely repair of damage to public facilities</li> </ul>
<b>C. Land acquisition and resettlement</b>					
N/A. Since the location of coastal protection facilities take place in coastal area, there is no land acquisition and resettlement of local residents due to the infrastructure development.	N/A				N/A
<b>D. Institutional strengthening and capacity building measures</b>					
<ul style="list-style-type: none"> <li>Appoint a commissioner for women's rights to implement and report on the gender action plan</li> <li>Training on gender action plans is provided to executing agencies and their stakeholders</li> <li>Create at least two management positions for women in the program office</li> </ul>	<ul style="list-style-type: none"> <li>100% training rate of female in institutions</li> <li>2 female staff members in the project office</li> </ul>	<p><b>Responsible units:</b></p> <ul style="list-style-type: none"> <li>executing agency.</li> <li>implementing unit.</li> <li>local governments</li> </ul> <p><b>Assistance units:</b> project office, gender experts.</p>	<b>Project Budget &amp; Government funds</b>	<b>2024 - 2025.</b>	<ul style="list-style-type: none"> <li>Number of women working in the project office</li> <li>Number of female staff in project implementing unit participating in training</li> <li>Information and activities of staff responsible for women's rights in the project office.</li> </ul>

Stakeholders	Participating Target		Participation Method		Time		Budget
	Participating Reason	Form and Depth of Participation	Methods	Responsibility Party	Start	End	
<ul style="list-style-type: none"> <li>• Executing agency/implementing agency/project office</li> <li>• Provincial government of Central Java</li> <li>• Regency government of Pekalongan</li> <li>• Other relevant agencies/organizations (including contractors and NGOs)</li> </ul>	<ul style="list-style-type: none"> <li>• Key officials and staff are directly responsible for project implementation and supervision</li> <li>• Understand the outputs/contents and activities of project implementation and monitoring, implementation</li> <li>• schedules/schedules, budgets and specific functions of the agency</li> <li>• Raise the awareness of implementing agencies/executing agencies/project offices of the bank's safeguards policy statement, as well as its resettlement and social action plans.</li> <li>• Understand other relevant policies such as procurement and prepare to submit progress monitoring reports to the bank.</li> <li>• Community environment/green education</li> <li>• Self-monitoring and management of</li> </ul>	<ul style="list-style-type: none"> <li>• Information sharing and regular meetings;</li> <li>• Consulting</li> <li>• Training course,</li> <li>• Shared decision-making</li> <li>• and responsibility</li> </ul> <p>Participation level: high</p>	<p>Meeting Training</p>	<p>The executing agency/implementing agency coordinates with other PMOs/implementing unit staff through the PMOs (social and gender commissioner). With the assistance of social and gender expert consultants and other consultants retained by PMOs</p>	2024	2025	



	community green behavior						
Affected persons and affected households	<ul style="list-style-type: none"> <li>• Representatives of government agencies of Central Java in Semarang and regency level in Pekalongan are responsible for decision-making and assisting in project implementation</li> <li>• Identify the role of each organization during project implementation and provide support during project implementation and operation.</li> <li>• Coordinate projects with existing programs/programs of government agencies.</li> <li>• To enable the relevant institution/implementing institution to express its needs/concerns and/or clarify matters to ensure timely</li> <li>• implementation of project outputs/content in accordance with</li> <li>• the AF-approved plan</li> <li>• Self-monitoring and management of community green behavior</li> </ul>	<ul style="list-style-type: none"> <li>• Regular meetings</li> <li>• Consultation and join decision-making</li> <li>• Public consultations</li> </ul>					

<p>Contractor &amp; sub-contractor</p>	<p>Contractors bidding on development projects funded by the Adaptation Fund (AF) must be aware of and comply with the institution's environmental and social framework, known as the Safeguards Policy Statement. This policy outlines mandatory requirements to identify, avoid, minimize, or mitigate harms to people and the environment.</p> <ul style="list-style-type: none"> <li>• A core tenet is the "do no harm" principle, meaning projects should not leave people or the environment worse off. To uphold this, AF requires assessments of environmental and social risks and impacts. This includes evaluating effects on the natural habitat, pollution, indigenous peoples, and involuntary resettlement.</li> <li>• Explains AF policies on gender and development, gender mainstreaming and gender-specific indicators, and social action plan monitoring/reporting.</li> </ul>	<ul style="list-style-type: none"> <li>• Information sharing</li> <li>• Consultation, joint decision-making, share responsibility and control</li> </ul> <p>Participation level: High</p>	<p>Meetings, group discussions, public consultations.</p>	<ul style="list-style-type: none"> <li>• Pekalongan Municipal government</li> <li>• KEMITRAAN PMU 3S Project Pekalongan</li> <li>• Expert on social and gender issues</li> </ul>	<p>2024</p>	<p>2025</p>	
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	<ul style="list-style-type: none"> <li>Contractors are encouraged to hire local women, low-income families and other vulnerable groups for civil works.</li> </ul>						
Women	<ul style="list-style-type: none"> <li>Support gender mainstreaming and ensure that women benefit from the project.</li> <li>Knowledge of projects, activities and outputs.</li> <li>Ensuring participation of women and their ability to participate in consultations and benefit from projects, learn about job opportunities, training activities.</li> </ul>	<ul style="list-style-type: none"> <li>Information sharing</li> <li>Consultation, joint decision-making</li> </ul> <p>Participation level: High</p>	Meetings, group discussions, public consultations.	<ul style="list-style-type: none"> <li>Pekalongan Municipal government</li> <li>KEMITRAAN PMU 3S Project Pekalongan</li> </ul> <p>Expert on social and gender issues</p>	2024	2025	

**Table 8-4. Stakeholder Communication, Consultation and Participation Planning**

Stakeholders	Participating Target		Participation Method		Time		Budget
	Participating Reason	Form and Depth of Participation	Methods	Responsibility Party	Start	End	
<ul style="list-style-type: none"> <li>• Executing agency/implementing agency/project office</li> <li>• Provincial government of Central Java</li> <li>• Regency government of Pekalongan</li> <li>• Other relevant agencies/organizations (including contractors and NGOs)</li> </ul>	<ul style="list-style-type: none"> <li>• Key officials and staff are directly responsible for project implementation and supervision</li> <li>• Understand the outputs/contents and activities of project implementation and monitoring, implementation</li> <li>• schedules/schedules, budgets and specific functions of the agency</li> <li>• Raise the awareness of implementing agencies/executing agencies/project offices of the bank's safeguards policy statement, as well as its resettlement and social action plans.</li> <li>• Understand other relevant policies such as procurement and prepare to submit progress monitoring reports to the bank.</li> <li>• Community environment/green education</li> <li>• Self-monitoring and management of</li> </ul>	<ul style="list-style-type: none"> <li>• Information sharing and regular meetings;</li> <li>• Consulting</li> <li>• Training course,</li> <li>• Shared decision-making</li> <li>• and responsibility</li> </ul> <p>Participation level: high</p>	Meeting Training	The executing agency/implementing agency coordinates with other PMOs/implementing unit staff through the PMOs (social and gender commissioner). With the assistance of social and gender expert consultants and other consultants retained by PMOs	2024	2025	

	community green behavior						
Affected persons and affected households	<ul style="list-style-type: none"> <li>Representatives of government agencies of Central Java in Semarang and regency level in Pekalongan are responsible for decision-making and assisting in project implementation</li> <li>Identify the role of each organization during project implementation and provide support during project implementation and operation.</li> <li>Coordinate projects with existing programs/programs of government agencies.</li> <li>To enable the relevant institution/implementing institution to express its needs/concerns and/or clarify matters to ensure timely</li> <li>implementation of project outputs/content in accordance with</li> <li>the AF-approved plan</li> <li>Self-monitoring and management of community green behavior</li> </ul>	<ul style="list-style-type: none"> <li>Regular meetings</li> <li>Consultation and join decision-making</li> <li>Public consultations</li> </ul>					

<p>Contractor &amp; sub-contractor</p>	<p>Contractors bidding on development projects funded by the Adaptation Fund (AF) must be aware of and comply with the institution's environmental and social framework, known as the Safeguards Policy Statement. This policy outlines mandatory requirements to identify, avoid, minimize, or mitigate harms to people and the environment.</p> <ul style="list-style-type: none"> <li>• A core tenet is the "do no harm" principle, meaning projects should not leave people or the environment worse off. To uphold this, AF requires assessments of environmental and social risks and impacts. This includes evaluating effects on the natural habitat, pollution, indigenous peoples, and involuntary resettlement.</li> <li>• Explains AF policies on gender and development, gender mainstreaming and gender-specific indicators, and social action plan monitoring/reporting.</li> </ul>	<ul style="list-style-type: none"> <li>• Information sharing</li> <li>• Consultation, joint decision-making, share responsibility and control</li> </ul> <p>Participation level: High</p>	<p>Meetings, group discussions, public consultations.</p>	<ul style="list-style-type: none"> <li>• Pekalongan Municipal government</li> <li>• KEMITRAAN PMU 3S Project Pekalongan</li> <li>• Expert on social and gender issues</li> </ul>	<p>2024</p>	<p>2025</p>	
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	<ul style="list-style-type: none"> <li>Contractors are encouraged to hire local women, low-income families and other vulnerable groups for civil works.</li> </ul>						
Women	<ul style="list-style-type: none"> <li>Support gender mainstreaming and ensure that women benefit from the project.</li> <li>Knowledge of projects, activities and outputs.</li> <li>Ensuring participation of women and their ability to participate in consultations and benefit from projects, learn about job opportunities, training activities.</li> </ul>	<ul style="list-style-type: none"> <li>Information sharing</li> <li>Consultation, joint decision-making</li> </ul> <p>Participation level: High</p>	Meetings, group discussions, public consultations.	<ul style="list-style-type: none"> <li>Pekalongan Municipal government</li> <li>KEMITRAAN PMU 3S Project Pekalongan</li> </ul> <p>Expert on social and gender issues</p>	2024	2025	



## 9. GRIEVANCE REDRESS MECHANISM AND MONITORING

During the construction and implementation phases of any project, a person or group of people can be adversely affected, directly or indirectly due to the project activities. The grievances that may arise can be related to social issues such as eligibility criteria and entitlements, disruption of services, temporary or permanent loss of livelihoods and other social and cultural issues. Grievances may also be related to environmental issues such as excessive dust generation, damages to infrastructure due to construction related vibrations or transportation of raw material, noise, traffic congestions, decrease in quality or quantity of private/ public surface/ ground water resources during irrigation rehabilitation, damage to home gardens and agricultural lands etc.

Should such a situation arise, there must be a mechanism through which affected parties can resolve such issues in a cordial manner with the project personnel in an efficient, unbiased, transparent, timely and cost-effective manner. To achieve this objective, a grievance redress mechanism has been developed and is being implemented as part of the project.

**A Grievance Redress Mechanism (GRM) has been developed and is designed to be problem-solving mechanism with voluntary good-faith efforts. The GRM has been available to the community during the project development phase.** It is in the process of being updated to better meet the needs of the project/community as implementation progresses and the updated GRM will be in place by the time the ESIA is disclosed. The GRM is a living system and will be reviewed and revised as required throughout the life cycle of the project.

The Grievance Redress Mechanism is not a substitute for the legal process. The Grievance Redress Mechanism will as far as practicable, try to resolve complaints and/or grievances on terms that are mutually acceptable to all parties. When making a complaint and/or grievance, all parties must act at all times, in good faith and should not attempt to delay and or hinder any mutually acceptable resolution.

All complaints and/or grievances regarding social and environmental issues are able to be received either orally (to the field staff), by phone, in the complaints box or in writing to the KEMITRAAN 3S project team or the Construction Contractor. A key part of the grievance redress mechanism is the requirement to maintain a register of complaints and/or grievances received at the respective project site offices. All complainants shall be treated respectfully, politely and with sensitivity.

### 9.1. Grievance Procedures

During the implementation of this project, public participation will always be emphasized, and the appeal mechanism will be established. The public complaint procedure is as follows:

**Phase 1:** If affected people has concern or question on the project, he/she can file an oral or written appeal to Kemitraan Project Office, Contractor, Kandang Panjang & Bandengan Village Representative (neighborhood); if it is an oral appeal, the village (neighborhood) committee shall make the appropriate treatment and record it in writing. Kemitraan Project Office, the village (neighborhood) committee of Kandang Panjang & Bandengan Representative, shall resolve

within 1 week;

**Phase 2:** If affected people are dissatisfied with the processing decision of Phase 1, he/she can lodge an appeal to Kemitraan Project Office in Pekalongan after receiving the decision; Kemitraan Project Office should make a decision within two weeks;

**Phase 3:** If the affected people are still dissatisfied with the processing decision of Phase 2, they can file an appeal to Kemitraan Headquarter Office in Jakarta and Public Works Service and Resettlement Office in Pekalongan after receiving the decision; Kemitraan Headquarter Office in Jakarta and Public Works Service and Resettlement Office in Pekalongan should make a decision within 2 weeks

At any stage, if the affected people are dissatisfied with the existing grievance procedure, and the dissatisfaction is resolved, the affected person can directly sue to the civil court according to national regulation.

## 9.2. Complaint Principles

Relevant units at PMU should abide by the following principles in the process of appeals and complaints:

- 1) There are specialized personnel in the PMU and relevant agencies (such as Public works service at regency level) responsible for keeping the complaint letters, and there is a special person to organize and record the oral opinions, and require that each level of complaints and complaints shall be effectively answered in a timely manner within two weeks;
- 2) All agencies (PMU, appointed representative of village, and public works service at regency level) shall accept public complaints and appeals free of charge, and the reasonable costs incurred will be paid from the project's unforeseen fees.
- 3) These appeal procedures shall be effective throughout the project construction period to ensure that the public can use them to deal with related issues. The above appeal channels shall be notified to the public through the participation process of the public meeting. At the same time, the complaint and appeal process shall be announced through the media.
- 4) During the implementation of the project, the relevant departments involved in the complaint and grievance shall register and manage the complaint materials and the results of the processing. PMU as the project owner shall collect the complaint and grievance cases and materials related to the project in a timely manner and report the project in written materials once a month do. The PMU will conduct regular checks on the registration of complaints. In order to completely record the complaints of the affected people and the handling of related issues, the PMU will develop a registration form for the complaints and appeals of the affected people. See Table 9-1 for sample table format.

**Table 9.1 Sample of complaint registration form**

Name of complainant		Time	
Receiving unit		Location	
The content of complain			
Demanded solution			
Proposed solution			
Actual handling situation			
Complainant (signature)		Recorder (signature)	
<p>Note:</p> <ol style="list-style-type: none"> <li>1. The recorder shall truthfully record the contents and requirements of the complainant's complaint.</li> <li>2. The appeal process shall not be subject to any interference or obstacles.</li> <li>3. The proposed solution shall reply to the complainant within the prescribed time.</li> </ol>			

### 9.3. Contact Information for Complaints

The PMU and local government functional offices will arrange a person in charge to receive and handle the complaints and appeals of the affected populations. See table 9.2 for the names and contact numbers of the agencies and their responsible persons.

**Table 9.2. Information of agencies and personnel for receiving complaint and grievance of affected persons**

Unit	Person In Charge (PIC)	Contact Number
KEMITRAAN – Jakarta Office	Hindijani Novita	62 21 72799566, ext. 121
3S Project Pekalongan	Andi Kiky	TBD
Public Works & Public Housing Pekalongan Regency Office	TBD	TBD
Kandang Panjang Village Representative (head of village)	Ahmad Fauzan	TBD
Bandengan Village Representative (head of village)	Muh. Rusman Aji, SE	TBD
Project Contractor	TBD	TBD

## 9.4. Monitoring and Evaluation

A comprehensive monitoring system should be established during the construction phase of the project to guarantee that all goals and objectives are fully accomplished. For the duration of project implementation, the village district office responsible for oversight will conduct evaluations every 6 months, reporting their findings to the 3S PMU Project Management Office. At minimum, one dedicated staff member should be appointed to carry out monitoring and assessment activities under the guidance of an experienced consultant. If the designated monitor lacks prior involvement with tracking and reviewing social action plans for comparable initiatives, the expert consultant should provide the necessary training in M&E methods and best practices. This staff member will be accountable for producing the monitoring and evaluation report, a key component of the overall project progress update that gets submitted to the municipal authorities in Pekalongan. Hands-on supervision and routine checks at each stage of the project lifecycle ensures that desired impacts are achieved, implementation stays on track, and any issues are caught early and quickly corrected. With proper M&E protocols in place, the county will be well-positioned to deliver a successful, high-quality project that fully accomplishes its intended purpose.

### 9.4.1. Social Monitoring and Management Plan (SMMP)

Following the requirement of AF, once KEMITRAAN as the National Implementing Entity has identified potential impacts and risks of a project through environmental and social impact assessments, AF will require formulation of management measures to reduce or mitigate any negative impacts to be brought by the Project and included in relevant social management plan. If the National Implementing Entity lacks capacity to implement SMMP, relevant capacity strengthening activities will be included in the Project.

According to the social impact assessment for the proposed Project, various issues were identified, such as gender issue, vulnerable groups, interests of employees of project company, and labor management among participating contractors, GRM, as well as potential negative impacts during project constructions, and other unidentified impacts. While the major benefits of the proposed Project will be by 2025 when project is completed, at least more temporary employment opportunity will be created. This will directly benefit the local residents of Kandang Panjang and Bandengan. The main purpose of social management plan is to ensure project implementation will maximize social benefits and minimize potential negative impacts. Table 9-3 below provide the social monitoring and management plan of Rubble Mound breakwater project.

**Table 9-3. Social Impact Monitoring and Management Plan (SMMP)**

Social Impact	Agencies Involved	Time	Responsible Staff	Monitored by	Frequency
Functions of different implementation agencies	PMU, contractors, and local government agencies	Before and during project implementation	Appointed PMU staff	Monitoring team*	Twice a year
Further consultations with local communities and local government agencies	PMU, village and sub-district representatives	Before and during project implementation	Appointed PMU staff	Appointed PMU staff	Twice a year
Issues concerning vulnerable groups in project areas	PMU, village and sub-district representatives	Before and during project implementation	Appointed PMU staff	Appointed PMU staff	Twice a year
Issues and records of GRM concerning complaints from employees and project workers	PMU, village and sub-district representatives	Before and during project implementation	Appointed PMU staff	Appointed PMU staff	Twice a year
Issues and records of GRM concerning complaints related with project impacts during construction and operation.	PMU, contractors and local government at regency level	Before and during project implementation	Appointed PMU staff	Appointed PMU staff	Twice a year
Increasing Employment opportunities by the Project	PMU, contractor, village government	During and after project construction	Appointed PMU staff & contractors	Appointed PMU staff	Twice a year

\* Monitoring team may consist of local government at village and regency levels

## 10. CONCLUSION

- Pekalongan is a city with a high level of vulnerability, danger and risk due to the impacts of climate change. The influence of global warming has an impact on the loss of natural coastal protection. The Pekalongan City Government has continued its efforts for almost 2 decades to control damage to coastal areas using various technologies, both biological technology and construction engineering. The Pekalongan City Government will continue to take various

steps to protect coastal areas from coastal erosion. Engineering models for wave control construction technology in the form of sea walls, revetments, groynes, jetties or breakwaters, groynes parallel to the coast, and sea embankments and others. These efforts are made to protect beaches and coastlines from damage by abrasion, intrusion and coastal protection

- The preparation of Environmental Document in the form of ESIA for Breakwater Construction aims to carry out a study on safeguarding and protecting the coastal environment. This is based on the fact that environmental protection and management is a joint responsibility and task of all elements of development, including government, society and partnership elements from the business world, NGOs and others.
- Since the construction work will be conducted in sea shore area, possible negative impacts due to land acquisition and voluntary resettlement are not in place. When construction projects require acquiring land or resettling people, it can lead to major disruptions and hardships for local communities if not managed carefully. However, in this case, the project location along the seashore avoids these risks. As no existing settlements or private land ownership are present in the intertidal zone or open waters, the builders will not need to negotiate with residents or purchase occupied properties. There will be no demolition of homes, loss of assets, or forced relocation of families to make way for the new development. The shoreline habitat is uninhabited, so the builders can proceed freely without causing displacement, compensation issues or community resistance. While the oceanfront setting has other environmental impacts to consider, the lack of human activity and infrastructure means the project will avoid negative social impacts related to land rights and resettlement. Overall, choosing this previously undeveloped shoreline location helps prevent the human upheaval and disruptions to livelihoods that often accompany acquisition of inhabited land for major construction projects. With no communities to displace, the contractors can focus their impact mitigation efforts on protecting the natural coastal ecological environment.
- The government at the local level (village level) and regency level pay close attention to the work of vulnerable groups and women. Their basic rights and interests will be protected in process of social economic development. All ethnic groups live and work together. The society is harmonious and stable without any social risk.
- The local and regency governments place a strong emphasis on safeguarding the rights and wellbeing of vulnerable groups and women in their jurisdictions. At the village level, officials make concerted efforts to ensure the basic needs and interests of marginalized community members are protected as social and economic development initiatives are undertaken. This includes the elderly, disabled, impoverished, and other groups who may not have a strong voice in local affairs. Regency leaders have implemented policies and programs aimed at upholding women's rights, providing educational and vocational training opportunities, and facilitating access to healthcare services. By prioritizing inclusivity, the goal is to enable all citizens, regardless of gender, ethnicity, age, or background, to actively participate in and benefit from the progress being made.
- At both the village and regency levels, there is a focus on promoting harmony and stability between the area's diverse mix of ethnic groups. Leaders encourage open dialogue and cooperation between groups, rather than division. Members of different ethnic communities



are given opportunities to live and work alongside one another through integrated neighborhoods, workplaces, and schools. By building understanding and camaraderie, the various groups develop strong interpersonal bonds and a shared sense of identity as residents of their village or regency. This reduces social tensions and conflict while fostering a climate of mutual respect and collaboration.

- Through these measures to protect vulnerable groups and facilitate ethnic integration, the local and regional governments aim to create a cohesive, fair, and inclusive society. With citizens' basic needs met and social equity prioritized, the likelihood of instability, unrest, and risk is significantly reduced. People feel invested in and protected by their leadership and community, working together to drive continued development.
- The project has very little effect on the environment. The project's environmental management plan will be closely adhered to while it is being implemented. There are several reasons why the project's environmental impact is minimal. First, a comprehensive environmental management plan was developed during the planning stages to identify any potential hazards or risks and outline steps to mitigate them. This plan will be carefully followed at each stage of implementation to ensure no unforeseen environmental damage occurs. Second, the project incorporates green building practices, and a minimal footprint to reduce its ecological impact. Sustainable materials, responsible waste disposal practices, and conservation of natural features on the site are all priorities. Third, there is a strong appeals process in place for any concerned stakeholders to voice objections or request interventions. This transparency ensures environmental stewardship remains a priority. Fourth, regular monitoring and audits will identify any issues arising so they can be addressed proactively. With proper oversight and commitment to the management plan, the project's social and environmental hazards will remain under control. The developers have taken a conscientious approach to minimizing ecological disruption. While no large-scale infrastructure project is without impacts, this one has worked to reduce its footprint and operate responsibly within the bounds of its environmental plan.
- The project to reshape the shoreline and collect silt along the coastal area of Kandang Panjang would provide numerous benefits for the region's environment and economy. By enabling conditions for mangroves to grow and flourish along the coast, the project would restore vital habitat that protects the shoreline from erosion and storm surge. Mangrove forests are highly effective at trapping sediment and stabilizing the substrate with their intricate root systems. This allows the coastline to build up naturally over time. In addition, mangroves provide shelter and breeding grounds for many species of fish, crabs, and other marine life, bolstering biodiversity. As the mangroves expand, they will draw in more tourists eager to explore these unique coastal wetlands and observe wildlife. Local communities could capitalize on this ecotourism potential by offering mangrove boardwalks and eco-educational programs. Visitors interested in conservation and nature would flock to Kandang Panjang to immerse themselves in the mangrove forests, providing a significant boost to the local economy. Reshaping the shoreline to enable mangrove growth is a farsighted plan that would yield ecological and economic dividends for many years to come through habitat restoration,



ecotourism revenue, and community revitalization. With careful project implementation, Kandang Panjang's mangroves and coastal communities could thrive once again.

- The project's local benefits may result in more options for residents to find temporary work and higher incomes.

## **Appendix 1. Term of Reference SIA Consultant**

**Terms of Reference Template  
for Consultant Recruitment**

<b>I. Informasi Posisi</b>	
Program	: Melindungi-Mempertahankan-Melestarikan menuju Ketahanan Iklim: Pendekatan 3S untuk Membangun Ketahanan Kota Pesisir terhadap Dampak Perubahan Iklim dan Bencana Alam di Kota Pekalongan, Provinsi Jawa Tengah
Durasi	: 2 bulan
Unit	: SGS
Report to	: Team Leader AF Pekalongan
Job title	: Konsultan Pelaksana <i>Social Impact Assessment (SIA)</i> Program AF Pekalongan
<b>II. Latar Belakang</b>	
<p>KEMITRAAN melalui pelaksana PMU AF Pekalongan dengan skema pendanaan Adaptation Fund (AF) saat ini sedang menjalankan program melalui pendekatan 3S (Melindungi-Mempertahankan-Melestarikan) menuju Ketahanan Iklim, yang selanjutnya disebut Program AF Pekalongan. Program AF pekalongan mengintervensi Kota Pekalongan secara umum dan secara khusus berada di 8 kelurahan dalam 2 kecamatan; yaitu kelurahan Pasir Kraton Kramat (Kecamatan Pekalongan Barat), kelurahan Padukuhan Kraton, Kandang Panjang, Bandengan, Degayu, Panjang Wetan, Panjang Baru dan Krapyak (Kecamatan Pekalongan Utara).</p> <p>Untuk mengimplementasikan rangkaian pendekatan tersebut, khususnya di sejumlah lokasi kerja, terdapat 2 bagian intervensi, yakni berbentuk <i>soft structure</i>, seperti pemberdayaan masyarakat, peningkatan kapasitas dan penguatan kelembagaan pada sosial – ekonomi. Sedangkan, <i>hard structure</i> terdiri dari pembangunan MCK, TPST, sarpras Ekowisata dan <i>breakwater</i>. Diharapkan, fokus implementasi dimaksud dapat mempersiapkan serta sekaligus menjadi modalitas dalam menumbuhkan kemandirian masyarakat maupun pemerintah setempat yang berketahanan iklim.</p> <p>Tentunya, niat baik ini perlu diiringi dengan dukungan yang kuat di tingkat kebijakan dalam perencanaan dan penganggaran yang tersinergi antara pemerintah Kota Pekalongan, Provinsi hingga Pusat yang sejauh ini telah difasilitasi dan disatukan dalam Rencana Aksi Daerah (RAD API) sebagai acuan bagi pihak-pihak tersebut. Dengan demikian, pasca pelaksanaan program kedua intervensi yang dijelaskan sebelumnya masuk pada bagian aksi yang terus berlanjut ke depannya di Kota Pekalongan.</p> <p>Namun demikian, tantangan dalam mewujudkan hasil yang dicapai serta upaya memastikan keberlanjutan memerlukan kajian mendalam, terutama dalam kaitannya dengan dampak sosial masyarakat. Hal ini selain sebagai salah satu upaya mitigasi dampak sosial serta syarat persetujuan yang akan menopang pembangunan <i>breakwater</i>. Hal ini terlepas dari hasil kajian teknis yang menunjukkan pembangunan fisik (<i>breakwater</i>) akan memberikan efek positif terhadap pembentukan sedimentasi dan bermanfaat bagi pelestarian tanaman mangrove di wilayah Pekalongan <i>Mangrove Park (PMP)</i> di Kota Pekalongan.</p>	

### **Purpose**

To provide explanation of investigation or irregular issues and the follow-ups.

### **Scope**

Irregular issues in the Partnership

### **Reference**

1. ISO 9001:2015 Quality management system requirements  
Clause 8.7 Control of nonconforming outputs

### **Definition**

*Originator* is the personnel identifying the nonconforming service and/or the nonconformities.

*Nonconforming service* is a service which does not conform to the service requirements which must be identified and controlled to prevent its unintended use or delivery.

*Nonconformities* are the non-fulfillment of the quality requirements planned within the organization standard.

*Correction* is the effort taken, regarding the nonconformities encountered to restore the problems/nonconformities back to its ideal condition.

*Corrective action* is the action taken, regarding the nonconformities encountered to eliminate the cause of nonconformities in order to prevent recurrence.

*Document controller* is personnel given the responsibility to receiving new documents, retrieving obsolete documents, and distributing the documents.

*MR* stands for Management Representative(s).

### **Process**

1. Originator reports to unit head with evidence.
2. Unit head evaluates and judge the problems' magnitude.
3. When the problem indeed needs special actions to take, unit head brings the problems to Directors and asks for advice.
4. Directors analyze the problems and whenever necessary, with advices from Senior Advisors, send Project Committee Review or assigned team to investigate.
5. If the investigations require the personnel to travel, then assigned team returns with FR.GS.10 Back-to-Office Report.
6. Assigned team reports to Directors and if it's needed, Directors call for an emergency meeting with all relevant units.
7. When it is caused by deficiency of internal system, then SOP.MS.07 System improvement must be executed.
8. When no deficiency of internal system identified as root cause of problems, then any actions decided and taken should be recorded in the minutes of meeting.



## **kemitraan Partnership for Governance Reform in Indonesia**

partnership

Number : SOP.PR.03 Title : Complaint Handling  
Issued date : 06 August 2018 Rev. : 02

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### **Purpose**

To provide guidance and procedures of receiving, handling and resolving complaints addressed to the organization.

### **Scope**

Any complaints concerning the organization, the people, the performance and projects funded by Kemitraan considered as dissatisfaction or deficiency of a process performance/service and inconformity to relevant requirements

### **Reference**

1. ISO 9001:2015 Quality management system requirements
  - Clause 8.2.1 Customer satisfaction
  - Clause 8.5.2 Corrective actions
  - Clause 8.5.3 Preventive actions
2. Manual of Policies and Procedures and Internal Control Framework

### **Standards of Service**

Kemitraan aims to provide all its stakeholders with the highest standards of service and compliance. If Kemitraan and or its implementing partner fail to provide the expected performance, a complaint or concern from stakeholders will be taken care seriously and must be responded properly then an improvement plan must be in place.

### **Principles**

Basic principles must be observed fairness, accessibility, responsiveness, efficiency and integration

### **Definition**

A *complaint* is an expression of dissatisfaction by one or more persons of Kemitraan and or its partner's performance, services, action, treatment or works. This could include, but not limited to:

- A failure to provide information or give the correct information;
- An unsatisfactory level of service, including delays and non-delivery of service; irrelevant projects or activities
- Dealing with negative impacts caused by project implementation due to lack of safeguarding on financial fiduciary, environment, social, health and safety protection
- A failure to follow Kemitraan's core values and agreed policies and procedures; such as fraud, dishonesty, conflict of interest, misused of organization property etc.

## Purpose

To provide guidance and procedures of receiving, handling and resolving complaints addressed to the organization.

## Scope

Any complaints concerning the organization, the people, the performance and projects funded by KEMITRAAN considered as dissatisfaction or deficiency of a process performance/service and inconformity to relevant requirements

## Reference

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- A failure to provide information or give the correct information;
- An unsatisfactory level of service, including delays and non-delivery of service; irrelevant projects or activities
- Dealing with negative impacts caused by project implementation due to lack of safeguarding on financial fiduciary, environment, social, health and safety protection
- A failure to follow KEMITRAAN's core values and agreed policies and procedures; such as fraud, dishonesty, conflict of interest, misused of organization property etc.
- The behavior of staff, consultant, implementing partners, vendors or contractors contracted by KEMITRAAN including the case of discrimination, harassment or abuse of power

*Originator* is the personnel identifying the nonconforming service and/or the nonconformities.

*Complaint Officer (CO)* is a person assigned to administer and manage complaint from receiving, maintaining record, communicating to relevant unit/officer, responding and closing the case

*Nonconforming service* is a service which does not conform to the service requirements which must be identified and controlled to prevent its unintended use or delivery.

*Nonconformities* are the non-fulfillment of the quality requirements planned within the organization standard.

*Correction* is the effort taken, regarding the nonconformities encountered to restore the

problems/nonconformities back to its ideal condition.

*Corrective action* is the action taken, regarding the nonconformities encountered to eliminate the cause of nonconformities in order to prevent recurrence.

*An investigation team* is a team established by the Executive Director comprising of at least 3 persons to investigate the complaint and find solution addressing the complaint. A staff subject of the complaint must not be part of an investigation team.

#### Channel of Complaints

KEMITRAAN opens access to complaints through various means including:

Means	Address	Contact Person	Remark
Telephone	62 21 72799566, ext. 121	Hindijani Novita	Complaint Officer
Email	<a href="mailto:hindijani.novita@KEMITRAAN.or.id">hindijani.novita@KEMITRAAN.or.id</a> or <a href="mailto:director@KEMITRAAN.or.id">director@KEMITRAAN.or.id</a>	Hindijani Novita Budi Santoso	
Mail	KEMITRAAN, Jl Wolter Monginsidi no 3, Kebayoran Baru, Jakarta Selatan 12110 – Indonesia	Hindijani Novita	
Fax	62 21 7205260	Hindijani Novita	
Social Media (WA)	081381600702	Hindijani Novita	
Website	<a href="http://www.KEMITRAAN.or.id/complainthandling">www.KEMITRAAN.or.id/complainthandling</a>		
Face to Face contact	Any KEMITRAAN staff	Any KEMITRAAN staff	Face to face or in writing

#### Process

1. Complaint Officer (CO) receives complaints through post-mail, emails, websites, social media, verbal complaints to KEMITRAAN's staff etc.
2. CO registers the complaints in FR.PR.01 Complaint Register and acknowledges receiving the complaint and inform the originator that within **5 working days** at the latest the complaint will be resolved.
3. If the complaint needs an immediate solution, CO immediately consults relevant officer/unit and send a resolution.
4. When CO is able to solve directly the complaints itself, then proceed to step 8
5. When CO can't solve the complaints, CO forwards and consults the complaint to relevant officer/unit via email. If the resolution may need an investigation, the CO reports to Operations and Executive Directors for establishing a investigating team.

6. Relevant officer/unit confirms receiving the complaint information from CO by replying the email.
7. Emails should cover all correspondences relating complaints.
8. Relevant unit/department or investigation team **must** prepare immediate answer to the complaint in **3** (three) working **days** by the latest and send to CO. If the complaint needs an immediate response, the complaint must be addressed on the same day, during working hours. If the time frame cannot be met, CO must inform the originator about the expected
9. The CO responds to the originator based on the clarification or answer prepared by relevant officer/unit. If the response is too technical and only concerned officer/unit who is familiar with the issues, the concerned staff or unit is also included in the email communication so they can directly clarify or respond if needing further feedbacks.
10. If the response does not satisfy the originator, repeat the steps as above
11. CO maintains and updates the status of the complaint in the log book
12. Relevant complaints and feedbacks are disseminated to all staff or relevant department for lesson learnt and improvement. At least during the management meeting held on a monthly basis, the CO shares and updates the progress of complaints
13. If there is a need of policy change or possible legal process, Directors and Legal Advisor must be involved in preparing solutions.
14. All feed-back must be disseminated to relevant department
15. End of process.

### **Records**

1. FR.PR.01 Complaint register



### Appendix3. Flowcharts: Complaint handling

#### Distribution

General  
Revision history

Revision	01
Issue date	27 April 2015
Details	First revision
Prepared by	Hindijani Novita
Approved by	Budi Santoso

Revision	02
Issue date	06 August 2018
Details	Reference adjustment - upgrading to ISO 9001:2015 requirements.
Prepared by	
Approved by	

#### FLOWCHART: Complaint handling

